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A TREATISE
ON
GYNAECOLOGY,
CLINICAL AND OPERATIVE.

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PREFATORY NOTE.

The present translation of Dr. Pozzi's work has been made from proof sheets of a New Edition which have been supplied as ready by the publishers. The Society is indebted both to them and to the author for their zealous co-operation in this matter. In order to avoid delay in the issue of the book, the translation has been entrusted to several different hands. By far the larger part of it has been done by Dr. Lazarus Barlow and Mr. Leonard Mark. The remaining portion of the book is well advanced in preparation, and Vol. II. will be issued very shortly.
TREATISE ON GYNECOLOGY,

CLINICAL AND OPERATIVE.

BOOK I.

ANTISEPSIS—ANÆSTHESIA—MODES OF PROCURING UNION AND OF ARRESTING BLEEDING—DRAINAGE AND PLUGGING.

CHAPTER I.

ANTISEPSIS IN GYNECOLOGY.


The rules of antisepsis established for general surgery are, one and all, applicable in gynaecology; nevertheless, there are certain special details and procedures on which it may be well to lay some stress. I shall consider these in two sections: the first relating to operations performed per vias naturales, on the vagina, the cervix, and the uterine cavity; and the second to operations performed after opening the abdomen, viz., laparotomies. Afterwards I shall indicate the methods of preparation and of keeping the usual ligature and suture materials.

Operations performed per vias naturales.—We will consider successively the antisepsis of (a) the operator, (b) the instruments, (c) the surroundings, and (d) the patient.
(a) The Operator.—If absolute cleanness, or rather, one might say, immaculate purity of the hands is a necessity in every operation, it is perhaps never more so than in the case of operations performed in the interior of the vaginal or uterine cavities, for any germ deposited in them finds a cultivation medium eminently favourable for growth, and infection proceeds by strides.

The nails must be cleaned with extreme care by means of a pointed nail-file; the hands and the arms to the level of the elbow must be washed with warm water and a hard brush for three or four minutes.* The towels before use should, if possible, be sterilised by exposure to dry heat in a stove.

Researches have lately been made by von Eiselsberg† at the clinique of Professor Billroth on the various substances used for washing the hands at the hospital. All soaps are good except the common hard soap, and its mode of preparation (the use of tallow often considerably decomposed, and the low temperature of the lye) fully explains the presence of those spores which von Eiselsberg found in it.

After washing with soap, the hands and forearms of the operator and of all persons who are to take part in the operation, nurses as well as assistants, must be washed in sublimate solution (1 in 1,000) up to the elbow.§

Some operators are not satisfied with this method of ablution, and prefer to plunge the hands and arms first in a *4 solution of potassium permanganate, which colours the skin a brownish violet; this colour is immediately discharged by a concentrated solution of oxalic acid, and afterwards the hands and arms are washed in water sterilised by a Chamberland filter. This procedure might, I think, be reserved for those exceptional cases

* The experiments of Förster have shown the extreme difficulty of thoroughly disinfecting the hands. He washed them carefully first with soap and water, then in an antiseptic solution, and, having dried them on a towel previously heated to 140° C., he plunged them into a sterilised solution of peptone. Nevertheless colonies of bacteria afterwards developed in it.


‡ Furbringer, Zur Desinfection der Hände (Deutsche med. Woch., 1888, No. 48, p. 985), beyond washing with soap and in sublimate solution, asserts the utility of washing the hands in alcohol at 90° C. The objections brought against this procedure are that it is superfluous, and makes the fingers hard and less sensitive. (P. Landsberg. Deutsche med. Woch., 1889, No. 2, p. 37.) Personally I do not follow it.
where the operator has previously been in contact with septic or suspected objects.

When one is obliged to handle foetid material, as in the case of cancer of the uterus, beyond the use of antiseptics, great advantage is derived from the use of deodorants. Nevertheless the two classes of substance must not be confounded. In the absence of deodorants the hands become impregnated with an unpleasant odour, which clings to them in spite of repeated subsequent washing. Foulis, of Edinburgh, has recommended in such cases the use of oil of turpentine before operation, which obviates this disadvantage very effectually.

A basin of sublimate solution (1 in 1,000) must be always at the side of the operator, that he may frequently wash his soiled hands in it. Lastly, the operator and his assistants must wear over their other clothes a long linen overall that must be changed and washed every day. For operations where there is the chance of becoming wet from the use of continuous irrigation the surgeon should be protected by a large mackintosh apron.

(b) Instruments.—The more simple the construction of the instruments used the better; they should be easily taken to pieces if they consist of several parts, devoid of hollows, grooves, and joints whence impurities are removed with difficulty. For this reason the slides of hysterometers must be avoided, tubular suture needles, needle-carriers with springs, and, in spite of the great convenience, needles with movable eyes, after the ingenious model of Jacques Reverdin. Instruments in one single piece are the best.

The instruments, plunged for five minutes in boiling water, and dried with extreme care immediately after the last operation, are to be again plunged in it before the impending operation, and then placed in a carbolic acid solution (1 in 20). The action of boiling water for five minutes destroys all germs, as verified by H. Davidsohn,* by making cultures. In this case sublimate cannot be used on account of its destructive action on metals. If the instruments were previously used on a septic case (foetid pus, sanious or gangrenous material) these precautions will not suffice. It is then necessary either to boil them for half-an-hour in strong carbolic solution, or to keep them in a

stove for an hour, at a temperature of 140° C., or to let them stand in cold strong carbolic solution for twelve hours. These procedures considerably affect the instruments, and especially soften bistouries, but are nevertheless indispensable.

(c) Surroundings; Operating-room; Appliances.—It is extremely important to have the operating-room perfectly clean, and devoid of curtains, hangings, matting, carpets, &c., where dust can lodge. In private, every room where a gynaecological operation is to be performed of any importance must be completely denuded of furniture. In hospital it is necessary to be able to wash the floor, the ceiling, and the walls of the operating theatre every day with plenty of water and a hose. Further, it is an advantage to have at hand sterilised water and antiseptic solutions conveniently placed in reservoirs. If these are provided with pipes the solutions are brought within reach of the hand. In figure 1 is shown the arrangement I have adopted with this object in view at my hospital of Lourcine-Pascal. Besides the light coming from a high and large window laterally into the room, it would be extremely valuable to have light coming from above.

The appliances of the operating-room should be as few as possible, and those exclusively of metal or of glass, to facilitate removal and cleaning. Fig. 1 gives some examples of this kind.

(d) The Patient. Antisepsis of the external genital organs.—The patient is to take a complete bath (preferably of sublimate solution) the evening previous to or the morning of the operation. The bowel must be carefully emptied by means of an enema, and afterwards washed with a saturated solution of boracic acid (3 per cent.), however little it may enter into the operation: the catheter must be passed by the operator or an assistant before purifying the hands. In every operation involving the vulva care must be taken to thoroughly shave the hair from off the labia majora, not only for the convenience of the operator, but also to avoid the lodging of septic matters.

The external genitals are to be washed first with soap and a brush, and then with sublimate solution (1 in 1,000).*

* Mercuric iodide has been recommended, but it does not appear to offer any notable advantages. See the discussion on this subject at the St. Petersburg Gynaecological Society, March, 1887 (Centr. f. Gyn., 1887, p. 400). Pinard uses 1 in 4,000 iodide instead of 1 in 1,000 sublimate.
Fig. 1.—Gynaecological operating-room (Lourcine-Pascal), arrangement of reservoirs for injections and irrigations.

11 in. Large bay-window placed behind the operator; the upper portion (1) is transparent, the lower part is of ground-glass and can be used as a slate for demonstrations. (The operating-table is further lighted by a sky-light); (a) Chamberland filter; (bb) Inter-communicating glass jars, for filtered water; (c) Boiler heated by gas; (d) large reservoir receiving the overflow pipe of the filtered water jars (the cock and overflow pipe have been omitted so as not to complicate the drawing); (e) Sink; (f) Reservoir of filtered and boiled water to which has been added 6 per 1,000 of sea-salt; (g) Sterilised 1—20 carabolic solution; (h) Sterilised acid-sublimate solution (1 per 1,000 of sublimate and 5 per 1,000 tartaric acid); (i) Sterilised acid-sublimate solution (1 per 5,000); (j) Small movable reservoir that is filled with sterilised carbolic solution (1 per cent.) for continuous irrigation during operation; (f', g', k', t). Tubes fitted with cocks carrying the liquids from the corresponding reservoirs, over the table and within reach of the hand; (k) Porcelain trough mounted on legs and forming a table-basin for keeping the instruments immersed in carbolic solution.
The cleansing of the vagina may be effected by the same solution diluted with an equal bulk of warm water.

I believe that sublimate solution, one part in two thousand of water, used as a vaginal injection offers no drawbacks when the injections are given under the conditions and according to the instructions which will be indicated later on. Much objection has been taken to sublimate latterly in gynaecological, and above all in obstetric practice. It is true that at first it was used with too little care and in too strong doses. But perhaps the reaction has carried us a little too far in the opposite direction. The writers who have published works on this point have not always sufficiently recognised the essential difference which exists between injections given soon after delivery and those given under other conditions. In a woman recently delivered the vaginal and uterine cavities communicate freely by means of a cervix more or less gaping and softened. An injection into the vagina, especially if care be not taken to keep its walls stretched by the fingers, passes very easily, flows so to speak into the uterus, collects and remains there to be absorbed by the softened mucous membrane or its denuded surface. Hence the accidents pointed out as the consequence of simple vaginal injections.* Moreover, these accidents have not been observed with sublimate alone, but also with carbolic injections. In passing I will mention the danger there is in employing aqueous solutions prepared on the spot by diluting very concentrated alcoholic solutions of carbolic acid. Small oily droplets are likely to be formed, particularly if the product is impure, which dissolve with difficulty, and then it may happen that instead of a solution a mixture may be injected of a truly poisonous nature. This is the explanation of the grave symptoms (cyanosis impending death, recovery with weakness of the right arm) observed by Briggs† in a puerperal woman, and consequent on a vaginal injection.


† W. A. Briggs (Sacramento Med. Times, 1887, No. 2, p. 49).
injection of half a litre of water containing a teaspoonful of an alcoholic solution of carbolic acid. It is certain also that intrauterine injections of sublimate solution of too great a strength (1 in 1,000) can prove harmful even in the absence of the puerperal state, as in the case mentioned by Mijulieff, where an injection of this kind continued for twenty-six days, for a simple metritis provoked haematuria and nephritis of mercuric origin (néphrite hydrargyrique). I purposely omit mention of experiments made on the vagina in rabbits and guinea-pigs, as I do not regard the results obtained on this special point as conclusive. Further, it must be remembered that the sublimate solutions ordinarily used, so soon as they come into contact with a fairly abundant secretion, leucorrhoea, cancerous discharges, &c., are very rapidly neutralised, and lose at once part of their disinfecting and toxic qualities. Ernest Laplace* has lately pointed out the relative untrustworthiness of this antiseptic, of which he has investigated the causes and sought the means of remedying them. The mercuric salt is precipitated by albuminous material in the form of albuminates which gives rise to the rapid loss of antiseptic power.† Laplace has also found that to prevent the formation of these albuminates of mercury it is only necessary to make the solution acid by adding 5 per cent. of tartaric acid, and he was able to repeat his experiments without the development of a single germ. This discovery, very important for general surgery, can be made use of in gynæcology. I have myself taken advantage of it, and always to my satisfaction.

A few words must be said about creolin, a new antiseptic which has lately made its appearance, and has been experimented with in gynæcological and obstetric practice at La Maternité and the obstetric clinique of Breslau by Baumm and Born.‡

† Here are some of his experiments. Into an open tube containing 25 cc. of natural serum are placed 5 cc. of a 1 per 1,000 sublimate solution; it does not prevent the development of germs; in half a cubic centimetre of serum bacteria are even found. In a tube containing 5 cc. of 1 per 1,000 sublimate solution to which one-eighth of a cc. of putrefied human blood, containing bacteria, has been added, the microbes flourish; a few drops of this mixture, cultivated on gelatine by Esmarch's process, furnish at the end of five days rich colonies of staphylococcus aureus.
‡ Baumm. Das Creolin in der Geburtshilfe (Centr. für Gynäk., 1888, No. 20, p. 321).—Born. Erfahrungen über das Creolin (ibid., p. 324).—Cf. also on
From their observations it would seem that creolin offers certain special advantages, but also some disadvantages, which would render its use very restricted. It is very difficult to obtain it of constant strength, as its chemical composition has not as yet been definitely fixed. It is used as a 5 per cent. solution in the treatment of ruptured perineum, cracks in the nipples, &c. More concentrated it is liable to give rise to erythema, or even to eschars. It appears, too, to be inferior as an antiseptic to a sublimate solution of 1 in 8,000 (Baumm). For intra-uterine injection Born used a 1 per cent. solution; for vaginal irrigation a 2 per cent. solution. No accident from absorption arose, and the antiseptic power seemed to be a real one. Creolin possesses the great advantage of leaving the vagina all its suppleness, and of even rendering its surface oily, which is eminently favourable for all obstetric and certain gynaecological operations when several fingers have to be introduced into the vagina, or in the extraction of a bulky tumour, e.g., enucleation of fibroids, vaginal hysterectomy. It is known that sublimate and even carbolic solutions, on the contrary, induce in the vaginal walls a hardness and roughness which is at times inconvenient. This, I take it, is the single practical indication for the new antiseptic. The opacity of the creolin solution renders it useless for the immersion of instruments.

Naphthol β, employed by Bouchard for intestinal antisepsis, has latterly been extolled for dressings in watery solution or incorporated in gauze.* It has the advantage of being but little poisonous, and seems destined to prove of real service. The saturated watery solution only contains 2 per cent.

Vaginal injections to be truly of use must be given according to certain rules. The irrigators with a spring are bad instruments, and ought to be discarded. Some sort of receptacle (they are made with handles, and in the shape of cans), and furnished at its lower end with a tube terminating in a glass canula which can be easily disinfected (figs. 2 and 3), is to be raised to a moderate height, or held up by the hand of an assistant. The person who is giving the injection places the canula in the

vagina with one hand, and introduces by its side the first and second fingers of the other hand. These are gently pushed into the fornices and moved about in various directions with a certain degree of force over the whole surface of the vagina so as to draw out the folds and wash it thoroughly. Unless this course is adopted some impurities are sure to be left and become a source of infection. The surgeon himself or his chief assistant should give such an injection before every operation. I have called this procedure "sluicing" (rincer) the vagina.

All the canulas to be used by the surgeon should be preferably of strong glass, and have one single terminal orifice, for the stream of liquid ought first to be directed towards the fornices and the cervix, as it is the reflux stream which alone cleanses the vagina. For injections which the patients are to personally give themselves, it is preferable to have canulas pierced with several holes situated in a bulbous extremity so as to avoid the possibility of its introduction into the os tincæ. It is also in such cases of advantage to use a fenestrated speculum, which
should be fixed around the canula; this draws out the vaginal folds and allows of a more thorough cleansing (fig. 4). Every vaginal injection should be given with the patient recumbent over a bed-bath or an india-rubber receptacle fitted with a tube to conduct the water into a pail (figs. 5 and 6).

The accidents that may arise from the use of injections, and the risk of wounding the cervix or of forcing the liquid through it, have been greatly exaggerated. Some practitioners have to my mind committed a grave mistake in going so far as to forbid the use of any canula at all. The only precaution necessary is to order patients not to insert the canula for a greater length than 5—6 centimetres, or about the length of the finger. Gum-elastic tubes, inasmuch as they cannot be properly cleaned and kept antiseptic, should be cast on one side. Curved tubes offer no advantages over straight ones.

Night and morning for the week preceding the operation the patient is to have an antiseptic injection (sublimate solution 1 in 2,000), after which a small plug of iodoform gauze is to be inserted into the vagina. On the day of operation three are to be given, two with an hour's interval, and the third immediately before the operation is begun; later on I shall point out the reason of this course of action (vide p. 13).

After every antiseptic injection, and particularly after the use of sublimate, care must be taken at the termination to press upon the fourchette so as to ensure the complete evacuation of the liquid. Some women, as a matter of fact, evidence such rigidity of the lower end of the vagina and of the vulva that an appreciable quantity of fluid can remain blocked up in the upper
portion of the canal and cause accidents from absorption. Once I witnessed such an accident—slight, it is true—which depended upon no other cause.

There is a widespread opinion that in minor gynaecological operations, *e.g.*, examination, catheterisation, dilatation, anti-

![Fig. 5.—Smester's receptacle for vaginal injections.](image)

![Fig. 6.—Bed-bath with tube for outflow, for vaginal injections.](image)

septic injections ought to be given after and not before the operation. This is one of the gravest of mistakes. It is especially before the manipulation that antiseptics are needed. The observations of Kaltenbach* on auto-infection amongst puerperal

women had already led to the suspicion that the female external generative organs, particularly in the puerperal state, were infectious, so to speak, and the direct researches of Winter* have recently settled this important fact beyond the possibility of doubt. The genital canal of a healthy female, the vagina, and cervix contain pathogenic organisms—staphylococcus pyogenes aureus, citreus, and albus, with three varieties of streptococcus, each easily recognisable from its particular morphological characteristics and capable of cultivation. But it is an important fact that these micro-organisms seem to possess an attenuated and latent virulence, since inoculations of these germs or of their cultivations are without effect upon animals. Nevertheless they are a perpetual source of danger, for this latent power can, on the least septic stimulus from without, burst forth and increase with fearful consequences. Further, there is no proof that these germs, attenuated in virulence so long as they are confined to their natural habitat below the internal os, cannot take on anew virulent properties if they are transported beyond this natural barrier by any untimely manipulation. That these germs can in reality be carried into the uterus by using the sound or by internal examination is placed beyond doubt by Winter's accurate observations of tissue removed from the uterus a short time after these manipulations have been carried out.

The results of these remarkable investigations are considerable, and I shall again recur to them when discussing the subject of metritis; but as far as the question of disinfecting the vagina and cervix before the operation is concerned, its absolute necessity is thereby fully evidenced. But is it possible by even the most careful injection to remove all the micro-organisms inhabiting the cervix? Steffeck† made some careful investigations on this point, and below is an instructive summary of his conclusions:

1. After a simple vaginal injection of a litre of sublimate solution of strength 1 in 3,000, just as many germs are found in the cervix as before—the vagina alone is cleansed.

2. After the same injection aided by vaginal cleansing with one finger, on sowing some of the vaginal mucus in agar-agar,

colonies develop in considerable numbers, but certainly in fewer numbers.

3. After the same aided by two fingers, two out of three cultures remain sterile.

4. In a later experiment injection of the vagina and cleansing of the cervix are carried out in the following manner: one finger is thrust into the cervix as deeply as possible, another finger sweeps round the anterior fornix and cleans it; then the position of the two fingers is reversed, so as to clean the posterior fornix; lastly, the jet of injection fluid is directed full on to the os. After an injection carried out in this manner all attempts at culture were fruitless, while before this disinfecting tubes showed 50—100 colonies. Similar good results were obtained with 3 per cent. carbolic solution. But as might be expected, this disinfection is only temporary, for germs descend from the supravaginal cervix into the os tincæ. As a matter of fact, at the end of an hour germs can be found anew in the lower part of the cervix. There is, however, a means of destroying them for a considerable time, namely, by giving a second injection with the same precautions one hour after the first, and again a third after the same interval. The mucus which flows afterwards contains no organisms. Steffeck was able to satisfy himself of this fact after the lapse of five days in a puerperal woman.

No doubt this method of sterilisation is lengthy, but it reduces at least to a minimum all chances of auto-infection, and that is the reason why I recommended above that three injections should be given at an hour's interval before all operations. The uterine sound should never be passed, nor should a dilator be introduced into the uterine cavity without having previously disinfected the vagina and cervix by three injections.

The absence of this precaution explains the numerous accidents caused by these manipulations in spite of their having, apparently, been performed with antiseptic arrangements.

If the case be one accompanied by a foul odour, e.g., cancerous vegetations, gangrenous fibroid, &c., this antiseptic injection should be preceded by a deodorising injection (which is at the same time antiseptic though to a less degree) of a litre of boiled water to which has been added a variable quantity of "liqueur de Labarraque," or Pennès's vinegar (two or three tablespoonfuls to the litre).
For rectal and vesical cleansing 3 per cent. solution of boracic acid or 1 per cent. solution of salicylic acid may be used; neither of these solutions acts as an irritant to the mucous membrane.

I shall now make some remarks upon iodoform gauze, which I recommend almost exclusively as a dressing.

The iodoform gauze we ordinarily use is made and supplied by the manufacturers. It is said to contain 20 to 30 per cent. of iodoform. But it is preferable in the large practice of a hospital to have it prepared by some trustworthy person—a course not only more economical but also more certain. It is made by steeping 10 metres of absorbent gauze, or gauze without dressing, which has previously been sterilised by boiling, and cut into lengths of one metre, in the following solution:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iodoform</td>
<td>50 grms.</td>
</tr>
<tr>
<td>Glycerine</td>
<td>100 &quot;</td>
</tr>
<tr>
<td>Ether</td>
<td>700 &quot;</td>
</tr>
</tbody>
</table>

It is afterwards passed through the press and hung in single lengths in a darkened airy chamber which has been warmed to 30° C. in order to dry it, and is kept in well-closed tin boxes.

Some curious experiments of von Eiselsberg* made at Billroth’s clinique with gauze thus prepared with the greatest care nevertheless showed him that it contained very often (11 times out of 30) germs which could easily be demonstrated by cultivation. But if, before the addition of the iodoform, the gauze were subjected to a temperature of 100° C. for half-an-hour, which is easily done by making it boil, 18 out of 20 cultivations proved sterile. This preliminary precaution ought, therefore, never to be neglected.

It would doubtless be better still to raise the gauze to a temperature of 120° C. in a heating chamber;† so as to destroy spores and germs at the same time, but this apparatus is not at everyone’s disposal, and sterilisation by boiling water, if not perfect theoretically, nevertheless seems to be sufficient in practice.

It may cause surprise that the presence of iodoform is not sufficient to neutralise the micro-organisms. On this point the

* Cf. v. Eiselsberg, loc. cit.
† L. Tripier. On the sterilisation of cotton, gauze, and water, &c. (Prog. méd., Dec. 3, 1887, vol. 6, p. 483.)
researches of Heyn and Rosving* must be called to mind. They proved this fact, that iodoform \textit{in vitro} is not a germicide, and, in fact, offers no obstacle even to the development of germs. De Ruyter (Berlin) and Lübbert † arrived at the same conclusion, which has recently been confirmed by the experiments of Tilanus.‡ But does that mean that iodoform \textit{in vivo} is not an antiseptic in the presence of pathogenic ferments? By no means. The researches of Behring§ (Bonn) afford the solution of this apparent contradiction, according to whom iodoform destroys leucomaines and ptomaines as they are produced.

![Fig. 7.—Iodoform insufflator.](image)

We must regard it as an established fact that it is almost impossible to obtain completely aseptic dressings.|| They may be kept unexposed to the air in tightly closed metal boxes—and this is an indispensable precaution—but each time the box is opened germs can effect an entrance. It is therefore advisable

to use antiseptic gauze (iodoform) rather than aseptic gauze, which has been simply sterilised by moist heat. Nevertheless, if sterilisation were practised in full, not only upon the dressings but also to all the bed linen, doubtless it would be effectual.

In Bergmann’s clinique, where everything is thus carefully purified, the aim is to replace antisepsis by asepsis as far as possible, and it is for this reason that simply sterilised gauze is employed there in a large number of dressings.*

If in consequence of symptoms of absorption it becomes necessary to replace this iodoform gauze by some other local application, sterilised sublimate gauze (1 in 1,000) may be used. It is easily prepared by first boiling ordinary gauze in a 5 per cent. solution of carbonate of soda for an hour, so as to remove all the dressing, and then in 1 per 1,000 sublimate solution also for an hour. It is dried in an oven, and afterwards kept in well-closed boxes or glass bottles.

I have tried salol and iodol, but found them far inferior to iodoform and sublimate. Carbolic gauze loses its antiseptic powers so quickly that it is one of the most untrustworthy preparations. In addition to that it is also somewhat of an irritant.†

Antisepsis of the cervix and uterine cavity.—After operations on the cervix or uterus it is well to leave some form of antiseptic

* In the practice of Bergmann, of Berlin, all dressings are sterilised by exposure to steam at 100° C. in an oven (Rietschel and Henneberg’s Dampfapparat) for a quarter to half an hour, and then dried by a current of air at the same temperature for two or three minutes. They might afterwards be impregnated with an antiseptic solution (sublimate). It is greatly to be desired that our hospitals were supplied with similar apparatus. They are certainly of the first importance.

† As new antiseptics we may mention ichthyol, which has been successfully used as a local dressing for ulceration of the cervix and pruritus of the genitals. It has also been given internally in cases of diseases of the generative organs dependent upon the arthritic diathesis (chronic metritis ovaritis). H. W. Freund. Ueber die anwendung des Ichthyols bei Frauenkrankheiten. Berl. klin. Woch., 1890, Nos. 11 and 45. Cf. for the literature of the subject R. Polacco, L’ittio in gynecologia (Ann. di Obst. e Gin., March, 1890).

The aniline dyes have recently been recommended as powerfully antiseptic by J. Stillling, Anilin. Farbstoffe als Antiseptica und ihre Anwendung in der Praxis (Centr. f. Gyn., 1890, No. 47, p. 855). He uses a solution of from 1 to 5 per thousand.

Michelsen (Anwendung des Lysol in der Gynäkolgie u. Gebertshilfe in Centr. f. Gyn., 1891, No. 1, p. 1) has insisted upon the value of lysol, which should be a disinfectant of the first rank. A one to two per cent. solution is used.

S. Gottschalk (Das Thiol bei Frauenkrankheiten in Centr. J. Gyn., 1891, No. 12, p. 230) employs thiol, which is exactly like ichthyol in its antiseptic properties, except that it is without the evil odour of ichthyol; the excessive dearness of
in the cervical canal. I myself used small bougies prepared according to the following formula of von Hacker.*

\[
\begin{align*}
R & \quad \text{Pulv. iodoformie} \quad \ldots \quad \ldots \quad \text{gr. xx.} \\
& \quad \text{Gummi Acaciae} \quad \ldots \quad \ldots \\
& \quad \text{Glycerini} \quad \ldots \quad \ldots \\
& \quad \text{Pulv. amyl} \quad \ldots \quad \ldots \quad \{ \text{a} \text{a} \text{ gr. ij.} \}
\end{align*}
\]

Of this mixture small sticks are to be made of the size of the ordinary nitrate of silver pencils.

These bougies have the advantage of being most easily manageable, and can be pushed far into the uterine cavity without difficulty; but occasionally (no doubt from faulty preparation) they dissolve imperfectly and cause colicky pains. I have therefore discontinued their use, and simply sprinkle iodoform on the cervix, or insufflate the cavity with a special apparatus, and afterwards leave in contact with it a plug of iodoform gauze.

The disinfection of those agents by which dilatation of the cervix is effected is a very important point for consideration. I consider tupelo and compressed sponge as wholly inferior to laminaria, and never use them. But laminaria has often proved a source of infection in spite of the greatest precautions. To make it antiseptic the choice lies between two procedures—1, immersion in a concentrated alcoholic solution of carbolic acid after Martin; or 2, to leave it in ether saturated with iodoform, to which it is advisable to add a tenth part of alcohol, after Herff of Darmstadt, Doléris, &c. But whichever course be adopted, before application the tents should be rapidly washed in carbolic solution (1—50) or sublimate (1—1,000).

Intra-uterine injections in gynecological, are far from pre-

this new antiseptic has up to the present, however, prevented its coming into general use.

Berlioz (of Grenoble) has proposed a new antiseptic, microcidine, which, in solutions of 3 per 1,000, and especially of 5 per 1,000, is said to have very considerable antiseptic powers. They are only feebly poisonous, not caustic at all, but have the inconvenience of becoming changed somewhat rapidly. Instruments are not injured by contact with microcidine. A solution of 3 parts per 1,000 is as a rule sufficient; but for infected wounds a solution of 5 parts per 1,000 is used in preference.

Microcidine is a preparation of the base naphthol, and the object of the preparation is to make this antiseptic more easily soluble in water than it is in a state of purity. Cf. Polaillon, A new antiseptic microcidine (Semaine méd., April, 1891, p. 178). Report read before the Academy of Medicine.

senting the same dangers that they do in obstetric practice; but exception must be made for those cases where the uterine cavity is very dilated, and presents, after an operation, a large bleeding surface (enucleation of fibroids, curettage of cancer of the body, &c). In such cases the conditions, so far as facilities for absorption are concerned, are much the same as obtain after delivery.
When the uterine cavity is not dilated to any great extent (e.g., after curettage for a catarrhal or haemorrhagic metritis), so long as a double-channel catheter be used (whether of hardened gum, glass, or celluloid) there is no danger in the use of 1 in 2,000 corrosive sublimate. But since the greater number of these instruments are made of metal which is attacked by the sublimate, a 1 per cent. solution of carbolic acid is better. The solution must be lukewarm, and half a litre or even more can be given until the returning fluid shows that the interior of the uterus is thoroughly clean.

A very large number of injection canulas have of late been introduced to notice. Without describing them I may just mention those of Pajot, Budin, Pinard, Militano, Doléris, Segond, and Mathieu. When the uterine cavity is not enlarged, I use Bozeman-Fritsch's pattern after dilating the cervix, if that be necessary (fig. 8-1). If the uterus is considerably dilated the ordinary injection-catheter or canula presents no danger; so long as the pressure exerted be not too great the liquid readily flows back around the catheter.

When the uterine cavity needs energetic disinfection (as in certain cases of gangrenous fibroids, fungating and putrescent intra-uterine cancer, &c.), 1 in 2,000 sublimate solution makes a better injection; after it has been used in large quantities it must be followed by another intra-uterine irrigation of some indifferent fluid so as to ensure the thorough evacuation of the poisonous antiseptic. For this purpose I recommend water,
sterilised by the Chamberland filter, and afterwards boiled. To this should be added six parts per 1,000 of sea salt, which modifies in the right direction its endosmotic and irritant qualities, inasmuch as it approaches its composition to that of blood serum.

Fig. 10.—Continuous irrigation during operation with Fritsch’s speculum.
The ulcerated cervix is rendered accessible by the application of Simon’s concave retractor below and a Fritsch’s flat retractor for continuous irrigation above—(a) attachment for the irrigation tube; (b) portion of the upper retractor where the movable handle can be attached; (ce) wings of the upper retractor; (d) Simon’s retractor fixed to its handle; (ee) Labia majora; (ff) vaginal fornixeo.

I use this liquid largely for simply aseptic washings when for one reason or another the use of antiseptics seems to be contraindicated. I must not leave the subject of the antisepsis of the vagina and cervix without mentioning a procedure which is at
once a help in the operation and a means of disinfection: I allude to continuous irrigation during operation (irrigation continué opératoire). It can be practised either by means of a special speculum (fig. 10), or simply by means of a long canula held in the open hand of an assistant which he rests upon the pubes, while at the same time he holds in the same hand another instrument (a retractor or tenaculum forceps, fig. 11). The liquid I use for this irrigation is one per cent. carbolic acid, at a temperature of 35°—40° C. If the irrigation is to be of some long continuance, it must only be of half the above strength, otherwise it is liable to give rise to painful excoriations. The fine stream of water which passes continually over the field of operation, and the rate of flow of which can be regulated, has a double advantage; it constantly keeps the part free from blood, and does away with the necessity for sponges or their equivalents; further, it keeps the wound constantly bathed in an antiseptic solution, and protects it better even than the spray from germs floating in the air. I make a routine use of con-
tinuous irrigation in all my operations on the vulva, vagina, and cervix, nor can I recommend it too highly.

I never use sponges, for balls of absorbent cotton-wool take their place with advantage. They may either be used dry, when they should be enclosed in a layer of gauze, or impregnated with sublimate solution and strongly wrung out.

Laparotomy.—I now come to the special antiseptic precautions which concern laparotomy.

![Fig. 12.—Madame Horn's laparotomy table (open) used by A. Martin.](image)

At the outset we are confronted by an important consideration. How comes it that operators of high authority, such as Lawson Tait and Bantock for example, look on antisepsis as useless and even dangerous, and in spite of this obtain magnificent results?* Does that fact not entirely invalidate the minute precautions that we are about to recommend?

The contradiction is less real than apparent, and to become

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convinced of that it is only necessary to follow in every detail the procedure of the surgeons I have just mentioned. It will be seen that if they are not antiseptic, that they are to the best of their power and to a very great degree aseptic, that is to say, that they replace chemical antisepsis by physical antisepsis (the use of heat) and by the greatest care in cleanliness. Now during the most important time in laparotomy (i.e., during all intra-peritoneal manipulations), asepsis is not only equal in value to antisepsis, but even superior, for, from the great delicacy of the epithelium covering serous membranes, the use of an antiseptic solution of sufficient strength to be effective alters it profoundly, and may give rise to grave results for the operation. In the abdominal cavity, therefore, we must pursue rigorous asepsis, while we reserve antisepsis for the exterior.† If it is further observed that after laparotomy the exact adaptation of the abdominal walls by suture, leave, so to speak, no wound, it is intelligible how the omission of antiseptics in the dressings may be considered of no great importance. Nevertheless to my mind that point is a mistake.

(a) The operation.—Operator and assistants must be absolutely clean. No person who is to be present must, for forty-eight hours at the least, have entered a dissecting or post-mortem room, or touched anatomical specimens or a septic wound. If they have, a bath must be taken either in sublimate or vapour, and followed by energetic rubbing and soaping of the whole body.

A long linen dress perfectly clean is to cover the ordinary clothes. The hands and arms are to be disinfected according to the directions laid down above. Care must be taken not to touch any object that has not been disinfected, nor to shake hands with anybody so soon as the ablutions have been made. In case of need, gloves sterilised in an oven should be put on to protect the purified hands up to the moment of operating.

The number of assistants should be as restricted as possible, so as to diminish the chance of infection. One is usually sufficient for the operation itself; a second is needed for preparing and passing the sutures and ligatures. The operator

himself takes the instruments from the receptacle in which they are immersed.

No operation within the abdomen must be undertaken if one has the smallest pimple or the smallest suppurating scratch on the hands. No indiarubber finger-stall would be a sufficient protection against the possible infection of the peritoneum.

(b) The Patient.—The patient is to take the night before a sublimate or a soap bath. For several days previous she must be given a vaginal injection night and morning of sublimate solution (1 in 2,000), followed immediately by a plug of iodoform gauze placed in the vagina. The bowel must be emptied the night before by aperients, and on the morning of the operation by an enema. Before the operation an assistant is to pass the catheter, and to disinfect himself immediately afterwards. The hair is to be shaved, and the abdomen washed with soap and a brush, then with ether, and in the last place with 1 in 1,000 sublimate solution. Especial care must be taken to clean the cutaneous folds of the umbilicus. And the abdomen is to be covered with compresses steeped in sublimate during the time that elapses between the cleansing and the operation, however short its duration may be.

c) The Surroundings.—In hospitals a special room must be reserved for laparotomies. It must be removed as far as possible from the common ward containing suppurating or septic wounds, from water-closets, and, in a word, from every source of infection. Its angles must be rounded off; there should be neither corners nor surfaces which cannot be easily and quickly reached for thorough cleansing purposes. All furniture ought to be able to be quickly removed from it, and the appliances—seats, tables, shelves—must be made of painted or varnished metal or of glass, exclusively. After each operation the whole room should be washed with a hose adapted to a pump or cock which supplies the water at a sufficient pressure to allow of its projection on the most distant points.

If the operation is not to be in hospital a room must be prepared at least two days before the proposed laparotomy. It must be fully denuded of all furniture. If it is impossible to have the walls white-washed they must be carefully cleaned, as well as the floor, ceiling, and wood-work, by cloths soaked in carbolic acid (1 in 20). Though the house be neither old nor
the room suspected, to this cleaning must be added a disinfection with sulphurous acid by throwing some sulphur on a chafing-dish, heated in the middle of the chamber, and then closing the room hermetically for twenty-four hours.

The temperature must be kept up during the whole operation, so as to prevent chilling of the patient, internal and external. A temperature of $25^\circ C.$ at the least, and $30^\circ$ at the most, is necessary. In order that it may not be a dry heat—which would subject the exposed viscera to great danger—care must be taken to saturate the air with carbolic steam by means of a spray-apparatus. This spray is never to be projected upon the field of operation, as was done in the early days of Listerism, and as
some laparotomists still persist in doing. The jet of steam is to be directed towards the middle of the room, and somewhat from below upwards. The single effect sought is to saturate the atmosphere. When that object is attained the apparatus is stopped working, and not recontinued unless it becomes necessary from the length of the operation. The rotatory spray-producer of Collin admirably fulfils this indication. Constantly directed upon the patient the spray is even more hurtful than useful: it chills her, and beyond measure acts as an irritant to the peritoneum, not to speak of the danger of intoxication.*

(d) The Instruments.—The instruments will have been cleaned with the utmost care, and plunged into boiling water for 5 or 10 minutes after the last operation. On the day of the laparotomy they must be kept for an hour in a stove at a temperature of 120°-140° C., (fig.13), and afterwards immersed in 1-20 carbolic lotion. It is equally effective if a stove be not at hand to boil them for a quarter of an hour at the least, in filtered water, to which it is well to add one part in a hundred of carbonate of soda to protect the instruments from injury. This procedure has been recommended by von Bergmann.

A third method of disinfecting cutting instruments and needles is to place them in the flame of a bunsen burner or a spirit lamp, or to rub them with chloroform and then boil them in sterilised water.†

I advise the operator never to use any but his own instruments; from an antiseptic point of view one can never be sure of borrowed instruments, and it is far better to have a disinfected bistoury, for example, even though it be blunt, than an excellent one that may nevertheless contaminate the patient.

For the same reason I have discarded sponges. It is not always easy to obtain new sponges which are at the same time perfectly pure, and that is explicable if the number of preparations are considered to which they must be subjected before deserving this qualification.‡ And sponges that have already

† Marcel Baudouin. Asepsis and antisepsis at the Hospital Bichat (Progrès méd., 1890., Nos. 5, 7, 9, 35 and 37).
been used require an even more particular purification if one bear in mind the septic nature of the liquids with which they may have been soiled. They are, therefore, both untrustworthy and expensive. The last consideration may perhaps occasion surprise by being mentioned, but it seems to me to be one of importance to hospitals. Then, too, the sponges at one's disposal—especially at a distance from great centres—may be either too easy or too hard to tear, or of a size or form that is inconvenient and unmanageable. After observing at Vienna, in the practice of Billroth, the advantages presented by antiseptic compress-sponges, for laparotomy, I have used them to the exclusion of all other kinds. This is my method of preparing them:

A piece of gauze is folded in such a way as to form squares composed of eight layers of gauze and having sides 30 centimetres in length. These are tacked together all round. The compresses are then boiled for two hours at the least, either in a solution of carbolic acid (1 in 20) or in sublimate solution (1 in 1,000). Afterwards they are kept in a fresh solution of the same strength, which must be renewed every week. When they are to be used they are carefully washed in warm water that has been sterilised by filtration and boiling, and are wrung dry; they now form a very absorbent and convenient kind of sponge, which can quickly be turned into any kind of shape or size, twisted round the finger to penetrate cavities and interstices, spread out over the exposed bowel, and, in a word, present great advantages over ordinary sponges. During one operation the same compress-sponge may, if absolutely necessary, be used several times so long as it has been washed. Those alone which have been soiled by any septic liquid are immediately cast on one side. After every operation all of them are destroyed. Their trifling cost warrants this sacrifice, which in the case of sponges might at times cause difficulty.*

With regard to the antiseptic precautions which form part of the operation itself I shall simply enumerate them here, but

* It is now about five years since I (the first in Paris) began to use exclusively these compress-sponges in laparotomies. In a communication made on October 19th, 1887, to the Surgical Society of Paris, I pointed out their many advantages. Following my example, Terrillon has lately been extolling their virtues. Hourteloup and Bouilly have adopted them. I feel certain that, after some slight temporary hesitation, their use will become general.
shall re-consider them in detail when I come to describe each separate operation. At present I shall only mention those which are of special importance.

(a) Toilet of the Peritoneum.—The care with which laparotomists have long striven to free the peritoneum of effused fluid and every clot of blood has been pushed to extremes. The danger of these residues has been exaggerated; they can quite easily be re-absorbed, provided the absorbent power of the peritoneum has not been destroyed by the injudicious use of lotions or of rubbing. We ought to be very careful in the use of this "toilet of the peritoneum,"* and endeavour to avoid the necessity for it by preventing the escape of the contents of tumours. If that has been unpreventable the cavity must be cleaned as quickly as possible with compress-sponges. According to some writers such liquids as the contents of cysts, the pus of old standing pyo-salpinx, which have the reputation of being extremely infectious, are far less dangerous than ordinarily thought.†

(b) Free washing out of the peritoneum with warm sterilised water (to which I add chloride of sodium six parts per 1,000) has been greatly extolled by Lawson Tait, and is especially of use in cases where an irritating or infective liquid has succeeded in contaminating the serous membrane during the operation, but it should not be mis-used to cleanse from blood, which is easily done by means of compress-sponges. Though it is, of course, dangerous to leave in the peritoneal cavity the least drop of pus or the smallest septic particle, the same is not the case with small blood clots, for they are readily re-absorbed.

There is yet one other point about flushing with warm water that I simply mention in passing. It has been extolled for combatting "shock"‡ in the patient. Polaillon§ has lately pointed out the dangers of flushing with water that is too warm, especially in the supra-umbilical portion of the peritoneum, in the region of the solar plexus: it may cause arrest of breathing and syncope. When practised in the pelvis alone it would only

* Cf. on this subject, the discussion at the Berlin Obst. and Gyn. Soc., May 10th 1889 (Cents. f. Gyn. 1889, No. 24, p. 418).
† Experiments of Demboński cited by T. Veit in the above-mentioned discussion.
§ Polaillon. On one danger of flushing the peritoneal cavity, &c. (Bull. Acad. de Méd., Aug. 28th, 1888, 3rd series vol. 20, p. 327.)
be dangerous if not carried out with great rapidity, or if any other liquid were used than one the absorption of which could not prove harmful. Nevertheless, the experiments of Delbet* have proved that these flushings temporarily do away with the absorbent power of the peritoneum, and when one fears a subsequent oozing this is a matter of very great importance. It would then often be wise to provide means of drainage.

Water filtered by a Chamberland filter can nevertheless contain microbes, as Tripier† has shown, and simple boiling, as is well known, only kills the germs and not the spores. Certainly boiled and filtered water is very likely to be pure and may be used without great misgiving. But absolute safety is not attainable unless it be raised to 120° C. The following is the procedure advised by Tripier: A glass globe is provided with two very short glass tubes traversing the stopper; one of these tubes has a bulb filled with cotton wool, that none but filtered air may enter the globe. The second tube is later to have attached to it a piece of india-rubber tubing provided with a clamp. The globe, not quite full of water (the tubes ought not to dip into it), is to be heated to 120° C. in a Chamberland heating chamber. When the globe has been taken out, the india-rubber tube is to be fixed to one of the glass tubes, and by inclining the globe the rate of outflow is regulated. I propose a still simpler plan, and one in which a simple oven may be used; it is as follows: In a globe having a long neck drawn out to a point, and not quite full, water is raised to the boiling point, and when by this means all air has been expelled the neck is to be sealed in a flame. The globe can now be placed in an ordinary oven

† Tripier. On the sterilisation of water to be used in dressing wounds. (Progrès Méd., July 11th, 1888, vol. 8, p. 18.)
and subjected to a temperature of 120° C. without fear of finding all the water evaporated as steam (which would occur were the neck not sealed). The globe may now be kept sealed, or the end of the neck broken off and a plug of cotton wool inserted to filter the air and make its access harmless. Several globes should be thus prepared beforehand. This water, if salt be added (six in 1,000), being perfectly pure, is excellent for flushing-out the peritoneum, and may be used in cases where death is imminent from loss of blood, for injection into the veins. The old fashioned transfusion of blood has, by many operators, been replaced by this measure.

(c) Cauterization of cut surfaces, pedicles, adhesions has been performed with such antiseptics as strong carbolic solution, tincture of iodine, iodoform, or with the actual cautery. This last method, introduced by Baker-Brown, is very wide spread in England and Germany. I adopt it very often myself, whenever the surface of the section is a suspicious one (as in certain salpingotomies), or even when it is simply thickened and spongy. Of course I am only here speaking of cauterization from an antiseptic point of view, and that must be distinguished from its hæmostatic power, which is so useful in cases of general oozing (hæmorrhagies en nappe). Paquelin’s thermo-cautery has with us replaced the red-hot iron of Baker-Brown. It is advisable to envelop the handle of the instrument in iodoform gauze before touching it, so as not to soil the hands.

Preparation and method of keeping ligature and suture materials.—I must not leave this part of my subject—anti-sepsis in gynaecology—without mentioning, as a kind of appendix, the modes in vogue for preparing and keeping the chief kinds of thread that are used either as ligatures or as sutures.

Silk.—The silk which combines the greatest strength with the least volume is plaited flat silk (it can be obtained in twelve different sizes). It is made up into very loose skeins, and this is essential to ensure equal and thorough disinfection, and then boiled for an hour in carbolic solution (1 in 20). It is afterwards wound on glass plates and put into a fresh solution of the same strength, which must be renewed every week. Further, not too much must be prepared beforehand, as it is far more reliable immediately after being boiled. Hegar prepares his silk with iodoform. He steeps it for twenty-four hours in a mixture of
one part of iodoform to ten of ether, then dries it, and either preserves it in a glass bottle or on reels, which are afterwards powdered with iodoform. Silk can also be made aseptic by boiling it in sublimate solution (1 in 1,000).* Personally, in laparotomy I prefer carbolised silk, as it is less likely to produce poisoning when many ligatures are necessary, and especially when a large number has to be left in the abdomen. As a matter of fact, some enfeebled patients are extremely susceptible to the action of corrosive sublimate.

**Catgut.**—Four sizes of catgut are obtainable from the manufacturers. The best results seem to me to be given by preparing

![Catgut box](image)

it with oleum ligni juniperi, which must not be confounded with the oil of juniper berry.† After an hour's immersion in a

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* Nilsen (Trans. of the Obst. Soc. of New York in the American Journ. of Obstet. March, 1888, p. 308), advises, whenever silk must be used for sutures, or ligatures exposed to the air, to boil them in wax with carbolic acid; its permeability would thereby be destroyed, and secondary infection prevented.

† It was first recommended by Tiersch, and adopted afterwards by Küster, Schröder, Martin, Hofmeier, &c. Kocher, by experiment, proves that this oil sterilises violin catgut in twenty-four hours (Troisfontaine's Handbook of Surgical Antiseptic, p. 100). This same surgeon has, however, recently attacked catgut, and considers it accountable for some septic accidents which arose in his practice, he has therefore discontinued its use and discountenanced it; but it seems probable that Kocher had the misfortune to employ bad catgut. (Kocher, Correspond. f. Schweiz. Aerzte, 1888, No. 1, p. 3.) His view has been strongly opposed by Zweifel, *Die Stielbehandlung*, &c., p. 51, and J. L. Championnière (Bull. et Mem. de la Soc. de Chir. à Paris, 1888, p. 51).
watery solution of sublimate (1 in 1,000), I steep the rolls of catgut in the juniper oil for a week at the least; they are then taken out and kept in rectified spirit, to which a tenth part of juniper oil has been added. When the catgut is to be used, it is placed for a few minutes in 1 per 1,000 sublimate solution. This swells it to a slight extent, but makes it far more supple.*

The advantages of catgut thus prepared are considerable. It is much superior to the catgut in ordinary use; which is disinfected by means of carbolic oil. Its strength and flexibility are remarkable: it may be used for internal sutures (sutures perdues), for it dissolves and is absorbed in a time proportionate to its thickness. On this point each operator ought to make careful trial for himself. It is by reason of this combination of qualities that "continuous" sutures and "deep and superficial" sutures (les sutures continues en surjet et à étages superposés) have been able to be tried with so much success, and have yielded such excellent results.

A. Reverdin† has lately proposed a technical improvement which seems likely to me to prove of great service. He leaves the catgut in an oven at a temperature of 140° C. before steeping it in juniper oil and preserving it in alcohol. He advises care in determining that the catgut has not been greased during its process of manufacture, from a commercial point of view. However, I think it is always well to remove grease from catgut by means of ether before subjecting it to any other preparation. Benckiser;‡ who has adopted the method of disinfection by heat, places small coils of catgut in envelopes before putting them into the oven, and only tears the envelope afterwards at the moment he is going to use the catgut.

Many surgeons prefer to disinfect catgut by means of carbolic

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* Martin proceeds in a slightly different manner. He rolls the catgut on glass plates, and immerses them for six hours in 1 per 1,000 sublimate solution. The catgut is then taken out, pressed in a cloth, dried, and placed in a mixture of two parts of alcohol to one of oleum juniperi. It may be used after six days' interval. At the operation, the amount which will probably be used is kept in a basin filled with some kind of antiseptic. At the Women's Hospital (Frauenklinik) in Berlin, the catgut is left for twenty-four hours in the oil of juniper, then for twenty-four hours in glycerine, after which it is placed in absolute alcohol, containing a small quantity of the oil.

† Aug. Reverdin. Researches on the Sterilization of Catgut (Rev. Méd. de la Suisse romande, 1888, Nos. 6, 7 and 9, p. 578, &c.).

acid or sublimate. This is the method of preparation adopted in Bergmann’s practice.*

It is immersed for 10-14 days in the following solution:

- Corrosive sublimate ... ... ... 4 grammes.
- Rectified spirit ... ... ... 800 "
- Distilled water ... ... ... 220 "

This solution is renewed from time to time: to preserve the catgut it is afterwards placed in the following solution:

- Corrosive sublimate ... ... ... 1 gramme.
- Rectified spirit ... ... ... 800 "
- Distilled water ... ... ... 200 "

J. L. Championnière, following Lister, soaks the catgut in this mixture:

- Crystallised carbolic acid ... ... ... 20 grammes.
- Water ... ... ... ... 2 "
- Olive oil ... ... ... ... 100 "

The carbolic acid is dissolved in the water, and then an emulsion is made by vigorously shaking it with the oil. Five or six months’ soaking are necessary to obtain a good catgut by this method, and even then it is always oily and unpleasant to handle.

Mikulicz has described the following method of preparation: The catgut is first soaked in carbolic glycerine (10 per cent.) for 48 hours, then for 5 hours in a half-per-cent. solution of chromic acid, and finally preserved in absolute alcohol.† By this means the catgut is converted into an extremely resistant and strong material for suture. Leopold has also adopted this method of preparation for cases of Caesarian section.

Döderlein,‡ recommends a slightly different mode of preparation. He soaks the catgut for 10 minutes in a solution of chromic acid (1 in 10,000), dries it, and then sterilises it by two hours’ exposure to a temperature of 130° C in a stove.§

Silver-wire and Horse-hair must be kept in rectified spirit after being heated to 120° C in the stove.

Elastic ligatures. Drainage tubes.—These are obtained in a state of relative purity by being subjected to boiling in sublimate solution (1 in 1,000) for 20 minutes. They are afterwards preserved in well-stoppered glass bottles,* containing either strong carbolic or one per thousand sublimate solution. Nevertheless, their perfect disinfection is not thereby assured, for the temperature and the solutions to which they are exposed, though doubtless sufficient to destroy germs, are not sufficient for the spores. Neither can recourse be had in this case to the stove, and a temperature of 120° C. for that affects the india-rubber.

They must, therefore, be disinfected by a roundabout method, viz.: allowing the spores to germinate, and destroying them afterwards. This end may be obtained by leaving them for 5 days in water kept at about 35° C. in an incubator, and renewing the water every day. Then only can they be placed in a sublimate solution, or 1 in 20 carbolic, without fear, and the solutions must be changed every other day for the first fortnight. At the end of that time they may be used with perfect safety.

* M. Baudouin (Asepsis in Surgery in Gaz. des Hôpitaux, Aug. 29, 1891, No. 100, p. 935) recommends a sublimate solution of one per cent. strength, and several successive boilings.
CHAPTER II.

ANÆSTHESIA IN GYNÆCOLOGY.


Local anaesthesia may often be used, with slight modifications, according as the skin or the mucous membrane is to be operated upon.

For an incision or a rapid dissection, refrigeration by means of an ice and salt mixture may be employed. The moment to be seized is when the skin becomes white; if the action of the freezing mixture be prolonged, it is likely to produce blisters or even eschars. A convenient method is by means of Richardson’s ether-spray. It is too well known to call for comment. It has the inconvenience of being slow in its action, and of preventing the use of the thermo-cautery. Some foreign authors and Terrilon* in France, have proposed to replace it by the use of a spray of ethyl bromide, which is not inflammable; but this liquid has other inconveniences, which have prevented it from coming into general use. The good effect of ethyl chloride has lately been insisted upon by Redard.† It, also, is used in the form of a spray.

Cocaine may be employed even for obtaining anaesthesia of the skin. Wölfler‡ has shown that a hypodermic injection of half a Pravaz syringeful of a five per cent. solution suffices to produce at the end of one or two minutes an anaesthesia lasting for from twenty to twenty-five minutes. The anaesthetic zone extends over an area of 2-3 centimetres, and outside this there is

* O. Terrillon (Bull. et Mém. de la Soc. de Chir., 1880, pp. 198, 213, 221, 261).
‡ Wölfler. Ueber die anästhesirende Wirkung der subcutanen Cocain-Injektionen. (Wien. med. Woch., 1885, No. 50, p. 1581.)
another semi-anæsthetic zone of the same extent, the two together yielding an area of from four to six square centimetres, wherein one can operate, without causing pain, for a period of from twenty to twenty-five minutes. And this is much more than is necessary to open an abscess or to extirpate a small tumour.*

If the operation is on a mucous surface, painting with a ten per cent. solution is preferable. An anæsthesia is thereby obtained which can easily be prolonged by repeated painting for sufficient time to perform an Emmet's operation or an amputation of the cervix, as I have ascertained from my own experience. The mucous surface thus anaesthetised seems to patients as if changed "into wood," to use their own expression.

I am certain that if the timidity of patients could be overcome, the part local anæsthesia would play in gynæcology could be considerably extended.† (Nevertheless, the fears of such patients are much more easily disarmed by general anæsthesia.) Daniel Lewis‡ (New York) was able to amputate, without pain, the breast of a woman of seventy-eight years of age, after the injection of cocaine, in whom a cardiac murmur made general anæsthesia inadvisable. In the same way I amputated the finger of a young woman who absolutely refused to be put to sleep.

It is worth while noting an observation made by Hanks,§ with a view to ascertaining its truth. He says that in any plastic operation, where the wound has been smeared with cocaine, the result has been a bad one as regards the union. May not this possibly have been due, in the cases mentioned by the American surgeon, to the cocaine solution not having been sterilised? The solutions ought to be made with water which has been distilled first and afterwards boiled, and a few drops of Van Swieten's solution should even be added.

These solutions should, however, be used with moderation,

* Instead of making the injection underneath the skin, it is better to make it in its thickness—endermic rather than hypodermic.
and it should be borne in mind that certain accidents have resulted from their employment. Dudley* reported to the Obstetrical Society of New York three cases in which the hypodermic injection of cocaine was followed by alarming symptoms. In two of the cases he had injected a solution into the cervix just before curetting the uterus, and in the third case he had injected it into the margin of the anus before removing a syphilitic vegetation. He used a 1 in 10 solution, and injected about 15 minims, i.e., 1 gramme. One of the patients fainted; all three suffered from great depression. The same mishaps have been seen by Emmet. Such a thing has been observed as loss of consciousness after a hypodermic injection of 6 drops of a 20 in 100 solution of chlorhydrate of cocaine, equal to 6 centigrammes of the active principle.† Such serious symptoms as sickness, fainting, slowness of breathing, enormous increase of the pulse rate, have occurred when a similar injection containing one English grain (65 milligrammes) was made by Dr. J. B. Howell‡ upon himself as a physiological experiment. It seems hardly prudent to exceed 5 centigrammes as a dose, that is 20 drops (about 1 gramme), when using a solution of chlorhydrate of cocaine of 5 in 100. Reclus,§ who used formerly to use as much as 20 centigrammes, never goes now beyond 10 or 15 centigrammes.||

One can hardly look upon the accidents attributed to exceedingly weak injections in any other light than as exceptions, resulting either from an error in the dose or from some idiosyncracy. Quite recently, for instance, Hallopeau published a case of acute and prolonged poisoning by cocaine, after about 8 milligrammes had been injected into the gums. The acute symptoms were followed by functional troubles which were at

§ Reclus and Wall. On cocaine in the practice of surgery (Rev. de Chir., Feb, 1889, p. 149).—Delbosc. On cocaine, Thesis, Paris, 1889.—Roux (Revue méd. de la Suisse romande, 1889, p. 55) is strongly opposed, and with good reason, to this exaggeration. He insists upon the special sensibility possessed by certain subjects; he has seen symptoms of a tetanic form come on after an injection of five half centigrammes.—At the present day Geyl (Nouv. Arch. d'obstet. et gyn., 1890, vol. 5, p. 637) makes use of the muriate of cocaine.
|| P. Reclus. L'anesthésie par la cocaine. (Gaz. des Hôp., Feb. 3, 1891, No. 15, p. 133.)
their worst one month after the injection, and only disappeared after two months and a-half. Hallopeau has collected reports of two other similar cases.*

Such facts ought not to be enough to make us give up or dread what is an excellent method of local anaesthesia; they should only serve to show that prudence is necessary in its use.

Continuous irrigation, which comes in so handily as an antiseptic during operation, is also remarkable as a sedative, and especially so when it is a weak carbolic solution (10 in 1,000).

Lastly, when we have to deal with hysterical or highly nervous women, we can sometimes induce sufficient anaesthesia by means of hypnotic suggestion.† I make mention of this more especially as a pathological curiosity; and yet I have been able, at the Lourcine-Pascal Hospital, to perform the operation of curetting without producing any pain, after having suggested to the patient that she was not going to suffer, and without its having been found necessary to send her to sleep. Quite recently Geyl‡ (of Dordrecht) was able, under similar conditions, to excise a prolapsed rectum, and to amputate the cervix uteri; the anaesthesia, under the hypnotic influence, lasted two hours in the first case and more than half-an-hour in the second. Mesnet§ reported to the Academy of Medicine a case of vaginal cystocele, which had been operated upon in the same circumstances without any pain.

General anaesthesia is absolutely necessary in major operations, but, if proper care be taken, it can be employed also for quite small matters. For instance, I have been in the habit of having women anaesthetised before curetting the uterus.

Lastly, one has to use an anaesthetic whenever one wants to examine any abdominal organ and there is likely to be any difficulty. The exploration is considerably facilitated by the abdominal parietes becoming flaccid and by the absence of all those reflex actions which take place when there is any pain. This anaesthesia for exploratory purposes should be the rule in a

* H. Hallopeau. Sur une forme prolongée de cocaïnisme aigu. (Bull. gén. de thérapeut., June 15, 1891, p. 481.)
† Guinon. Raclage de l'utérus sous le sommeil hypnotique. (Gaz. méd., Paris, April 16, 1887, p. 181.)
large number of cases we have to deal with; it is often without it, impossible to obtain a sufficient knowledge of the state of the uterine appendages when those organs are inflamed.

Lawson Tait, Keith, and a number of foreign operators* prefer ether to chloroform, as it does not so often give rise to excitement in the first stages, and to sickness. But ether has been stated to produce a destructive action upon the renal epithelium, so that there is some danger in its use when the kidneys are more or less affected, as is so frequently the case in abdominal tumours. Lee, Dudley, Freeman, Talbot, &c., have all cited cases of this kind.†

Many of the German laparatomists employ a mixture of chloroform and alcohol, as it produces a more even anaesthesia, and vomiting does not occur so frequently.

In France, chloroform reigns supreme, and the rules for its administration are well enough known for me not to have to insist upon them. Its purity should always be ascertained, especially when it is about to be used for a long operation.

* P. Silex (Ueber die Aethernarkose, in Berlin. klin. Woch., 1890, No. 8) has cited 2,500 cases where ether was employed; he did not meet with a single death.
When the operation is going to last a long time, and when the subject is particularly nervous and excitable, I have found it a good plan before beginning to administer the chloroform to give a hypodermic injection of one centigramme and a-half (that is, 25 or 30 drops) of the following solution:

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<th>10 grammes.</th>
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<tbody>
<tr>
<td>Distilled water</td>
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</tr>
<tr>
<td>Chlorhydrate of morphia</td>
<td></td>
<td></td>
<td>10 centigrammes.</td>
</tr>
<tr>
<td>Sulphate of atropia</td>
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<td>5 milligrammes.</td>
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The injection should be given 15 or 20 minutes before beginning with the chloroform. A much more regular sleep is then induced, it lasts much longer, and a much smaller quantity of chloroform is needed. It is incomparably easier to watch the progress of the anaesthesia, and for protracted operations I can hardly say too much in favour of this process of mixed anaesthesia, which we owe to Dastre and Morat.*

The patients are put to sleep in bed and brought into the

* The system of applying mixed anaesthetics (that of Dastre and Morat) is the one by means of which one will escape the only true accidents produced by chloroform, the syncope connected with the laryngeal reflex, and especially the secondary syncope, for which the surgeon is totally disarmed. By means of it one will avoid any agitation at the beginning, the sickness will be diminished, less chloroform will be used, and so there will be less danger of the ultimate intoxication from the anaesthetic in prolonged operations. The various questions, both theoretical and practical, which have been raised by its use are discussed in the two following communications: On a method of anaesthesia (C. R. de la Soc. de Biologie, 7 ser., April 7, 1883, vol. 5, p. 242).—On the method of MM. Dastre and Morat, mixed anaesthesia with morphia, atropine and chloroform (C. R. Soc. Biol., April 14, 1883, vol. 5, p. 259).—See also the discussions on the subject by MM. François-Franck, Poncet, Brown-Séquard, Paul Bert, Aubert.

My learned friend, Professor Dastre, has stated to me that in his laboratory experiments, before employing this method, he used to lose one animal (dog) out of four which he put under an anaesthetic. During the last ten years (1879-1889) since, he has been using it for hundreds of animals, he has not lost a single one, and to this advantage should be added that of its convenience and safety.

This method has passed into common surgical practice. Aubert, head surgeon at l'Antiquaille, at Lyons, uses no other. He has given an account of its advantages (C. R. Soc. Biol. April 21, 1883, p. 282) in these words: "I know at present of no method preferable or more practical. The following are the advantages of this method: 1. The safety. 2. The short time in which sleep is produced. 3. The absolute quietness of the patient. 4. The ease with which he is awakened. 5. The simplification of what follows, in the way of discomfort and sickness. Some of my colleagues in Lyons, and particularly Professors Gayet and Léon Tripier, have on my advice adopted this method of anaesthesia. The number of cases has to-day (1887) reached several thousand without a single accident." This method originated in the combined use of morphia for the first time by Cl. Bernard, in 1846, and in surgery (1873) by Nussbaum (of Munich). The experiments were continued, in France, by Guilbert, of Saint-Brieuc (1870), Labbé and Goujon (1872). The combined use of
operating theatre on a hand-trolley (fig. 16) so that they are spared the shock produced by the preparations going on for the operation, and the anaesthesia begins in a much less painful manner.

One should always bear in mind that to prolong the administration of an anaesthetic is a serious matter. This is owing to its action both upon the nervous system and upon the kidneys. Many of the cases published under the heading of shock undoubtedly owe their fatal termination in great measure to the depressing influence the anaesthesia has had upon the nervous centres when it has lasted two or even three hours.

The same cause may perhaps be at work in a certain number of so-called reflex accidents, observed after utero-ovarian operations, and especially so in what has been called the *guttural reflex*, which is marked by a painful and incessant desire to spit. I have had opportunities of witnessing this symptom after long operations performed in regions other than the abdomen, and I believe it is due to a true intoxication following upon the chloroform.

On the other hand, the absorption of a large quantity of chloroform or ether, and its subsequent elimination by the kidneys, may bring on an intense renal congestion with or without albuminurca.† This no doubt has a great deal to do

chloral and chloroform had been tried upon drunkards by Dr. Forné (1871) and Dr. Dubois. Professor Trélat also tried chloral and morphia together to produce anaesthesia in operations which only required numbness (4 grammes of hydrate of chloral and 40 grammes of syrup of morphia of the Codex in 120 grammes of water, to be taken half at a time, three-quarters of an hour before the operation, with a quarter of an hour's interval). Lastly, alcohol has been added to chloroform and to ether (Dubois, 1876), especially in cases of alcoholism. See Dastre, Criticism on the recent works on anaesthetics (Revue des sciences méd., 1881, vol. 18, p. 383). Anaesthetics, Paris, 1890. E. Bidot. The methods of mixed anaesthesia, &c. Thesis for M.D., Paris, 1887.

See also for the methods of administering anaesthetics, J. V. Laborde, Accidents from chloroform, &c. (Bull. de l'Acad. de méd., June 2, 1891), and discussion (ditto. June 9, 1871). M. Baudouin, A new mode of anaesthesia: chloroform given in small and continuous doses (Gaz. des Hôp., 1590, Nos. 63 and 68). I have for a long time past employed this excellent method.


† I have laid stress upon this fact in a work, published in the Ann. de Gyn., in July, 1884 (On the importance of changes in the kidney, following upon fibrous tumours of the uterus, in the diagnosis and prognosis of hysterectomy, vol. 22, p. 1). Here is what I then wrote: "Lastly, one cause which has much to do with the appearance or the exaggeration of renal affections in persons undergoing operations, is the great duration of the anaesthesia, which so often occurs in hysterectomy. Chloroform, when absorbed in large quantities, is sure to act upon the renal epithelium,
with the breathing troubles we have mentioned as coming on after laparotomy. It is especially after abdominal hysterectomies that these troubles connected with the cardio-pulmonary apparatus have been observed: we shall see that the kidneys are an especially weak point, for although all abdominal tumours predispose to chronic nephritis, it is never to be seen so frequently as in patients who are suffering from fibrous tumours. The process of filtration is very faulty in these patients, and is unable to rid the circulation of the toxic material which has been absorbed during such a long while by the lungs. Besides, the heart is often affected with the kidneys, in these patients who have had an abdominal tumour for a long time.* So it is easy enough to understand the chapter of accidents which comes on after a long anaesthesia, especially when one has not gone thoroughly into the case.

I have just mentioned heart disease, which is so frequently come across in abdominal surgery. Supposing it to be a cause for extra care in the prolonged use of an anaesthetic, should it, therefore, be a counter indication for the employment of chloroform? In our country we lean towards that opinion. The first ovariotermists in England, on the contrary, look upon the question in an opposite light. According to them, the accidents which are most to be dreaded, when the patient has been sent to sleep, are owing to the reflex inhibition of the heart or of the respiratory and vaso-motor centres. It is principally in cases where there is any organic change in the heart that this reflex inhibition is to be dreaded. Hence the

and thus add an extra difficulty to the elimination of the contents of the urine, which is full of danger when the process of elimination is already influenced by any organic lesion present "

Some months later, Terrier, in the meeting held the 17th of December, 1884, at the Société de Chir. (Bull. et Mém., p. 927), presented a note on the presence of albumen in the urine after the administration of chloroform, after some analyses had been made by his interne in pharmacy, G. Patein; he added a second note on the 1st of April, 1885 (Bull. et Mém., p. 221). Terrier and Patein ascertained by some exact analyses in a series of patients who underwent ovariotomy: first, that after only undergoing anaesthesia, the proportion of cases where albumin is noticed tends to become double, and also the quantity of it becomes considerably increased; second, after an anaesthetic and an operation, albuminurea is almost the rule. They and Professor Bouchard also attribute this albuminurea, first, to the action of the chloroform; secondly to that of the operation which excites the sensitive nerves. This albuminurea following operations may be of short duration, but it may be fatal. (See thesis by Patein, On albuminurea following inhalation of chloroform. Paris, 1888.)

* See, for more information on this subject, the chapter relating to Fibroids.
ANÆSTHESIA IN GYNAECOLOGY.

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conclusion, apparently paradoxical and yet, perhaps, legitimate, that chloroform should be used, especially in any important operation upon a person suffering from a valvular lesion of the heart, and should then be pushed with vigour so as to abolish all reflex movements.*

As undoubted counter-indications, I would mention fatty degeneration of the heart, any advanced disease of the kidneys, general atheroma of the arteries, and, lastly, extreme weakness.

This is not the place to describe in detail the general method of administration, and the means of assistance in case of accident. I shall merely give a few recommendations.

One preliminary precaution of importance is to make certain that the patient is not wearing a tooth-plate, or any movable artificial tooth, or to be sure to carefully remove them. One should never forget to apply to some parts of the face some greasy substance, for fear of any blistering from the contact of the chloroform, when the anaesthesia is to last as long as it sometimes does in gynaecological operations. The chloroform should have been recently rectified, and kept away from light. Only the necessary amount at each operation should be poured into a small bottle, which is arranged either with a double tube or with a stopper, so that only very small quantities can be dropped out at a time. Abroad, Junker's apparatus is very much used; in France we are well satisfied with the use of the compress, which is often spoken of in England as the Scotch method; it allows of the face of the person operated upon being very carefully watched. The compress should be carefully held with the fingers and slightly raised a little above the mouth and the nose. I am in the habit of pinning a piece of some waterproof material on the top of it (for instance, a piece of glazed plaster); there is thus less waste of the chloroform, and the person giving it is not inconvenienced by it so much.

It is as well to entrust, as far as possible, the chloroform to the same assistant, to give it in continuous small doses, and to carefully watch the breathing and the pulse.

To avoid accidents, watch the respiration and the pupil rather than the pulse; prevent the tongue from falling backwards and

* F. Hart and B. Barbour. Handbook on Gynaecology, French translation, Paris, 1886, p. 168. Quédan and Terrier have recently been expressing themselves as being in favour of this method before the Société de Chirurgie.
draw it slightly out of the mouth, dragging the lower jaw forwards with your fingers and holding the tongue with a pair of forceps.

One ought not to use forcipressure forceps, as they cause bruising. I use a pair of forceps which was made for me ten years ago by Aubry, and which has since been copied. It has a flat blade, shaped like a spatula, which is slipped under the tongue, and two pointed hooks on the other blade, which meet the first and cause nothing more than two pricks of no consequence.

There are in gynaecological operations certain circumstances in which one should be extra careful. When the woman is lying on her side or kept in the genu-pectoral position, the breathing becomes difficult, and it becomes more difficult to give the chloroform. There are certain moments in the operation of laparotomy which are anxious ones for the anaesthetist; for instance, when large quantities of fluid are drawn off, when huge tumours are removed, when a uterine pedicle or some large ligament is drawn upon, there may be a reflex action upon the circulation and the respiration. The mere impediment to the breathing due to such a mechanical cause as an accumulation of mucus in the back of the throat is nothing but an incident and not an accident; all one has to do is to remove it with a small sponge fixed in a handle, which should be introduced boldly and deeply.

If the breathing becomes embarrassed or stops, one should immediately perform artificial respiration and keep on at it without too much haste and with regularity; if the heart suddenly stops and there is syncope, the head should be kept low, the face should be smacked, cold water should be poured over the face.
and neck, the phrenic and pneumogastric nerves should have electricity applied to them, and *artificial respiration should be continued*. I have seen a patient recover only after twenty minutes of this proceeding, which had been carried on by relays of assistants. If the room is much heated, and full of carbolized vapours, one must not omit to allow plenty of fresh air.*

* Laborde (Bull. Acad. de Méd., June 9, 1891) speaks strongly in favour of an apparatus for producing artificial respiration in case of accidents due to chloroform. It consists of an ordinary bellows, and a mask for the face. The air sent by the bellows enters the mask and goes into the air passages.

I believe that one should be satisfied with the means *already* mentioned; the advantages of tracheotomy appear to me to be also very doubtful.
CHAPTER III.

METHODS OF PRODUCING UNION AND OF ARRESTING HÆMORRHAGE.


Sutures.—Union by first intention, which, with rare exceptions, has become the rule in modern surgery, can hardly ever demand more care to bring it about than it does in gynaecology: it is the essential for the perfect success of plastic operations, and for the safety of others. I shall not dwell upon the local conditions which must be present for a wound to have a good chance of uniting; the conditions, as is well known, are: a cleanly cut surface; the exact replacing of the parts (without any culs-de-sac, burrows or dead spaces) also their being placed uniformly, the absence of any traction or uneven pressure. So that one has, so to say, to pare the bleeding surface, and, if necessary, to make it even with a pair of curved scissors, by removing any jagged edges or tags of fat, and one has then to place the sutures so that the tissues are brought together and held in a way which most nearly approaches the normal state.

Although every gynaecologist should be familiar with the ordinary methods of surgery, it is necessary here to insist upon certain points of particular interest.

The needles can be handled in various ways: 1. They can be held directly in the hand. This method is very awkward, and should only be employed in cases of necessity. 2. The needles fixed upon a handle should be used when one has to go through
tissues which are very firm and difficult to get at. For instance, Deschamps' pointed needle will be very convenient for placing sutures deep in the vagina, in the cervix uteri, or in any cul-de-sac. On the other hand, when one has to go through tissues which are slightly resistant, but are rich in blood-vessels,
such as ovarian pedicles, broad ligaments, &c., one should use blunt needles with a curved point, so as to push the vascular parts aside without wounding them.

![Diagram](image)

**Fig. 19.**—Diagram to show the superiority of flat needles over ordinary needles.  
*a, Perforations in the skin done with ordinary needles; b b, These same perforations enlarged by the suture; c c, Perforations done with Hagedorn's needles; d d, The same perforations not at all enlarged from the effects of the suture.

**Fig. 20.**—Hagedorn's flat needles.

I have already said that we should absolutely condemn any needles with a movable eye, and grooved needles, however convenient they may be, owing to the difficulty in having them perfectly clean.
3. The needles are fixed in a handle (porte-aiguille). This is the most usual way.

Three kinds of needles are used. The ordinary surgical needles are flat and rather broad near the point, which gives them the appearance of a lance. This endows them with great penetrating power, but at the same time with the disadvantage of producing small transverse wounds, which tend to become enlarged by the traction of the suture (fig. 19). The most
commonly used needles are the curved ones, or the ones curved towards the point.

*Hagedorn's flat needles* (fig. 20), which have their curve the way of their edges instead of their surfaces, so that they present much more resistance than the former ones, have infinitely more power of penetration, owing to the sharp edge which forms their point. They are of the greatest service in plastic operations.
One should be provided with all sized needles. The finest ones are necessary for certain plastic operations, such as vesico-vaginal fistulae; whereas one requires very strong ones for suturing the abdominal parietes after laparotomy.

**Needle-holders.**—These are made in a variety of forms, and they have to answer two rather different purposes, according to whether the suture requires placing with great precision, or whether much force has to be used. In the first case one will find it more convenient to use a holder with a catch, which will allow the needle to be directed without one's having to keep it fixed by pressing upon the handle. Such needle-holders, made by Collin (one of which, after my design, for using Hagedorn's flat needles), are very good, and can be taken to pieces for thorough cleaning (fig. 21 2).

When one has to use very great force, so as to go through very thick or very resisting parts, the needles have to be much larger. Since the resistance offered by the catch of the instrument is then insufficient, it is much better to have one with free handles of large size, so that these can act as levers with considerable force, and one is enabled without effort to keep the needle firmly in its place just when the most force is required. Besides, the force of impulsion and the force of pressure then becoming one and the same, one almost automatically exerts one's muscles, so that the power for the second act is equal to the power for the first.

![Fig. 23.—Intestinal sutures.](image)

1, Czerny's suture; 2, Lembert's suture; 3, Gussenbaur's suture.

The pattern used by A. Martin (fig. 22 1) presents unusual dimensions, and I have been able to ascertain by experience
that they are nothing out of the way. I have got Collin to make me a holder on this principle for the largest needles generally in use, and for those of Hagedorn (fig. 22 3), and this has seemed to me preferable to the one with a spring used by the German surgeon.

For suturing the intestines, which is sometimes necessary in the course of a laparotomy, it is better to use an ordinary round sewing-needle, as it makes a smaller hole. I give here a sketch of Czerny, Lembert and Gussenbaur’s sutures, which are those most frequently used in this case (fig. 23). I lay great stress upon the importance of always bringing the mucous membrane into exact apposition.*

Formerly, for operations, one used to use thread made of hemp, silk, or flax; antiseptics had not then taught the necessity of perfect purity in the materials for suturing, and these threads, by their porosity, used to become regular nests for microbes, and suppuration in their course used to be the rule. The introduction of metallic sutures by the American gynæcologists, Sims and Bozeman, was for the surgery of former days a step in advance, the importance of which can hardly be exaggerated for the time when it was realised; the silver wires were much more easily made aseptic than the others; hence, no doubt, the unexpected results which followed, and the enthusiasm to which they gave rise.

At the present day they are in very general use, especially in France, and one is bound to recognise that they offer certain advantages.† One finds, however, that they are inconvenient in some respects; they break easily; they cut through the tissues more easily than other sutures, when they surround a rather large mass; it takes longer to apply them. Lastly, if cut too short, their pointed ends wound the vagina or the perineum; if these ends are left very long they run the risk of being pulled upon. That is why I have myself pretty nearly given them up, using instead, on almost all occasions, either

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† I have seen Désormeaux make use of an iron wire. Copper wire has been recommended, in America. Hunter. Fine copper wire suitable for plastic operations. (Trans. of the Obstet. Soc. of New York, in Amer. Journ. of Obstet., 1887, vol. 30, p. 406.) They have neither of them much in their favour except their cheapness, and they have the disadvantage of undergoing changes much more readily than silver wire.
catgut or antiseptic silk. Hegar* uses them when he has to do with some organ with a cavity, such as the vagina, where silk so easily becomes septic, owing to its permeability. But, I believe, one can obviate that difficulty by using frequent injections of perchloride or iodoform powder.

The horse-hair of Florence (which is made from the silk-producing glands of the silk-worm) will not absorb moisture or anything else, just like silver wire; it is not so easily broken as the latter, and at the same time it is less flexible; it is as stiff as horse-hair, and presents the same appearance. It has been found fit for all the various uses the metal wire has been put to, and it has even been given the preference by some authors, such as Bantock and Sänger. I find that is inconvenient, owing to its not retaining the knot as well as catgut or silk, and that it does not admit of being bent like the metal wire, so that the parts which are ligatured are not left perfectly safe. Lastly, the ends present sharpish points as they dry up, which should be borne in mind during any plastic operation upon the vulva or the vagina. It is, however, a good substance for suturing, and one ought to be acquainted with it. The best of these horse-hairs that I have come across have always seemed to be those with a slight reddish tint. Before using them, one ought to let them soak for at least a quarter of an hour in a solution of carbolic acid, or of the perchloride, for fear of finding them so stiff as to be very unmanageable.

The silk which one finds the firmest is that which is plaited (and not twisted), and it is to be had of the very finest kind. It is most excellent for suturing when it has been rendered aseptic according to the indications I have given (see p. 31). It can even then be employed for the interrupted sutures which are placed in layers one above another, and Billroth uses threads of no other material than silk. There have been experiments made which went to prove, not only that it was well worn by the tissues, but also that it became absorbed. And yet there is no doubt that it is inferior, in both these respects, to good catgut. In all cases, therefore, where the tissues do not require

* Hegar and Kallenbach. Traité de gyn. opér. French translation, p. 140.—Sänger also prefers them for plastic operations about the perineum. He crushes a small lead shot on the extremities of the threads, after they have been cut short so as to soften them.
to be kept together by very strong sutures for a long period, I believe that catgut is the one to be used. I prefer, on the contrary, using very fine silk for the intestines, the stomach, or the bladder; also to use silk in certain parts for putting in sutures to give additional support.

Silk has one disadvantage which it is important to notice, and which is owing to its porosity. This is secondary infection; the silk sutures and ligatures which are left in regions where suppuration may occur are sometimes the cause of interminable fistulae, which last until the suture has been eliminated after becoming septic. One should then prefer using catgut for the ligatures, and the Florence horse-hair for the sutures. These last are impermeable and less likely to become infected. This rule is especially applicable to operations connected with a pyo-salpinx or a pelvic abscess, when one has to apply the sutures quite near to the centre of the disease. In the same way, sutures in the abdominal wall, in contact with a tube or with a plug connected with any drainage, should not be made of silk, but of Florence horse-hair or silver wire.

There is not to be found either in general surgery or in gynaecology a substance for ligatures or sutures which is to be compared to catgut. The property it has of becoming dissolved and absorbed within a period which varies from eight to fifteen days, according to its strength and mode of preparation,* makes it invaluable for the ligatures which are to be left in the abdominal cavity, and for sutures placed in the cervix or vagina after plastic operations, when the removal of any sutures would cause so much difficulty and, sometimes, so much pain. For a long time past I have only used catgut for sutures, only placing at certain points a silk or silver wire suture as a support. One should remember that catgut has a greater tendency than silk to become loose and untied; so one has to make three knots one above another and to tighten them carefully; one will then be guarded against any mishap.

One should remember that the catgut which is generally sold is always of a doubtful quality, and often bad; so it is indispensable for the surgeon to have it prepared under his own eyes by a trustworthy assistant, unless he himself prepares it. The

* Chromicised catgut is not absorbed, it even resists absorption more than silk. (Thomson. Centr. f. Gyn., 1889, p. 409).
fears expressed by Kocher (of Berne) and some other surgeons on this subject are undoubtedly exaggerated, and one should by no means, like them, systematically give up this useful adjunct to surgery.*

The methods of suturing used in the surgery of former days seem to be very numerous. Actually, they tend to become more and more simplified, and for ordinary purposes the following sutures are about the only ones which practically are used in operative gynaecology.

1. The interrupted suture.
2 and 3. The continuous suture, simple or on different levels.
4. The mixed or combined suture.
5. The quilled suture.

The interrupted suture.—No matter what be the size of the wound, the whole of the parts should be brought into apposition for fear of any fluid accumulation taking place in any gaping part, which would interfere with the success of the sutures by causing distension, and might become rapidly septic. To insure this important point, Hegar, and after him Simon, has clearly pointed out the necessity, when one is putting in deep sutures, of passing the needle and the thread as well, through the entire thickness of the bleeding surface; at most one might leave out in the middle of it a surface of 1 or 2 centimetres, which

* See on this subject the discussions before the Société de Chirurgie (Bull. et Mém., Jan. 18, 1888, p. 51, and July 8, 1891). C. Brunner, Ueber Katgutinfection. (Beitr. zur Chir., 1889, vol. 6, p. 98.)
the thread bridges over, instead of tunnelling under it (fig. 24). It is obvious that the needles to be used in bringing certain surfaces together (colpo-perineorrhaphy, &c.), should be very long and very strong. After putting in these deep sutures, it is indispensable to put in some superficial ones with finer needles and thread, so as to bring the edges of the integuments exactly together. To do this with great precision, one ought to pass the superficial sutures quite near the margin of the wound.

They are introduced quite the last thing of all and tied at once, whereas the deep sutures are introduced the first and tied the last. The parts are thus brought much more exactly together.

The deeper a suture has to go, the farther away from the edge of the wound should it have its point of entry and that of its exit (fig. 26). All the same, the traction produced by a single thread which may be rather long will cause a pouch to be formed where there is a large surface, and there will be the risk of having the parts puckered, just as if the traction were irregular or somewhat exaggerated. Hence came the idea of having deep seated sutures at different depths placed one above another. By means of a first row, or a first layer of interrupted catgut sutures, the deep parts of the wounds are brought together; a second and even a third layer are afterwards put in to bring the remainder together. This method of union, which was first applied to perineorrhaphy by Werth,* in 1879 was immediately adopted by Schröder and his school; the process is of great value in certain cases, although it has the drawback of allowing the knots to remain at the bottom of the wound, and so to hinder the perfect coaptation of the tissues.

2. The continuous suture does away with this drawback. So, when on the recommendation of a few surgeons† this suture which had been so long neglected, began to see life again, Brœse‡ lost no time in applying it to plastic operations in gynaecology.

* Werth. Centr. f. Gyn., 1879, No. 23, p. 361.—Henry O. Mercy (of Boston) has claimed priority for using sutures of animal tissues, which are to be left in the wound. (The Perineum, Philad. 1889, p. 29), and he refers to a work which he published in the Boston Med. and Surg. Journal, Nov., 1871, vol. 85, p. 315. It is about two cases of radical cure for hernia, in which the deep sutures were of catgut, which were absorbed.

‡ Brœse. Die fortlaufende Katgutnaht zur Vereinigung der Scheiden-Dammriise. (Centr. f. Gynäk., 1885, p. 777.)
Fig. 25.—Sutures.
1. Continuous suture; beginning of the suture.—I I. Catgut thread.
2. Continuous suture nearly finished.
Schröder joined him at once, and it soon came into general use amongst his pupils.* It has the great advantage that it is always to be relied on, and at the same time it is quickly put in. It is of great value when one has to submit a woman to several operations at one sitting, for instance, an amputation of the cervix with an anterior colpo-orrhaphy, a colpo-perineorrhaphy, and Alexander's operation (the patient suffering from an hypertrophy of the cervix and from a prolapsed uterus).

This one is sufficient whenever the surface to be brought together is neither too large nor too deep; it is also useful for

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stopping bleeding, as we shall try to show farther on. One begins by passing the needle through one corner of the wound and tying three knots together in the end of the catgut suture, allowing a short portion of it to hang out. This last is seized with a pair of forceps (in the figures Baumgärtner’s forceps is represented, which is especially constructed to facilitate the traction upon the deeply placed sutures); an assistant holds it, and it acts as a basis for continuing the line of suturing (figs. 25 and 26). Then the needle is pushed in 3 or 4 millimetres from the edge of the wound and passed under the whole of its surface until it comes out of a corresponding point on the other side of

Fig. 27.—Suture in different layers. Method of fixing the thread in the middle of the wound by tying one loop.

the wound; the thread is gently drawn, and the assistant who held the forceps is now entrusted with the care of keeping it on the stretch whilst one makes the second stitch of the continuous suture; he has to be careful not to suddenly let go of the thread when the second stitch has to be tightened, but he should follow with it to the upper part of the wound, holding it all the time, to prevent the last stitch from getting loose. It is as well, when one has reached the middle of one’s suture, to have the opposite angle of the wound drawn gently away with a pair of bullet-extracting forceps, so as to insure the edges being parallel.

One essential precaution for preventing the thread constantly slipping out of the eye of the needle is to fix it in with a simple knot.
3. The continuous suture placed at different depths.—If a single row of stitches is obviously insufficient to produce the complete apposition of the parts on account of the whole bleeding surface being too much to take up on the needle, it will be necessary to have recourse to the suture placed at different depths. For this, at any point where the wound is unusually large, the needle, instead of being introduced outside the margin, must be introduced within this margin, right into the bleeding surface, for one or two centimetres, if need be, the distance being estimated according to the surface of the wound under which the needle can be made to travel. As soon as the broader part of the wound has been thus diminished, the needle is once more passed through the skin and the wound is closed up finally by a superficial continuous suture (fig. 26).

Three layers of sutures may thus be required one above another. They should never be too much tightened, nor should the stitches be placed too near together.

Means of ending the suture.—When one has to finish off a continuous suture on the surface, one may have to deal with two contingencies: supposing one has made a continuous suture run along the whole upper surface of the wound, and thus brought the end of the thread close up to its beginning, all one has to do is to tie the two ends together (making three knots); in the opposite case, one has to tie the end of the suture in a knot on coming to the last stitch, allowing its loop sufficient length, or else one may draw back the end of the thread through the eye of the needle sufficiently to allow the double thread to pass through the last prick; the loop thus formed can then have the extremity of the ligature tied in a knot to it (fig. 27.)

Means of strengthening the suture.—Supposing that one has accidentally cut the suture in the deeper row while placing the superficial one, or supposing it to be broken, one should immediately place a separate stitch, at a sufficient depth at the seat of the rupture, tying it there, and going on with it in the line of suturing which has been begun. Last of all, wherever any sutures have to bear a lot of traction, especially where they change their direction and form, so to say, the keystone to an arch, I cannot say too much in favour of placing several interrupted stitches, either of silk or silver wire. They are the true
sutures of support, which prevent any undue dragging upon the parts held together by the catgut (fig. 28).

In a perineorrhaphy I place two of them, one at each extremity of the perineum, the anterior one surrounding the end of the recto-vaginal partition, and the posterior one uniting the extremities of the anal sphincter. In a colpo-perineorrhaphy I place a single one on the level of the fourchette.

4. Mixed or combined suture.—It is sometimes useful to combine the continuous and the interrupted sutures. As an example of these mixed sutures, I will describe the method which I have adopted for closing the abdominal wound after laparotomy.

As soon as the cavity of the peritoneum has been washed and made clean, the abdominal wound is brought together and an assistant keeps it closed over a sponge which is spread out as an epiploon, covering the surface of the intestines so as to protect them during the suturing. The peritoneum, towards the lower end of the wound, is then transfixed by a curved needle, with a

Fig. 28.—Suture in different layers in an operation for ruptured perineum. 1, 2, 3, The tract of the thread. a, b, The simple continuous suture. c, Interrupted suture for support. d, Starting point of the continuous suture in different layers.
long piece of catgut of medium thickness. A single stitch is placed at this level with a thread, the long end of which is still kept in the needle, whereas the short end is caught up by a pair of forceps to be used for traction. The operator then continues as quickly as he can to pass a lot of large stitches through the

Fig. 29.—Stitches placed in the abdominal walls after hysterectomy.

1. First layer of the continuous suture (peritoneum). 2. Second layer of the continuous suture (level of the muscles and fascia).

peritoneum, right up to the upper end of the wound (fig. 29). Before finishing he withdraws the sponge-compress, then he goes back through the whole length of the wound, sewing up the aponeuroses with a second layer of stitches, which should be rather
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closer together, at the same time closing the sheath of the recti muscles if it should have been opened. He thus returns to the point of starting, he removes the forceps which held the short end of the cutgut, and ties the two ends in a knot.

The abdomen is now firmly closed; nothing remains to be

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Fig. 30.—Sutures placed in the abdominal walls after hysterectomy. Interrupted sutures through the skin and in the subcutaneous adipose tissue.

*sp*, deep sutures; *ss*, superficial sutures; *le*, elastic ligature; *s*, peritoneal suture; 

*p*, pedicle; *br*, knitting needle raised by pads of iodoform gauze.

done but to join the integuments and the subcutaneous cellular tissue, which are sometimes of considerable thickness. By means of a very large curved needle and some silk, the strength of which should be in proportion to the thickness of the parts to be dealt with, a series of interrupted sutures are introduced at
intervals of about three centimetres. These sutures enter the skin two or three centimetres from the edges of the wound, they pass through the whole thickness of the adipose tissue down to the surface of the fascia, and then pass in an inverse manner through the other side of the wound. As soon as these deep sutures are in place, a pair of forceps is fixed on to each end. The wound is washed with a strong solution of carbolic acid, and the edges are then brought together, and, by means of a smaller needle and some finer catgut or some wormgut, one or two superficial stitches are placed in each of the intervals between the deep sutures.

These stitches are put as near as can be to the edge of the integument, so as to insure its perfect apposition. (I often use, as a substitute, a continuous catgut suture). It is only when they are all in their place and tied that the deep stitches are to be tightened and united, letting go the forceps, which had meanwhile been fixed to their ends (fig. 30).

Supposing the abdominal walls are very rigid (as in nulliparae) or distended (as in cases of any abdominal swelling or tumour) it is better to use silk for the deep interrupted sutures, rather than catgut.

5. Quilled suture.—One ought to employ small rolls of iodoform gauze instead of the bits of wood or pieces of catheter which were formerly in use. They are an excellent substitute for the leaden discs which were used by Lister with thick silver wire. This kind of suture is no longer employed in perineorrhaphy, as in former times, but there are exceptional cases in which it may be useful.* One such case is the following: Where there is a very large tumour, with adhesions to the peritoneum lining the front wall of the abdomen, its removal leaves a very extensive bleeding surface, formed by the under surface of the abdominal wall more or less stripped of its peritoneum by the tearing away of these adhesions. This large oozing surface may be a cause of danger from septicæmia. So it is as well, before closing the abdomen, to fix on each side a long deep suture which has each of its ends supported by a roll of iodoform gauze, thus causing a fold in the abdominal parietes, immediately above and parallel to the Fallopian arch. This effectually compresses the bleeding surfaces, stops all hæmorrhage or serous exudation, and

producing union and arresting hæmorrhage.

thus eliminates one of the causes of early infection. The sutures can be removed in five or six days.

Hæmostasis.—This can be effected in various ways: by pressure for capillary bleeding, by torsion for small arteries, and

by suturing for the surface of a wound. But the two great methods about which I am going to make remarks are ligature and forcipressure.
I shall not dwell upon the separate ligature of vessels, as it has no special importance here.

The ligature "en masse" is of much greater interest in gynaecology. It is by means of this kind of ligature that one controls the hæmorrhage from the pedicles of abdominal tumours, which is often so alarming. This ligature "en masse" has been done successively, according to circumstances, with metal wires, silk, or catgut threads, and elastic cords or tubing. We shall have to study the question more thoroughly when we deal with ovariotomy and hysterectomy.

Silk is, for the ligature "en masse" of the pedicles, the most frequently employed material, on account of the great resisting power it has, combined with its small volume. One should always choose silk which is woven and not twisted. There is no doubt, however, that when one has to leave a large quantity of ligatures in the abdomen (for instance, after an hysterectomy according to Schröder's method, intra-peritoneal enucleations according to Martin's method, &c.) there is a certain inconvenience in leaving, in the large serous cavity, any substances which will take a long time to become absorbed, and whose porousness will be an especial cause of secondary infection. So that, since we have in the catgut, which has been prepared with oil of juniper, an agent which is superior to any which have ever been prepared by former methods, many gynaecologists (Veit, Martin, &c.) have no longer any hesitation in giving up silk entirely for those ligatures which are to be left in the peritoneum and to substitute catgut, although it is undoubtedly more difficult to form a tight knot with it.

I shall restrict myself to mentioning the different methods which we have at our disposal for ligaturing "en masse."

If the part to be surrounded is relatively small, and if a single thread is sufficient, one may be content to put the thread round the part, and then to bring it tightly together with an ordinary surgical knot (fig. 31 3).

If the pedicle is very bulky, but yet by means of two threads can be sufficiently tightened, it should be transfixed in the middle with a needle provided with a double thread (fig. 31 3); one can then cut the loop, so as to have two distinct threads, which may be tied one on the right and one on the left (fig. 31 3), but it is better to avoid having to make two knots (the
knots being much less readily tolerated than the remainder of the thread) by using Bantock's knot (fig. 31 ⁵) or Lawson Tait's Staffordshire knot (fig. 31 ⁶).

![Diagram of knotting technique]

**Fig. 32.**—The chain ligature. Method of making a needle holding the thread pass twice through the same opening (membranous pedicles).

![Chain ligature diagrams]

**Fig. 33.**—1. The chain ligature. Usual method for placing the threads after the second loop. 2. The second loop having been divided, the blunt needle is introduced alone, and fetches one end of the first loop, which is hanging freely beyond the pedicle, and then takes it to the under surface whilst a fresh thread is being passed into its eye.

Lastly, supposing one has to deal with a lamellated pedicle, like certain ovarian pedicles, certain membranous adhesions, or
simply some large ligaments, one should introduce a series of ligatures, passing in and out of each other, so that when one

tightens them there is no risk of tearing the parts (fig. 3178).

The figures 32, 33, 34, and 35 show sufficiently clearly the
methods in general use for passing these sutures, and the one which has been recently proposed by Wallich* as a substitute.

It is rather like Long's† method, with this difference, that Wallich uses a single needle on a handle (a double eye seems to

* Wallich. Sur la ligature en chaine, procédé pour placer les fils. (Annal. de Gynéc., Nov., 1888.)
me to be useless), whereas Long makes use of a series of ordinary pointed needles, which appear to me to have several defects.

I shall only mention, in passing, the threads of kangaroo-tendon, which were suggested by the surgeons of the new world,* or the threads reindeer tendon (threads of the Ostiaks), which are so highly spoken of in Russia. There is no doubt that they are unmatched in the way of strength, and after they have had their grease removed with ether, and have then been prepared like catgut, they have every advantage required for a ligature

"en masse." The difficulty of obtaining them with ease, will, however, prevent their becoming of common use in our country.

When the ligature "en masse" is done externally, it is followed by the death of the tissues which are surrounded. When it is left behind in the peritoneal cavity with every antiseptic precaution, the ligatured parts do not become gangrenous; they still preserve a minimum of vitality, owing to the vessels coming from the adhesion and to those passing like a bridge over the course of the suture; after a while the stump becomes shrunken and absorbed, which easily explains the experiments which have been performed on animals.* The catgut threads

* Hegar has seen portions of muscle, and Czerny has seen portions of cancer, which had been recently cut out, completely absorbed in a few weeks in the peritoneum of a dog. Ziegler has seen fragments of bone undergo the same absorption. Tillmanns has seen pieces of liver, kidney, and lung do the same. (Verchow's Arch., 1879, vol. 78, p. 437.)
are pretty soon absorbed, as has been directly ascertained.* As to the silk threads, they are first of all infiltrated with young cells, then they are encysted, and last of all they disappear; but it takes months for this to occur, and it may happen for them to act as foreign bodies, and to bring about certain mishaps even after a lapse of a good long time. This tardy infection can only be explained by germs passing through the intestine, or through the Fallopian tube, unless one is ready to admit a sort of latent microbism which is set up under the influence of some unhealthy local or general condition.† To prevent this infection from coming on straight away, whenever the surface of a divided pedicle is at all suspicious looking (salpingitis, &c.), it is better to use catgut for tying, or at any rate to cauterise.

![Fig. 38.—Elastic ligature held in place by a silk thread (Hegar).](image)

as well as to ligature "en masse." The aseptic slough produced by the red hot iron is rapidly absorbed.;

* Thomson has made some important experiments connected with the most frequently used materials for suture in laparotomy. *Carbolised catgut* is absorbed in ten days; *chromicised catgut*, on the contrary, lasts for several months, a result which Sänger and Döderlein had ascertained in women who had survived Cesarian section. *Silk* is somewhat unravelled after fifty days, and is almost entirely absorbed after sixty-four. *Silkworm gut* is still intact at the end of two months (Centr. f. Gyn. 1889, No. 24, p. 409).

† Hüffel reports a case of an extensive abscess appearing at the level of the pedicle of an ovary which had been removed two years and a-half previously by Hegar, and one year after a confinement (Arch. f. Gynäk., 1876, vol. 9, p. 319).

‡ Kaltenbach (Operative Gynäk., 3rd German edition, 1886, p. 268) in a patient who had died from tetanus eight days after operation, found the cauterised surface to be quite smooth and free from any trace of inflammation, but with remains of the carbonised tissues. Heppner (Petersb. med. Zeitschr., 1870, vol. 17, p. 306) after two years, was hardly able to find any traces of animal charcoal in the neighbourhood of the pedicle.
Fig. 39.—Method of applying Pozzi's elastic ligature-holder.

1. First action.—The lower end of the elastic band is held in the fork of the handle; the band passing through the open catch is kept in the upper end of the instrument by means of pressure.  
2. Second action.—The elastic band has been twice passed round the pedicle; it is then once more held in the upper end of the instrument by pressure.
As for elastic ligatures, whether used externally or buried in the peritoneum, I can only mention their general use, all the technical details connected with them being found in the chapter on hysterectomy, for which they are mostly employed. They
have, however, in exceptional circumstances, been adopted for tying pedicles other than those of the uterus; for instance, Hegar has used them in some cases of castration, where there has been much bleeding.

To fix an elastic ligature, Oldhausen is content with tying the two ends in a double knot, and with sewing the ligature to the pedicle with a few silk stitches to prevent its slipping. Thiersch passes the two ends into a leaden ring, a sort of Galli’s tube, which he afterwards squeezes upon them. Hegar places a silk ligature upon the ends while they are held stretched, and then places a second ligature a little further for safety* (figs. 36, 37, and 38).

Various elastic ligature-carriers have been proposed since I had the first made, for the purpose either of placing the ligature with greater facility, or else of keeping it in its position like a sort of clamp in the extra-peritoneal ligature. As a matter of fact, I believe that this latter function is superfluous, and that two skeins of silk will accomplish it with ease, and certainly without the want of any instrument. My ligature-carrier (figs. 39, 40, 42,4,5), of which I presented the Society of Surgery in 1883 with the first model, and which I exhibited at the Congress in 1885,† after it had been perfected, has no other purpose than to facilitate the introduction of an elastic band into a very narrow space, such as the pelvic or vaginal cavity.

It is a simple instrument to manage, and, as it can be taken to pieces, it can be kept perfectly clean. Collin’s ligature-holder (fig. 41), which is simpler than mine, has the disadvantage of not being able to tighten the elastic loop after it is once put in its place. Terrillon’s and Segond’s ligature-holders (fig. 42, 1,2)‡ are excellent for holding the ligature, which is the principal object which they seemed to have had in view, but they are not of much avail in placing the ligature when any difficulty occurs, which to me seems the true purpose of a ligature-holder. As for the provisional ligature, they are not much superior to Hegar’s forceps (fig. 36) or to Walcher’s clasp.§

* See for these details, my “Note on the use of the elastic ligature, &c.” (Bull. et Mém. de la Soc. de Chir., Nov. 28, 1883, p. 889.)
† Compte rendu du premier Congrès franç. de Chir., 1885, p. 537.
‡ Bull. et Mém. de la Soc. de Chir., 1886, pp. 197 and 201.
(fig. 41), and as for the permanent ligature, I have already said that it is better to employ two silk threads.

Forcipressure.—It is owing to Köberlé first of all, then to Péan, and afterwards to Professor Verneuil * that this valuable method of stopping haemorrhage has become of frequent use in

* The method of stopping haemorrhage by means of the temporary or continued application of a pair of forceps is a very old one, and Professor Verneuil has given a very learned account of it, to which I would refer anyone caring to study the question. One has to recognise the fact, which has not been sufficiently insisted upon, that surgeons were long ago almost invited, so to say, to adopt forcipressure by the celebrated instrument maker Charrière. In his Catalogue, published the 16th April, 1851 (p. 11, fig. 53), he represents a small forceps almost identical with the forcipressure forceps of Köberlé and Péan. It is thus described in the text: "Forceps with fenestrated and crossed blades, after Charrière, for seizing insects or reptiles in narrow holes. These same forceps can be made with our rack-fastening, which will keep them closed when required." In 1859, in another edition of his Catalogue, p. 6, Charrière writes a paragraph on the means of fixation which belong—1st, to the two fenestrated blades for polypi of the oesophagus and for dissecting; 2ndly, to the artery forceps. He describes the addition of a nail riveted into one blade and fitting into a hole in the opposite branch, and he adds: "This method of transforming a pair of fenestrated forceps, a pair of dressing forceps (as it used not long ago to be called), into a pair of pressure forceps, allows one to carry the needles into very deep cavities to compress the vessels so as to stop haemorrhage during operations." Charrière, it is true, was only referring to a temporary arrest of the bleeding, for he adds: "The blades being conical in shape allows one to carry the ligatures quite deeply into the vessels." All the same he had quite understood the immense service which forceps can render for temporary haemostasis, for he again insists upon it in the Catalogue Commercial Ménié, 5th edit., 1860. He represents, p. 276, fig. 18, his forceps with fenestrated blades for continuous pressure, and remarks as follows (note 7): "1st. This instrument serves as an ordinary dressing forceps. 2ndly. The elasticity of its blades allows one to get a very firm hold of the arteries during haemorrhage, &c."

I have thought it worth while to insist upon these biographical facts, which are for the most part unknown to those who have dealt with the question of priority in talking about the matter. One thing cannot be denied, that the instrument, which some years later was to come into such general use, was manufactured in 1851 by Charrière for another purpose, and then designed by him in 1859, as being applicable to forcipressure.

All the same this was only exceptionally the practice until the day when, with the object of saving time in big abdominal operations, it was adopted both by Köberlé and Péan almost at the same time. Which of the two was first in the field? A sharp controversy on the subject only resulted in the production of certain documents which are difficult to appreciate.

Köberlé (on the permanent arrest of haemorrhage by excessive pressure, Paris, 1877) got Elser, a surgical instrument maker in Strasbourg, to make for him, in 1865, a pair of forceps somewhat analogous to Charrière's dressing forceps, provided with a rack fastening, which allowed one to compress tissues of various thickness to the extent desired. He makes mention of the use of these forcipressure forceps in a paper published at Strasbourg in 1866 (the Caesarian section performed successfully in a case of pregnancy in a bicornate uterus, 21 months after the death of the foetus at the 7th month). Since 1867 he generally used it for rapid forcipressure, and rarely had recourse to ligatures. This results from Revillout having published in the Gazette des Hôpitaux (1868, No. 75, p. 297), the method of operating which he had seen adopted by the Strasbourg surgeon, and also from what was published by Köberlé himself
surgery and gynaecology after having been inaugurated by Sédiillot with such faulty instruments. In England Spencer Wells became its most ardent champion, and it is in general use in surgery as well as gynaecology.*

In plastic operations one has to be careful not to make an abuse of this method, for the small portions of tissue which have been unduly squeezed in the fangs of the forceps become an obstacle in the way of immediate union.

As in the process of ligaturing, one might make a distinction between forcipressure dealing only with isolated vessels and forcipressure dealing with them by taking up the tissues in their entire thickness. This preliminary act of squeezing the tissues is a great help towards the permanent arrest of haemorrhage.

It is as well, therefore, to have at hand some forceps of various shapes, such as Billroth’s enormous forceps, which is suitable for compressing large fleshy pedicles, and such other varieties as have been suggested or modified by Kœberlé, Péan, Terrier, Spencer Wells, Tait, Thornton, &c.

Forcipressure is usually only employed for provisional arrest of bleeding. Nevertheless, in urgent cases it has been of use for the permanent arrest. Péan for a long time past has found it

shortly afterwards in the same journal (Gazette des Hôpitaux, 1868, p. 410). He soon began using his forceps for every operation.

Péan (on squeezing the vessels as a method of stopping haemorrhage, in vol. 2 of his clinical lectures on surgery, Paris, 1877) had, like Kœberlé, begun by making use of Sédiillot’s “serres-fines” (ovariotomy and splenotomy, Paris, 1869, p. 51). He afterwards, in 1868, got Guéride to make some forcipressure forceps of convenient and varied shapes, which appeared from that date in the catalogue of that instrument maker. The main point in the discussion, and the one which does not seem likely to be decided, is whether Kœberlé’s assertion is correct, that what he was daily employing was adopted, more or less perfected, by Revillout, or whether Péan’s is the correct assertion, viz., that he was the inventor of the instrument, when labouring under the same necessity in his operations as his colleague at Strasburg. Nothing could really be more natural. All the same, whether he invented it first or at the same time, Péan, with his position in the Paris hospitals and his large practice, helped most considerably to make its use general (Bull. et Mém. de la Soc. de Chir. de Paris, 1875, p. 17, 108, &c.).


possible to leave the forceps lying in the peritoneal cavity after abdominal hysterectomy, collecting them into a bundle which he places in the lower angle of the wound; this is obviously not to be compared to the use of the elastic ligature.

Forcipressure, which had already been employed by many surgeons from necessity in vaginal hysterectomy (Péan, Buffet, J. Bœckel, Ch. Jennings), came to be spoken of as the method to be chosen by Spencer Wells,* and Jennings,† at last it was

† Chas. E. Jennings. The Lancet, 1886, vol. 1, pp. 682 and 825.
systematically employed as such by Richelot, who prefers it even when it would be easy to use a ligature. Many surgeons follow this course, and it forms a subject which I shall have to refer to in the chapter on cancer of the uterus. I shall merely remark that the application of forcipressure for haemostasis for any

length of time to the tissues "en masse" is always followed by the mortification of an incomparably larger area than can ever be

* See, for notes on this subject, and for indications for forcipressure in vaginal hysterectomy, S. Pozzi, Annal. de Gyn., August, 1888, vol. 30, p. 81.
Fig. 48.—Haemostatic forceps.

seen after placing an isolated ligature, so it is inferior to the ligature from an antiseptic point of view.

_Drainage._—This is not the place to discuss the indications for

![Image of surgical tools]

Fig. 44.—1. Billroth's clamp for fleshy pedicles (hysterectomy). (Medium size, represented 1/3 of size.)

2. Spencer Wells' haemostatic forceps for grasping the pedicles _en masse_ (ovariotomy).

drainage either in wounds which are brought together or in the peritoneal cavity. I shall merely set forth a few general principles and mention the practical means of carrying them out.
Fig. 45.—1. Thornton's hæmostatic forceps for pressure *en masse* (ovariotomy).
2 Hæmostatic forceps for pressure *en masse* (Péan, Terrier, Collin) (for use in adhesion).

Fig. 46.—Hæmostatic forceps with curved blades, for vaginal hysterectomy (Péan and Richelot).
Drainage of wounds.—When after laparotomy the abdominal wound is closed with several layers of sutures it is generally found unnecessary to place any drainage between the surfaces brought together. This is not, however, the case when the cut surface has been in contact with any septic matter such as pus. In that case it is quite possible that, in spite of the most careful cleansing of the parts, a serous or seropurulent oozing may appear and endanger the primary union, unless it is at once carried away by the drainage. One had better in such cases place a small drainage-tube between the suture uniting the fasciae and the suture uniting the skin and cellular tissues;
this drainage tube is usually divided into two or three segments, and a safety pin passed through the ends will prevent them from sinking into the wound and getting lost.

I have seen Farkas, at Pesth, make use, for the same purpose, of a small disc of hard caoutchouc, which can be easily fixed into the end of the tube by means of a small suture on each side.

The best drainage tubes are made of thick caoutchouc, combining elasticity enough to keep their lumen open and suppleness to allow them to be adapted to any part.

It is hardly necessary to use glass tubes or hard incompressible caoutchouc if one has caoutchouc of sufficient thickness and of good quality.

_Drainage of the Peritoneum._—The fear of allowing an accumulation of liquid in the peritoneum (blood, ascitic fluid, or some more or less septic serous fluid, &c.), has induced surgeons, since the early days of laparotomy, to see that the peritoneum is carefully drained. Peaslee, in 1855, was the first to give rules about its being done; he would use an elastic sound, which was placed in Douglas' pouch and passed out of the vagina. Kœberlé, in 1867, introduced drainage through the abdominal wound and used a glass tube ending in a cul-de-sac and perforated with small holes throughout its whole length. From that time the two methods of peritoneal drainage were established. But the true indications for such drainage were not yet decided upon, nor are they even at the present day. Simms, in 1872, recommended its systematic employment after every ovariotomy. This unlimited use had at least the advantage of proving how harmless drainage can be when the reasonable precautions are taken. One is bound to recognise that after a very few hours the drainage tube becomes, so to say, sequestrated by the formation of pseudo-membranes which surround and isolate it. It is only when a continuous oozing takes place in the abdomen that a cavity forms near the extremity of the tube and keeps full of the accumulated liquid.

A new element cropped up to simplify the question; this was the knowledge of the great power of reabsorption possessed by the peritoneum* when it is not interfered with by any serious

* Wegener (Arch. für klin. Chir., 1876, vol. 20, p. 51), from his experiments made upon dogs and rabbits, concludes that the power of absorption possessed by the peritoneum in man is equivalent to something like from two and a half to six litres
injury or any extensive tearing, when it has not been long exposed to the air and the intestine is not paralysed. Hence it happens that after a simple laparotomy, that is, one where there are none of the complications just enumerated, a very considerable amount of liquid (either blood or serum) can be rapidly reabsorbed without causing the patient any inconvenience. Chénieux* maintains that this reabsorption is preferable to evacuation, and it cannot well be denied. The difficulty is to ascertain in what conditions it takes place, because if it fails there is every chance of septicemia appearing. I have said in a preceding chapter (p. 28) that the washing of the peritoneum causes a momentary suspension of this power of absorption possessed by the membrane.

Supposing the peritoneum to have been thoroughly cleansed, after any laparotomy, by means of sponges which are passed over all the deeper parts with the fingers, or of long forceps, one need not take into account the drainage of anything that may be left behind in the abdomen, but only of what is likely to be produced there and remain there after its deposit. The means of appreciating this are so varied that it is difficult to lay down any absolute rule; the surgeon will have to judge each case. One may nevertheless formulate the principal indications for drainage in the following manner:

1. Abundant oozing of blood or serum which is threatening after the closure of the abdominal walls, in consequence of special anatomical or pathological conditions, the power for reabsorption possessed by the peritoneum being no longer perfect. (The drainage in this case is no longer an evacuator only, but, according to Lawson Tait, it becomes a powerful haemostatic).

2. The existence in the peritoneal cavity of any septic surface (portions of a cyst wall, suppuration) capable of producing liquids the reabsorption of which would be dangerous; the presence of lesions in the peritoneum.

3. Any large tear in the peritoneum which would have a two-

per hour; hence poisons injected into the peritoneum have as rapid an effect as if they were injected directly into the vessels.


fold action: (a), as a source of persistent oozing; (b), as a hindrance to the normal process of reabsorption.

4. Lengthy duration of the operation and laborious manipulations, which have endangered the tone of the intestine and the vitality of the serous membrane forming its coat.

Drainage through the vagina.—As Douglas' pouch is the most dependent part of the pelvic cavity, it seems quite natural to fix upon it as the outlet for any liquids. Besides, there is also the advantage of not weakening the abdominal wall, and so favouring any future hernia by retarding primary union. The only objection which can be raised against using the vaginal method is the profusion of micro-organisms to be found in the vagina and the very great difficulty in getting the parts perfectly aseptic.

I shall purposely omit any mention of methods of drainage which are insufficient or complicated,* and shall confine myself to describing the method which I think the best. This is the introduction of a cross-shaped tube formed of two pieces of caoutchouc tubing fixed together. (The crosses can be made out of silk sutures, but then they run the risk of secondary infection). After a laparotomy one can introduce such a tube by means of an incision into the posterior cul-de-sac, or directly by puncturing with a large trochar, or better still with Wölfler's forceps. Lastly, I have seen A. Martin forcibly introduce this tube without any previous puncture; the two lateral branches being kept folded between the blades of a forceps, he places two fingers in Douglas' pouch, and, whilst an assistant keeps the cervix steady and irrigates the vagina with an antiseptic lotion, he pushes the forceps vigorously into the cul-de-sac behind the posterior lip and bursts through the tissues; the forceps enters the abdomen between the two fingers, which help from above to guide and support it. By this means the author says that one is enabled to proceed quickly, to avoid haemorrhage, and to be sure and keep clear of the rectum. For my part, I prefer making use of Wölfler's forceps with the necessary precautions (fig. 48 3). The transverse branch of the tube keeps it securely in its place, but does not prevent it from being pulled out when the time comes.

* Amongst the insufficient methods of drainage is the one where a simple tube is used. The method which was invented by Bardenheuer (Zurfrage der Drainirung des Peritonealhöhle. Stuttgart, 1885) is, on the contrary, too complicated.
The inferior end should always be surrounded by some iodoform gauze. The drainage tube should be left in its place for eight or ten days at most, unless there is any special indication. Some disagreeable sensation or some discomfort in

Fig. 48.—1. Cautchouc tube in the shape of a cross for draining cavities.
2. Method of holding the cross-shaped tube in the forceps, so as to introduce it into a cavity.
3. Wölfer's forceps for introducing tubes by transfixion.
the lower part of the belly is generally a sign that it can no longer be tolerated. It is as well not to have any injections made either into the tube or the vagina; one need only mop up any fluids with some iodoform gauze, which should be gently passed into the vagina.*

_Drainage through the abdominal wound_ has most often been effected with glass tubes. The ones to be preferred are those which have their lower end only pierced with holes (Keith, fig. 49 ²). The tube is pushed down into Douglas' pouch, and the upper end which protrudes from the abdomen is surrounded by some absorbent dressing. Lawson Tait makes use of a special kind of aspirator (fig. 50) for pumping out the fluids. Kœberlé,† as early as 1867, used to fill a glass canula with pledgets of carbolized cotton wool for the purpose of absorbing

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them. Hegar* adopted this plan, and improved upon it, taking advantage of the capillary condition of the absorbent substances which he placed in the canula and which he frequently renewed. He eventually transformed the latter into a large abdominal speculum (Bauchspeiculum) made of glass, or hardened gum elastic, from 3 to 5 centimetres in width and 18 in length, which he used to stuff with carbolized cotton wool in his first attempts, and then later on with iodoform gauze. The tube was changed every hour during the first day, then every two hours, and last of all every four hours. Hegar has since given up this practice, and keeps to capillary drainage with the gauze alone.

One can see that capillary drainage has for a long time been an adjunct to the tubular drainage through the abdominal wall. as by its means the opposing effects of weight are more thoroughly counteracted than they can be by placing the patient on her side or on her belly, which is what Nüssbaum used to do with his patients. It is Kehrert† who deserves the praise for having put into systematic use a practice which he found to be more or less empirical. He proposed the use of skeins of cotton threads, about as thick as the little finger, something like the wick of a spirit-lamp, and he had them disinfected by boiling them in a carbolic solution of 5 in 100; at present he prefers disinfecting them by steeping them in ether and iodoform, and then drying them.

Since Kehrert's paper, the use of skeins of thread, made antiseptic by being saturated with carbolic acid or iodoform, has become very common in Germany, both in gynaecology and general surgery. It is the form of drainage which Breisky has been using for a long time past after the total removal of a cancerous uterus through the vagina. Billroth, after having adopted it for various purposes, seems now to have given it up, and keeps to strips of iodoform gauze. These skeins of thread seem, however, to have recently come into favour again. Gersuny‡

maintains that their power of absorption is much superior to that of gauze, and Chrobak* has endeavoured to demonstrate it by experiments; he has employed them for drainage after ovariectomy and vaginal hysterectomy. All the same, we find surgeons of the standing of Hegar, Mikulicz, &c., who declare that the absorbing power of gauze is quite sufficient; besides, there is much to be gained in not multiplying, without clear necessity, the materials which are to be used for a dressing.

The indications for the simple capillary drainage of the peritoneum, independently of its combination with plugging, of which I shall speak presently, are, I think, very limited. I only use it, for my part, after vaginal hysterectomy. Instead of introducing one or two tubes into the wound in the peritoneum, or leaving it gaping, as do many surgeons, I prefer reducing its size by means of two lateral sutures, and then thrusting in to a depth of about one inch a large strip of iodoform gauze, which is doubled at its upper end, the two ends are then heaped up in the vagina, and can be found again by the thread which should be attached to them. After a variable length of time, according to the amount of oozing, one has to renew the other strips of iodoform gauze which complete the intra-vaginal dressing, leaving the strip in Douglas' pouch in place, as it acts as a drain. The latter should only be removed after six or eight days.

Antiseptic plugging of the peritoneum.—It is truly a bold idea to fill up a part of the peritoneal cavity with an antiseptic plug, and thus to isolate it. This isolation is effected, during the first hours, by nothing but the wall made by the material used for the plug, and later on by the adhesions which it causes to be formed all round it. Such a bold proceeding, it is true, was first of all suggested by the success following the plugging of wounds in place of draining them, according to the plan of Kocher and Bergman.† As a first step towards its use in gynaecology, Hegar,‡ when he was going to make an opening into any suppurating part in the pelvis, adopted an identical proceeding with the one used by Volkmann for hepatic

collections of fluids. Last of all, the true plugging of the peritoneum has had a good deal said in its favour by Mr. Mikulicz;* it has been employed in Germany and America,‡ but I have found nothing written about it by English authors, and in France I was the first to describe and apply it.†

Method of proceeding.—Mikulicz advises one to begin by covering the bottom of the cavity about to be plugged with a sort of bag made of gauze, slightly saturated with iodoform. A double thread of antiseptic silk should have been previously attached to this piece of gauze to give one the means of withdrawing it more easily. This double thread comes out through the opening of the gauze bag, which lies in its place folded up like a tobacco-pouch. To avoid losing time it should be prepared beforehand. Once in its place, one introduces from two to five long strips of iodoform gauze, which are carefully packed so as to fill up the whole cavity. Their upper end goes beyond the neck of the sac, and protrudes at the same time from the lower end of the abdominal wound (fig. 51).

This proceeding can often be simplified by merely stuffing the cavity in its whole depth, when it happens to be small or sinusous, with strips of gauze, but one has to be careful to smooth down the edges of the gauze, so that there is no chance of its leaving any filaments behind.

One useful precaution is to introduce at the same time a big drainage tube, somewhere about the centre of the plug, so as to prevent the retention of any liquid which may chance to be too thick to filter through the gauze.

I also recommend that the iodoform gauze should only be used after having been beaten to rid it of any excess of iodoform powder. I happen to have seen on one occasion the signs of slight iodoform poisoning, and Mikulicz has also given an account of the same thing in one of his cases. Last of all, I find it as well to put some special mark, such as a coloured


‡ Pozzi. *Capillary drainage and antiseptic plugging of the peritoneum.* (Bull. et Mém. de la Soc. de Chir., Feb. 29, 1888.)
thread, upon the various strips of gauze, to enable one to know in what order they should be removed.

How long should this plug be left in its place? Mikulicz advises one only to withdraw the innermost strips after forty-eight hours, and to remove the bag itself two or three days later. One should be guided by the amount of oozing and the general condition of the parts which are plugged. In any case, one should not remove the bag earlier than the fifth day, to allow
dime for the peripheral adhesions to become consolidated and escape the chance of being torn. It is easy enough to remove all the strips of gauze, if, according to my recommendation, some distinguishing marks have been placed upon them, allowing one to take away the most superficial ones first and then the

Fig. 51.—The peritoneum plugged (after hysterectomy).  
   a a, Iodoform gauze bag.  
   b, Silk thread fixed to lower end of bag.  
   c c, Strips of iodoform gauze.
PRODUCING UNION AND ARRESTING HÆMORRHAGE.

deepest. Otherwise one may unfortunately tear the parts.* Should the plug itself have to remain in its place long enough for some plastic aseptic peritonitis to occur all round it, and so to circumscribe it, it is obvious that the outer dressing will have to be changed as often as necessary, that is about three times a day.

It becomes rapidly infiltrated with the sero-sanguineous fluid which is secreted at the bottom of the wound, and which passes through the plug by capillary attraction.

It is no more possible to give any definite rules about the cases which require plugging than about those which require drainage. It in great part depends upon the judgment of the operator. Plugging should undoubtedly be an exceptional means, an ultima ratio, either to prevent general hæmorrhage (the haemostatic plug) or to prevent any risk of infection (the antiseptic plug). In the latter case, two different questions may arise: (a) One part of the wound is already infected at the time of the operation, and washing out the wound freely does not seem to be a sufficient precaution to take, on account of the abundant secretion of pus and septic matters; such a condition can also occur should any portion of infected tissue have to be left behind, owing to the danger of removing it. (b) There is a fear of infection after the closure of the abdominal wound. It may occur through the giving way of some suture which has been awkwardly placed, or through the perforation of some organ which has been involved, either before or after the operation, such as the intestine or the bladder. In cases of both sorts I have had to congratulate myself upon having resorted to the antiseptic plugging of the peritoneum.

**Intra-uterine drainage.**—The capillary drainage of the uterus with iodoform gauze has been practised as a means of disinfection for uterine catarrh.† A narrow strip of iodoform gauze is used, which has to be gradually introduced with the help of the sound. After twenty-four hours it has to be renewed, and one then finds the cavity sufficiently dilated to make the procedure much

* Gluck has recently proposed to make plugs out of various absorbent materials, skeins of catgut, &c. This is, I believe, a theoretical view of the matter which can be of no practical utility. Ueber resorribare antisept. Tamponade. (Deutsche med. Woch., 1888, No. 39, p. 791.)
easier. When the uterine cavity requires thorough disinfection, either by frequent irrigation or by the introduction of antiseptic tents, one can use much the same sort of means for draining or plugging this cavity as those which I have just mentioned for the peritoneum.

Langenbuch, Thiede, and Schede have effected this drainage by means of a caoutchouc tube, which is closed at the upper end, but perforated with holes in the part which is contained in the uterus. One is thus enabled to frequently inject the uterus, but it would be in vain to hope to remove any mucus with the help of drainage; it is much too thick to pass through the openings in the tube. Besides, it becomes difficult to keep the latter in its place. It is a very bad practice, and one by which the uterine cavity, far from being disinfected, may become rapidly infected.

It is quite a different matter when one has to deal with an uterus sufficiently dilated to allow the introduction of a large cross-shaped tube. This is much to be preferred to the metal instruments which have been proposed (Sevastopoulo), and which sometimes injure the uterus by their pressure. The cross-shaped drain is easier to introduce and to keep in place; besides, it is borne better by the patient. It can be of very great service when one finds in the dilated uterus some permanent source of infection, some sloughing fibroid tumour, or the remains of the foetal membranes, which have resisted the process of curetting. If necessary, this form of drainage can be made to precede the continuous irrigation, and in any case it will considerably facilitate the outflow of any liquids secreted, and the administration of any frequent intra-uterine injections.

Continuous irrigation.—The following is the method of proceeding which I recommend:

A cross-shaped drainage tube is introduced by holding its transverse branches folded up in a pair of forceps (fig. 48 2). This can be easily done, as the uterine cavity is dilated in cases where irrigation is thought necessary. One should first of all wash out the uterus with two or three litres of a fairly strong antiseptic solution (carbolic acid, 30 in 1,000, or the sublimate 1 in 2,000). The irrigation is then started with a good stream until the water returns perfectly clear, after which it is arranged
to run drop by drop with the help of Schücking's drop-counter, or simply by regulating it with an ordinary tap. One must then use a weaker solution (10 per 1,000 of carbolic acid or 1 in 5,000 of the sublimate). It is necessary to keep the fluid constantly at a convenient temperature (33 to 38° C.).

irrigation can be continued and the drainage left in its place for several days, care being taken to clean the latter every two hours (fig. 52).

The patient is laid on a waterproof draw-sheet, spread over a bed which is sloping sufficiently to allow the liquid to flow into
a reservoir at the foot of the bed (figs. 5 and 6). The external genitals and the thighs have to be smeared with vaseline; to prevent any excoriation.

The antiseptic plugging of the uterine cavity, which was first of all employed by Fritsch † as a dressing for certain cancers of the body of the uterus, has also been of great use to me in similar cases. The iodoform gauze is cut into long strips and then gently introduced into the uterus with some blunt instrument, such as a long pair of slightly curved forceps, gradually packing it away, in the same manner that "one would stop a tooth," to use Fritsch's expression. One can leave the gauze from three to six days, and then keep on renewing it until the part is well disinfected. I have often had great success after resorting to this plan.

The intra-uterine plug can also be hæmostatic. It requires then to be made, if possible, of gauze permeated with both iodoform and resin. This can be made on the spot, if necessary, by taking Lister's gauze and powdering it with iodoform. In very exceptional cases one may add a little perchloride of iron, after scraping away an intra-uterine cancer, or enucleating a fibroid tumour. Such a plug, if it be preceded by hot injections, and followed by the administration of argot, can be a valuable resource. It has been recently applied to hæmorrhage after delivery or abortion, as well as to the treatment of atony of the uterus.‡

Plugging the vagina.—This expression should not be mistaken for the application of a mere plug. It is used in its proper sense when the whole length of the vaginal canal is filled with one continuous column of more or less elastic substance, such as lint, cotton, gauze or wool; the material should have been previously rendered aseptic and antiseptic by the proper means. Such therapeutic agents may be added so as to join their special action to the mechanical one of the plug, but the latter always plays the leading part.

‡ A Dürhrszen. Centr. f. Gynäk, Aug. 27, 1887, No. 85, p. 553. This proceeding has been imitated in France by Auvard. (Gaz. hebd., 1887, No. 44, p. 706.)
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This proceeding may be of use both from an hæmostatıc and an antiphlogistic point of view.

A. Hæmostatıc plugging.—This is not a method of choice, but of urgency, in cases of profuse metrorrhagia, where, death being imminent, some prompt intervention is necessary. It is true a better plan would be in each individual case to deal with the cause immediately, and to remove it. But since this is not always possible, by way of gaining time, one has recourse to plugging the vagina, by placing just below the os uteri an enormous plug which is not easily permeable, and which forces the blood to coagulate in the uterus.* One must not forget that this is done merely as an expedient, not by way of treatment. It could not be continued without serious danger, both on account of the hæmorrhage itself and on account of the presence of a foreign body filling up the vagina, which frequently causes a rise of the temperature. However, all the same, one cannot proscribe a means which has rendered very great services.

The old method of plugging consisted in introducing into the vagina, by means of a cylindrical or bivalve speculum, a kite's tail, made of dry lint. The latter, loaded with germs, and often left for a long time in the vagina, became a dangerous source of infection. Since the introduction of antiseptics, the lint is replaced either by cotton wool or gauze, impregnated with an antiseptic, carbolic, salicylic or boric acids, the sublimate, or iodoform. These agents are not all equally good; some are even bad, such as the dry absorbent cotton-wool, which is too permeable. Gauze, when closely packed, is to a less degree, although still too much so, unless it has been previously moistened.

When the above operation has to be done, I recommend that the following method should be adopted, so as to have the best effect, it being borne in mind that the case is nearly always one where life is endangered.

One must first ascertain that the rectum and bladder are empty.

The most favourable position for exposing the vagina thoroughly, without causing too much discomfort to the patient, is that of lateral semi-pronation, or the position of Sims.

* For the same purpose Emmet has sometimes temporarily sutured the os uteri.
A valve is required to depress the posterior wall, and a good light should be thrown into the genital organs, so that every part may be clearly seen. Some carbolic lotion (10 in 1,000) is injected into the vagina, to wash away any blood clots lying in it. The cavity has then to be plugged. For this I recommend to have prepared a series of pellets of absorbent cotton-wool, which should be saturated, some with a concentrated solution of alum, some, in larger number, with the weak carbolic lotion which has been used for the injection. Before using these pellets, they should be forcibly squeezed, so as to take the form of small discs, of about the diameter of a five franc piece, with twice or three times its thickness. With the help of a long pair of forceps, five or six of these discs, saturated with alum, are arranged round the cervix, both in the culs-de-sac and over the os uteri. As soon as the latter is covered up the process of plugging is continued with discs saturated with carbolic lotion, which have been squeezed as dry as possible. A very large number of these pellets of cotton wool will be necessary, although they do not require to be packed away with force, but merely to be placed one on the top of the other, so as to form one even mass. As one proceeds, the valve of the speculum has to be gradually withdrawn, and removed altogether just before one has quite finished. When a patient has had her vagina plugged in this way, it sometimes becomes necessary to draw off her water with a catheter, on account of the pressure upon the neck of the bladder. The cotton-wool should not be allowed to remain more than twenty-four hours. When it is removed a copious hot injection is necessary, and the plug is only reintroduced if the haemorrhage continues.

B. Antiphlogistic plugging.—The uterus should be raised mechanically, so as to release the ligaments of the weight they have to bear; the venous pressure should be lowered and the flow of arterial blood diminished by compressing the surrounding parts; congestion and inflammation have to be thus resisted and the tissues put into a favourable condition for the reabsorption of any exudation and for the cessation of any morbid occurrence; such is the object of those who proposed this plugging or "columnning" of the vagina. Bozeman* seems to

have been the first to adopt the method and to give it a name. Taliaferro* was the one who made it generally known. It is fairly common in America,† and the happy results which have been published prove that it is a method deserving of serious consideration, notably in cases of sub-acute or chronic peri-uterine inflammation, of sub-involution, &c. The following is the way in which it is carried out:

The best position for the patient is the genu-pectoral one; it allows a free access to the vagina. One requires to have ready at hand: 1, some small pledgets of absorbent cotton-wool which have been made antiseptic, dipped in glycerine, and then thoroughly squeezed; 2, some flakes of fine wool which has been purified by hot air and afterwards washed in a carbolic solution, 10 in 1,000, and then well dried; this latter is employed on account of its great elasticity. Were the plugging done with absorbent cotton-wool throughout its whole length, it would be too compact. But cotton-wool which has not been freed from its grease may be used instead, if need be, although it is not so elastic as real wool. The first pledgets or discs impregnated with glycerine are arranged in the posterior cul-de-sac, then round the cervix, which should thus become in a way imbedded and fixed; one then continues to fill the vagina with some thoroughly carded wool or some non-absorbent cotton-wool, stopping just above the vulva. It is as well to make the patient rest in bed for two or three days after the first plugging, which has to be much less tight than the following ones. Should any erythema show itself, one had better go on making use of nothing but dry materials covered over with vaseline. Every two or three days the plugging should be renewed, and for it to produce its full effect it should be employed for several weeks running.

If the cotton or the wool is impregnated with any medicinal substance, such as glycerine of tannin, &c., the whole mucous surface of the vagina can be acted upon locally. But, as a matter of fact, when such is the object in view one is dealing with an "agglomeration of plugs."


* V. H. Taliaferro (Atlanta). The application of pressure in diseases of the uterine 1878.


Position of the patient.—With the patient in the upright position one is not likely to get more than very limited information. One may, however, gain some knowledge worth having by such means in cases of displacement of the genital organs or of abdominal tumours. The medical man places his left knee on the ground, whilst his right one, semi-flexed, can help to support his right elbow.

But the upright position is unfavourable to any complete exploration, and is only worth mentioning in passing. The principal positions one may be called upon to place the patient in for a thorough exploration are on the back, the side, or on the knees.

1. Simple dorsal decubitus.—It may be sufficient for a preliminary examination of the abdomen by palpation to make the woman lie on her back, with her head on a cushion and the legs slightly flexed, with the thighs separated and abducted. It is the position one gets the patient to assume when one has to examine her at short notice in her bed. It has the disadvantage
of not allowing sufficient relaxation of the abdominal muscles for proper palpation, and it is wholly unadapted to an examination requiring the use of the speculum.

2. Modified dorsal decubitus.

A. The lithotomy position.—This combines the relaxation of the abdominal walls and a convenient position for an intra-vaginal examination with the finger or the speculum. It is the one to be preferred for any thorough exploration. The patient is put on the edge of a bed or table; the upper part of the trunk and the head are slightly raised, as if the woman was almost sitting down; the legs are bent upon the thighs, the thighs upon the pelvis, and the lower limbs are held in this position either by the hands of assistants or by special supports, either knee-rests or foot-rests (figs. 56 and 57).

B. The dorso-sacral position.—This is the most convenient position for all operations performed upon the external genital organs and upon the vagina and uterus per vías naturales. It is the one which gives the surgeon the freest access to these parts. The patient is placed upon the edge of a bed or a table, with the head very slightly raised on a cushion; the
trunk is horizontal, the pelvis is raised and slightly flexed upon the vertebral column, so that the sacrum is distinctly sloping from above downwards and from before backwards. The knees are bent and the thighs drawn well back towards the abdomen by supports, or, better still, by two assistants, who hold them well flexed, keeping a hand free to help in the operation (fig. 54).

When one cannot get the help of skilful assistants, one can make use of Fritsch’s ingenious leg-rest (figs. 61 and 62), combining its use with that of the same author’s speculum-holder. The following figures are more explicit than a long description; one can see that it is very easy to adopt the apparatus to any table.*

An apparatus has also been invented, consisting of a stem of

Fig. 55.—Dupont’s speculum chair.

Fig. 56.—Veit’s movable table for gynecological examinations and operations. Patient in the lithotomy position.
variable length, which is fixed a little below the knee and keeps the legs separated. The best type of these instruments is Clover's crutch for lithotomy. It has been most ingeniously modified by Von Ott (of St. Petersburg).*

One very useful modification of this position consists in raising the pelvis well above the remainder of the trunk; it then becomes what might be called the sloping dorso-sacral position. This sloping of the sacrum causes the whole mass of intestines to fall back towards the concavity of the diaphragm,

![Figure 57](image)

Fig. 57.—Doléris' movable table for examining and operating.

and thus to allow the pelvic cavity to be more thoroughly explored. For a simple examination it is easy enough to get the patient into this position by making her lie on a long chair with her legs hanging over the back of it. Should one have

* For Clover's crutch see Doran. Handbook of Gynec. oper., 1887, p. 134. For that of Von Ott, see Blumenberg, Centr. f. Gyn., 1886, No. 31, p. 499. Sänger has also had one made (Arch. f. Gyn., 1885, vol. 25, p. 140).

Boureau has quite recently presented to the Société de Chirurgie a similar crutch to Clover's, but with braces for fixing it, and a speculum-holder with movable valves as well as a forceps holder, which enables one to dispense with the help of assistants in minor gynaecological operations. (Progrès Médical, Nov., 1888, vol. 8, p. 443.)
any assistants handy, they should be got to hold the patient's legs bent up towards her shoulders.

This position is often of great help to the surgeon, as it allows plenty of room for an exploration of the pelvis, especially in the case of small tumours of the uterine appendages. It was first of all recommended by Trendelenburg* for exploring tumours of the bladder, then it was applied by Pawlik as an aid to catheterization of the ureters; it has been again extolled quite recently by Mendes de Leon.†

To facilitate the exploration and render the pelvic organs more accessible during an operation, one finds it just as good a method to have the uterus raised by an assistant by means of two fingers in the vagina, or simply to use an air pessary; it is something like employing Petersen's ball in the operation for stone.

_Lateral decubitus._—In gynaecology one hardly makes use of any but the modified lateral or latero-abdominal decubitus, better known under the name of Sims' position, after the author who put it into general use. It is well adapted to any examin-

ation with the univalve speculum; the weight of the viscera being thrown forwards, the air having free access to the vagina, it becomes quite easy to separate its walls. This position can

be of real service in various circumstances. Lastly, it is one allowing more regard to the patient’s feelings of modesty.

The patient should lie on her side (preferably on the left) on

Fig. 59.—Von Ott's crutch or apparatus for holding the legs separated; the long strap is fixed to the table.
the edge of a bed or table, the legs bent at a right angle on the thighs, and the thighs at a right angle on the trunk. The lower limbs should be supported by an assistant, or by a small board fixed to an examination couch, or by a little table placed at an angle (fig. 63).

The patient does not lie entirely on her side, but her body is rotated in such a manner that the front part of it is brought in contact with the table. To encourage this movement the corresponding arm is brought out from under the body and placed round the table. If the axis of the patient's trunk is
directed perpendicularly to the edge of the table, the vulva then becomes oblique, and consequently the table should also be placed so that it is directed obliquely towards the window. For this purpose one may also place the patient on the table with the axis of her trunk in an oblique direction.

The genu-pectoral position.—It is difficult to get women to assume this position, being one which the least modest among them regard as indecent. It is only necessary in exceptional cases, it is true, but sometimes nothing could take its place.
Fig. 61.—Fritsch's leg supporter (for the dorso-sacral position) and speculum holder (front view).

Fig. 62.—Patient in the dorso-sacral position, fixed by Fritsch's leg-holder.—a, hook intended for a tube of the irrigator or for scissors, forceps, &c.; b, c, stem for fixing the leg-holder.
fact it allows a very free view of the front wall of the vagina and also a very ready access to any instruments. Besides, from the falling back of the viscera, it stops all intra-abdominal pressure, causes the uterus to move upwards and forwards, and opens out the vagina, into which the air penetrates freely as soon as its walls are separated.

The woman should be on all fours, on her knees and elbows, the thighs separated, the seat well projected forwards and rather beyond the edge of the examination table, the loins curved backwards, so that the general aspect of the position entitles it to the somewhat too vulgar name of "the cow's position" (position en vache) which has been given to it. According to the height

Fig. 63.—Patient in the latero-abdominal decubitus or Sims' position on Chadwick's gynaecological table.

or the corpulence of the woman, the duration of the examination, the front part of the body will have to rest either on the elbows or the chest. In the latter case it is more convenient for the patient to hold the table with her arms and rest her cheek upon it. The worst of this position is that it is painful, cannot be borne for long, and will not allow of an anaesthetic being given without some danger, in spite of the ingenious apparatus especially invented by Bozeman* (fig. 64).

* Bozeman. Operation of vesico-vaginal fistula without the aid of assistants New York, 1869.
Simple abdominal palpation.—The patient is placed in the dorsal position, with the knees slightly flexed. She is told to breathe without any effort, with her mouth open, and not to stiffen herself. The rectum and bladder should have been emptied. It is as well for her to have had an enema, preceded by the administration of some purgative, so that the whole of the large intestine should have been emptied.

The two hands should be used simultaneously. It is important for them not to be cold, otherwise they set up reflex contractions. One should set to work very slowly, and it is only after having, so to say, accustomed the abdomen to gentle manipulation, that one can use more force and plunge the fingers firmly into the abdomen for a deep exploration. It has even been noticed that

![Image](image_url)

Fig. 64.—The genu-pectoral position.
Figure showing how the vagina gapes open and the viscera drop towards the diaphragm.

a certain amount of massage makes the reflex contractions disappear, and allows a much more efficacious palpation.* It is as well to proceed methodically. One should first of all palpate the hypogastric region, then the iliac fossae, so as to ascertain the changes which have taken place in the volume or the normal situation of the internal genital organs. One will then pass on to the umbilical region and to the flanks, afterwards to the epigastrium and hypochondrium.

* A. Winawer. Ueber die Thure Brandt'sche Methode als Mittel die erkrankten Tuben palpabar zu machen (Centr. f. Gynäk, 1888, No. 52, p. 865).
The normal consistence of the abdomen presents variations which should be well kept in mind. The age of the patient, the absence of any previous pregnancy, or multiparity, the patient being thin or stout, the greater or less distension of the stomach and intestine with gas, in dyspeptic subjects, &c.; all these are so many varied sources of error. I could not, just now, consider each one, but will merely point out a few of them.

False tumours.—If one has taken the trouble to have the bladder and intestine emptied, a precaution will have been taken against the common error of mistaking their contents for a tumour. The flabby consistence of fecal matter contained in the cecum or the sigmoid flexure and its position in the flanks, besides the possibility of producing impressions upon it, which remain like they would in a lump of clay, are all characteristic signs.

One ought to remember that, in spite of a brisk purgative, accumulated scybala may remain behind, especially if any mechanical cause of constipation exists. An enormously distended bladder, rising above the umbilicus, has often been mistaken for a cyst. It is especially when for a long time it has never been properly emptied, and then only by overflowing, that it becomes thus distended, and acquires unusual proportions. This may arise from some compression of its neck, or else from some affection of the nervous system, deadening sensibility. I was once called to a lunatic asylum for the purpose of puncturing an ovarian cyst, which turned out to be nothing but an enormously distended bladder, in a general paralytic. A catheter should invariably be passed in a patient at the commencement of an exploration.

Lastly, one ought to know that a catheter which is rapidly passed may not always have quite emptied the bladder. There are cases in which it is bilobed, like a wallet,* after it has been squeezed between a pelvic tumour and the pubis. The communication between the two pouches may be of so uncertain a nature that after one has emptied the lower part the stream stops entirely. Should one suspect this unusual arrangement, one need only push the catheter (which should be long and made of hard gum-elastic) so as to pass through the contraction and empty the upper pouch. One may then see the subsidence

* S. Pozzi. Annal. des mal. des org. genito-urin, May 1, 1883.
of this pseudo-cyst, which has been superadded to some real tumour, the relations of which it helped to mark.

The recti muscles of the abdomen have often given a false sensation of a tumour by the rigidity of their contracted mass and their well defined edge. This is all the more likely to happen when the linea alba has given way, so that the two muscles are thrown on either side, and one may, for a moment, fail to recognise them. It seems, also, as if these muscles can undergo partial contractions between two of their tendinous intersections, which somewhat increases the difficulty.

Meteorism may sometimes almost resemble a tumour, or even a pregnancy. Percussion will undoubtedly be of great help, but will not always be able to remove any doubt. One has seen curious cases of pregnancy in nervous women, which have baffled some observers of distinction.*

Collections of adipose tissue, especially in the region of the flanks, may make an examination very uncertain. While on this subject, I might remark that I have frequently observed a local accumulation of fat in the hypogastrium of women suffering from any chronic affection of the genital organs, in the same way as in dyspepsics one sees fat accumulating in the epigastric region.

Exploratory anaesthesia.—Lastly, there are women who present such an amount of hyperæsthesia, or so much timidity, that they stiffen their muscles on the slightest touch. In such cases, and especially when an important decision has to follow the examination, one cannot dispense with sending the patient to sleep. One is then able to acquire an infinitely more exact knowledge of the facts of the case, especially when one combines palpation with the bi-manual exploration. One can hardly (except in cases of unusual thinness and flaccidity) succeed in examining the ovaries and tubes by palpation, without the help of an anæsthetic. This is the only condition under which it is possible to ascertain the exact relations of any swelling or tumour. Frequently, for instance, a tumour which seemed to be connected with the uterus when the patient was awake, is very clearly separated from it as soon as she is put to sleep.†

Lastly, a tumour, which at first seemed to be hard, becomes distinctly fluctuating under chloroform.

The vaginal tactus.—The index finger having been smeared with some antiseptic greasy substance (boracic vaseline, carbolic oil), is passed into the vagina from behind forwards on to the fourchette. Many gynaecologists maintain the importance of an antiseptic injection after the examination. To my mind it is no less important before. The finger, carrying with it any germs collected in the vagina, may, in fact, inoculate the patient, by causing even some slight erosion of the cervix in any rather thorough examination. As a general rule, the examination should be accompanied both before and afterwards by antiseptic injections.*

The index finger is the most convenient for examination purposes. The thumb has to be extended and placed obliquely towards one or other of the genito-crural folds, avoiding the median line, whilst the three other fingers, semi-flexed, have to depress the perinæum and the space between the buttocks.

The finger should follow the posterior or lateral wall of the vagina, so as to reach the os tincæ. When the latter is not situated directly in the axis, one will have to seek for it by a sort of rotatory movement from behind forwards and from before backwards, until one feels the external os with the pulp of the index finger. One will then have to ascertain successively the direction of the cervix, its dimensions, shape, consistence, how far it is open, and the state of its commissures. The finger then has to examine the posterior cul-de-sac, then the lateral ones, and the anterior. This examination will only prove

* To show the use of these precautions it is not out of place to refer to some accidents which followed some simple digital examination in the pre-antiseptic days. Verneuil (Bull. de la Soc. anat., April, 1872, vol. 47, p.190) has recorded a case where death supervened through acute peritonitis the day after an examination by means of the fingers and the speculum, in a woman suffering from an uterine polypus; he has mentioned the case of a patient with a polypus, who in the same circumstances suffered from peritonitis, which was cured; of another one with an ulcerated polypus, where the operation was put off to the following day, but the patient died after merely a vaginal examination. Last of all, another patient with an ulcerated polypus, where the digital examination with introduction of the speculum was followed by death the following day.—Houel, on the same occasion, mentioned a case in his practice, and in that of Broca, where death took place after slight cauterization with nitrate of silver.—More recently, in the wards of Professor Le Fort, a patient suffering from uterine polypus died from peritonitis, which followed an examination with the fingers and the speculum. M. Brault. Difficulty of diagnosis and dangers of surgical intervention in cases of latent polypi of the uterus. Thèse de Paris, 1880, p. 30.
satisfactory on completing it by palpation through the abdominal walls, that is by turning it into a bi-manual exploration, of which we shall speak farther on. On being withdrawn the finger should be made to pass over the vaginal walls, to ascertain their condition.

It may happen that the uterus is very high up and the cervix very difficult to reach. One can then penetrate further by introducing both the index and middle fingers: one can also depress the perinaeum forcibly, and get an assistant to help one do it by pushing one's elbow. Lastly, the cervix is sometimes so hidden away behind the pubis that it is only to be reached by putting the patient into Sims' position, or the genu-pectoral one. In exceptional cases one will have to practise a digital examination in the upright position (displacements, abdominal tumours).

The presence of the hymen may be an obstacle in the way of the introduction of the finger. Yet this membrane can most often be sufficiently stretched for one to examine a virgin carefully, without its being torn. As this is somewhat painful for a young girl it is better to put her to sleep, unless one has produced sufficient insensibility by means of cocaine. In these cases an exploration through the rectum will never completely take the place of one through the vagina, in spite of what certain authors have said.

Digital examination of the rectum.—It is mostly to get a knowledge of the state of Douglas' pouch and of the posterior surface of the uterus, that it is necessary to pass the finger into the rectum. Any swelling or tumours in this region could not be properly considered through any other channel. It is also very useful to be able thus to ascertain how far the rectum is empty, because lumps of foecal matter, felt through the vagina, have easily been mistaken for morbid growths. On the other hand, I have seen beginners feel the cervix uteri through the rectum and take it for a tumour. One has therefore, first of all, to accustom oneself to the feeling of these parts when in their normal state.

A simultaneous exploration through the rectum and vagina with the finger is occasionally useful for obtaining a knowledge of the state of the recto-vaginal wall.*

* A recto-vaginal examination with the fingers, combined or not with abdominal palpation, has been erroneously looked upon by Hegar as a recent institution. One
Schröder strongly recommends one, when examining the rectum, to introduce the thumb of the same hand into the vagina.

The introduction of the hand into the rectum, extolled by Simon (of Heidelberg)* is suitable for exceptional cases. The patient having been deeply anaesthetised, the sphincter is dilated, as for an operation on a fissure of the anus, and the fingers, packed closely together and thickly smeared with vaseline, are gradually introduced into the orifice. As soon as the sphincter is passed, one finds that inside the cavity of the rectum one has more room for separating the fingers and for exploring. I have twice made use of this means, and each time I introduced my hand and wrist into the rectum without the slightest mishap following, neither erosion nor incontinence. I, however, look upon the process as a dangerous one, especially if the surgeon’s hand is not a particularly thin and flexible one. Besides one has, in certain cases,† seen some serious accidents.

The digital examination of the bladder can be but of very limited use. Owing to the size and the dilatability of the female urethra it is generally easy enough to practise it without resorting to the incisions proposed by Simon. I have employed it without difficulty or any untoward result, after having enlarged the urethra with the help of Hegar’s bougies. It has been extolled in cases of cancer of the cervix with any suspicion of the vesical wall being involved, for the purpose of verifying this complication by seeing how far the mucous membrane is movable in the neighbourhood of the cervix.‡

The combined digital examination through the rectum and bladder (Nöggerath) can render great help in cases of atresia of the vagina, as it allows a bi-digital palpation of the uterus and tubes.§

finds a clear account of it by Récamier (Gaz. des hôp., 1850, p. 74), and Nelaton (Gaz. des hôp., 1852, p. 57).


Last of all, let us mention amongst the *combined examinations* catheterism of the bladder, associated with the rectal or vaginal touch, for, as has been so appropriately remarked by Professor Guyon, "a catheter is nothing more than a prolonged finger."

**Bi-manual exploration.**—For the purpose of making matters clear I have described the vaginal and rectal touch separately. But in practice they should rarely be resorted to without combining abdominal palpation, which helps admirably to complete them. Thus one becomes possessed of the most admirable method of investigation that perhaps exists in gynaecology, viz., the bi-manual exploration. It was practised to a certain extent by Puzos, Foubert, Levret, Baudelocque, and was never given up in France, but it was much neglected in foreign countries after the reappearance of the speculum. It has now regained its proper place, thanks to the works of Schultze.*

Fig. 65.—Bi-manual palpation.


*Schultze. Ienaische Zeitsch. für Med. und. Nat. Leipzig, 1864, vol. 1, p. 279. French gynaecology is too often neglected abroad for us not to claim for our country
The patient should be placed in the simple dorsal decubitus, or, in cases offering any difficulty, in the lithotomy position. Whilst the index finger of the right hand is employed with the tactus, as we have said, the left hand is placed transversely above the pubis, and the fingers are gently pressed downwards and

this important step in the way of progress, of which others have tried to get the honour. The glory of discovering the bi-manual exploration belongs altogether to N. Puzos, the celebrated accoucheur of the eighteenth century, and to the French school. In his treatise on labour (Paris, 1759, pp. 56 to 64) when talking of the inefficacy of the vaginal touch, such as it had been practised before his time, he says: “There is for performing this operation another method which, in the case of doubt regarding a woman or a young girl, gives one quite as certain knowledge of facts as the old method of touch used to give one uncertain and false knowledge.” He then goes on to describe this method of practising the vaginal touch by placing one hand on the belly and introducing one or several fingers of the other hand into the vagina. Then he insists upon the precautions to be taken for insuring success in this operation, such as the choice of the morning when the patient has not broken her fast, and the one or two enemata which should be previously taken to empty the large intestine, &c. Then he says: “If by means of tactus such as I suggest one gets a knowledge of the healthy condition of the womb, in those cases where it may be unhealthy one will more easily be able to form an opinion of those diseases to which it is liable.”

About the same time that Puzos was introducing combined exploration in woman, Foubert (1736) was practising it upon man, combining in this instance the rectal tactus with abdominal palpation. In some of the patients he was going to operate on for stone, by his method, which consists, as one knows, in making a puncture into the neck of the bladder from the perineum and then an incision, he had almost pushed the trochar right through the bladder on account of its not containing enough urine. “To obviate this mishap,” he says, “I have found a very simple means by which I can easily insure the perfect fulness of the bladder; with the finger, which I introduce into the anus, and the hand, which I press upon the hypogastrium, I make several to and fro movements by which I ascertain exactly, through the wall of the rectum, what is the volume of the bladder and how much it holds.” (Mém. de l’Acad. roy. de chir., 1745, vol. 1, p. 301.) The bi-manual recto-abdominal exploration was thus discovered.

After Puzos, this method of exploration became general in France, especially in the practice of Levret, who speaks of it on various occasions in his works on labour and diseases of women.

Talking of this same manoeuvre, J. L. Baudelocque says: “Proper tactus does not merely consist in introducing the finger into the vagina, but it entails also the application of a hand on the lower part of the woman’s belly,” and he recommends “that the abdominal muscles should be relaxed, and the urine and excreta evacuated, &c., and that by means of movements right and left with the hand the small intestines should be moved out of the way of the womb.” (L’art des accouchements, Paris, 1781, vol. 1, p. 123.)

He also says that in cases of extra-uterine pregnancy, it is a means of ascertaining whether the factus is in the tube or in the abdominal cavity (Ibid., p. 325).

This procedure is also described in his “The art of midwifery by questions and answers,” a work which has been translated into German (Anfangsgründe der Geburstsch, in Fragen û Antworten, transl. by Morel, Colmar, 1807, p. 84).

In France this method of exploration has never been given up, and has been
push the genital organs towards the finger which is placed in the vagina. One first of all tries to ascertain exactly the position occupied by the uterus in the hypogastric region; then one passes on to the lateral parts, and whilst the hand above presses on the flanks the finger in the vagina goes towards it, pressing into the vaginal culs-de-sac. One thus thoroughly explores the base of the broad ligaments and the uterine appendages, which may be abnormally large. One should at the same time take note of the sensibility of the parts. In the healthy state no pain is caused by pressure on the appendages, or by the raising and balottement of the uterus.

Bi-manual exploration should also be done by combining abdominal palpation with rectal tactus (Holst); it is most useful for ascertaining diseases of the appendages.

By means of bi-manual palpation one can sometimes succeed in examining the ovaries in thin women without an anaesthetic. It is as well, then, to follow Hegar’s advice and get an assistant to slightly depress the uterus with a forceps fixed into

habitually and constantly employed. Here is what Tr. Giraud writes in a thesis on acute phlegmasia of the ovaries: “Digital examination through the abdomen and vagina is most valuable, that is why one should insist upon its practice; it is the regulator and the compass in diagnosis.” Thesis for M.D., Paris, 1831, No. 169, p. 13.

Velpeau, after describing combined exploration, says that nothing can escape the use of the two hands employed together. “In fact, it is rare,” he says, “for a simple congestion of the ovaries or the tubes, or of the uterine appendages in general, and even of the lymphatic glands, or the presence even of the smallest urinary calculus to escape such an examination.” (Complete treatise on the obstetric art, 1835, 2nd edit., vol. 1, p. 192.) Later on (Academical discussion, diseases of the uterus, 1854, p. 83) he said: “One can, if care be taken, seize the womb between the two hands, judge of its thickness, direction, form, all its physical characters, in a word, almost with the same certainty as if it were on the table merely enveloped in soft rags or tissue.” He also mentions that there are many women in whom this examination can only be very restricted. “A long while ago,” he adds, “I was hunting up some statistics on this subject; I stopped at 400, and in all that number I had only come upon 100 refractory cases, and even these were not all absolutely so.”

Lastly, and as an answer to those who will consider bi-manual exploration as a method invented quite recently, and dating from a time posterior to the one when he was speaking, he says: “I have been daily showing the truth of this at the hospital for more than twenty-five years, and I will prove it to anyone who likes at the patients’ bedside.”

So that one sees Hegar claiming without reason the honour of having discovered the combined method of examination for Schultz, Holst, and Veit.

This point of scientific history has been judiciously brought forward by L. Guemes (on hæmato-salpingitis. Thesis for Paris, 1887-88, No. 178).
the cervix, whilst one palpates the abdominal wall, placing the index finger of the other hand alternately in the vagina and the rectum; one feels the ovary slipping from under the fingers, like a small testicle. The left one is generally reached more easily than the right, which Olshausen attributes to its being somewhat pushed forwards by the rectum. All the same, this examination frequently offers great difficulties, especially in women with thick abdominal walls. Rather than practise Nöggerath’s vesico-rectal tactus, which seems to me but an indifferent method, I think it better to have recourse, in difficult cases where exploration of the ovaries seems indispensable, to the contrivance suggested by Ullmann (a pupil of Albert’s, of Vienna). The bladder has to be emptied, and one then introduces into the rectum a balloon filled with two hundred or two hundred and fifty grammes of water. Bi-manual palpation will then be practised, and the uterine appendages will be found

![Cylindrical speculum](image)
well pulled up and held firmly, so that they can be got at much more easily.*

Examination with the speculum.—When Récamier had, so to say, re-invented the speculum, this precious means of exploration put all the others well into the background. One might say,

![Speculum Images]

Fig. 67.—A, Cusco’s small speculum (for virgins); B, C, Cusco’s speculum (closed and half open).

however, that the great services it has rendered to gynaecology have been almost counterbalanced by the harm it has for a time been the cause of.

Varieties of the speculum have been produced without end; but, although almost all are ingenious, a small number only of them are really of use.

![Speculum Images]

Fig. 68.—Ricord’s bivalve speculum open).

They can be divided according to three different types: cylindrical, with two or several valves—univalvular.

Cylindrical speculums.—They are all convenient for local applications, whether made of wood or ivory (fig. 66A); they thoroughly protect the walls of the vagina from the action of the heat when the actual cautery is used. The ones made of

looking-glass covered with gutta-percha (Fergusson's, fig. 66 B & C) would not help here, but they are very valuable on account of the good light they give, and the quickness with which they can be introduced, either for a superficial examination or for the various dressings or applications connected with the cervix. The last mentioned has its end sloping off like a musical reed, so as to correspond with the greater depth of the posterior cul-de-sac of the vagina. The glass speculum, named after Mayer, commonly used in Germany, mainly differs from it by having its end cut at a right angle. One requires these instruments of at least three different sizes.

Before introducing them it is as well to dip them rapidly into warm water, to prevent their bright surface from being made dull by the moisture given off from the vagina. They have to be lubricated externally with vaseline, and they are then introduced obliquely from below upwards into the vulvar orifice, which is held open with the fingers of the other hand. One should have ascertained beforehand, with the finger, the position of the cervix, so as to be sure the instrument goes in a right direction. It will have to slide over the fold formed when the fourchette is firmly depressed, so as to come as little as possible in contact with the front wall of the vagina. As soon as the vulvar ring is passed, the instrument has to be dipped down so as to bring it into the direction known to be that of the cervix, so as to go and seize the os tineæ. One should bear in mind that in beginning one always has a tendency to look for it in a direction both too far back and too deep. The longer and more prominent lip in Fergusson's speculum should always be directed backwards.

Speculums with several valves.—It would be quite useless to describe the three-valve speculum of Ségolas, or the four-valve speculum of Charrière, &c., as they only have a historical interest; those more recently invented do not seem to me to be much better.

Instruments with two valves are to be preferred to instruments with several valves.

Cusco's speculum, or the duck-bill speculum, more elegant and less complicated, requiring no plug, is also a most excellent speculum for examinations; it has, to begin with, the advantage of being very well adapted for inspecting the os tineæ, then,
if one withdraws it gently, for inspecting the culs-de-sac and the vaginal walls. Its small bulk, the ease with which it is introduced, make it a valuable instrument. It has been supposed to be difficult to disinfect; but it need only be plunged for a few minutes into boiling water, then into a strong carbolic

solution, to obviate any risk (fig. 67 A, B, C). Collin has had a model made which can be completely taken to pieces.

The same rules have to be followed in introducing it as were given for Fergusson's speculum. I recommend my students to

remember, however, that the axis of the vulva crosses the axis of the vagina perpendicularly; it is, therefore, better to introduce the end of the speculum very obliquely at first, at an angle of 45°, so as to open the vulvar orifice, then to place it horizontally as soon as it has got beyond it. The blades should
only be separated when the whole instrument has penetrated, so as not to expand the vulva by their lever-action.

We ought not to forget Ricord's bivalve speculum. It is especially suitable for examining a woman with a narrow or hyperesthetic vulva but with a large vagina and displaced cervix. It is very easy of introduction on account of its conical form and the plug which accompanies it. As soon as it has passed the vulvar orifice it is gently pushed to the end of the vagina, the blunt point is then withdrawn and the blades are separated, one being above and the other below; it is rare for it to fail in reaching the cervix, which may have escaped another sort of speculum (fig. 68).

What will greatly facilitate the introduction of the instruments
into the vagina is to have the bivalve speculum hollowed out at its upper portion. This hollowing out should be long and narrow, involving the edge of the valve and reaching as far as the anterior third of the speculum.

I shall make mention of the speculums with several valves suggested by Bozeman, Nott, Meadows, Goodell, and Messari, which have for their object to very widely dilate the vagina and the dispensing with assistants; however ingenious they are they cannot, however, replace them.

Collin has lately had some speculums made with a double and triple action (figs. 69, 70, 71), which allow the valves to be at the same time separated, parallelly and to act as levers one upon another. Another very simple model (fig. 71) has the first action only, but is not so convenient, as it necessitates subjecting the vulva to an amount of tension equal to that required for separating the walls of the vagina. Now, we must not forget that the vulvar ring is the narrowest part of the genital canal, whereas beyond it the vagina forms a dilated space which we
might compare to that of the rectum; the lever action of Ricord's and Cusco's speculums is therefore essentially rational, and should not be given up. Besides, these modern shaped speculums are not so much instruments for operations; they are intended to replace the two separate valves held by assistants for widely dilating the vagina and making the cervix accessible.

Univalve speculums.—These are above all instruments to be used in operating. With a single one it is possible to have very free access to that wall of the vagina which is opposite to the one against which the instrument is placed. A good view of the cervix uteri can thus be obtained, so long as the abdominal pressure is diminished, and the separation of the vaginal walls is facilitated by putting the patient into Sims', or the genupectoral, position. With the aid of two separate valves used simultaneously one has the best means possible of examining the cervix and the vagina; the only inconvenience is that one requires some assistance. Long before Sims had done anything to make the use of these valves common, they had been adopted by a few ingenious surgeons. Récamier, Piorry, Jobert de Lamballe, in France, were using either cylinders divided in half

Fig. 74.—Sims' valve with lateral dilators (Denonvilliers).
or small metal splints fixed on short handles. The last-mentioned surgeon undoubtedly owed his success in treating vesico-vaginal fistula just as much, if not more, to the evident superiority of the instruments he employed as to the questionable and too much vaunted ingenuity of his conceptions.

Sims' speculum or depressor is intended to be applied in the lateral position, bearing the name of that gynaecologist. It is for this purpose that two valves are united by their handles, so as to lessen the number of separate instruments. In dealing with a patient placed on her side, this arrangement does not present any inconvenience, but it is almost impossible to apply
the use of those valves joined together to the lithotomy position, generally adopted in France. These valves are made of metal, and their brilliant inner surface ought to be a good reflector of light (fig. 73).

For my part I much prefer Simon's valves (fig. 75) to those of Sims’. They have to be fixed on a handle, and have a much more prominent curve; besides, for depressing the posterior wall one can have a series of concave valves (which are powerful reflectors of light), and for the anterior wall one can have the flat ones. Lastly, during the course of an operation, one can also bring into use one or two lateral retractors (fig. 76), which
are nothing more nor less than narrow valves fixed on handles long enough not to get into the surgeon's way.

One variety of Simon's valves, a very short one (fig. 76 B), with its anterior extremity narrowed and hollowed out up to that point so as to increase its reflecting surface, is extremely useful for operations about the cervix uteri when it has been brought down, or about the entrance of the vagina.

_Uterine catheterisation._ — Levret seems to have been the first to explore the cavity of the uterus by introducing an instrument into it. But it is only after Huguier had written about it in France, Simpson in England, and Kiwisch in Germany, that this method of exploration came into general use. An abuse was even made of it at first go off, and Scanzoni was right in trying to bring about a reaction.

The _uterine sound_ has been made of a variety of shapes, without any real utility; the simplest of all (fig. 77) is the best. It consists merely of a graduated metal stem, terminated above in a small knob, below in a sort of spatula, which enables one both to hold and to direct it. The instrument should be fairly rigid and yet be flexible enough to receive and retain any curves one may require to make in it; both pure silver and pure copper are especially useful for this purpose; any sounds which are inflexible should be rejected. One should also have nothing to do with any slides for marking the point where the instrument is level with the os uteri; it is quite sufficient for ascertaining this and for afterwards reading off the scale, to catch hold of the instrument at that point with a pair of forceps with flat blades. Professor Trélat used to run a sort of spatula with a grooved end along the stem of the sound, which is both an ingenious and convenient plan.

One should never pass a sound into the uterus without having previously got a correct idea of its position by means of bi-manual palpation; it would otherwise be merely a case of groping in the
dark, and running the risk of doing some damage. It is sufficient
to bend the point of the instrument in the direction required,
and to carry the handle the opposite way, for it to enter the
cavity with ease in any cases of flexion of the organ.

Flexible sounds, some of which were fitted with dials, have been
suggested, but they do not seem to me to be in any way preferable
to a simple gum-elastic bougie, which will always be found useful
when a rigid stem cannot be made to enter on account of the
bends or sinuosities of the cavity.*

The most convenient position for passing the sound is the dorso-
sacral one. It can be practised without the aid of the speculum
by slipping the sound along the palmar surface of the index finger,
which should have been passed up first of all to the os tincæ.
The instrument has to be pushed on gently, and it should be
remembered that there is nearly always a slight obstruction to
its inward progress at the upper part of the cervical cavity. By
pressing the finger-nail against the instrument at the level of the
os tincæ one will be able to measure off the distance to which it
has penetrated.

But it is better, when performing catheterisation, to make use
of the speculum, and, even in difficult cases, and in those where
a correct diagnosis is of great importance, to have the cervix
fixed with a pair of forceps. It is sometimes the only way one
can reach the os tincæ, when it is displaced into one of the culs-
de-sac on account of the deviation of the body of the uterus. I
should add that gentle traction upon the cervix, by raising the
uterine cavity, will considerably facilitate any exploration.

The most rigorous antisepsis is indispensable when one is
practising uterine catheterisation. Not only should the instru-
ment used be purified in the way already described, but it is as
well to pass it through the flame of a spirit lamp. A vaginal
injection and an antiseptic cleansing of the uterine cervix with a
small stick surrounded with absorbent cotton wool is necessary
before the introduction of the sound. Winter’s† experiments have
taught us that in something like half the cases the uterine cervix
normally contains germs of a morbid kind, which remain there

* Caulet has had a flexible sound made after a much simpler model than his
predecessors, and therefore it deserves the preference (Bull. et Mém. de la Soc. de
Chir., 1887, p. 439); one can, however, easily do without it.
† G. Winter. Die Microorganismen im Genitalcanal der gesunden Frau (Zeitsch.
in a quiescent and inactive state, and are only endowed with a very slight virulence, as has been proved by inoculations. These germs have only been found by Winter in the uterine cavity when the latter had been previously catheterised, so that there is no doubt the sound can carry them into the upper parts of the genital tract, where normally they are never found, and thus one has the origin of such things as metritis, salpingitis, and perimetritis, which have been observed after uterine catheterisation, performed with clean instruments, but through a cervix which had not been previously purified.

One cannot too strongly recommend young practitioners never to pass the uterine sound without making sure of the two important points which follow: 1, the emptiness of the uterus, which has to be verified by the most minute interrogatory and by bimanual palpation; when there is the slightest doubt, which might even cause a delay of several days, the rule is to abstain; many were the cases of abortion brought about by the sound in the days when it was used much too readily; 2, the most perfect antiseptic condition of the instrument; the notches serving for measurement are difficult to keep perfectly clean; it is better, therefore, to use instruments which have none, even if one cannot measure quite so conveniently. The instrument should be carbolized and then passed through a flame immediately before its introduction. I know of several most unfortunate cases of metritis and salpingitis (one followed by death) which can be put down to the introduction of the sound for exploratory purposes, done without these minute precautions by surgeons of renown.

Uterine catheterisation enables one to obtain a fairly accurate knowledge of the extent to which the cervix is permeable, of the longitudinal diameter of the uterus, its transverse diameter, and, lastly, of the direction of the organ. In the normal state the ordinary sound enters without any difficulty, except for the slight jerk it gives as it passes the isthmus, which varies in length from between five and six centimetres in nulliparæ, to between six and seven in multiparæ. The extent of the lateral movements which can be carried out is very limited; the sound is, so to speak, fixed between the anterior and posterior walls of the uterus. When the beak is movable and can be turned in various directions, it means that the transverse and antero-
posterior diameters are increased, viz., that the cavity is greater than normal.

Is it possible by chance to introduce the sound into the Fallopian tubes? It is on this hypothesis that many writers have explained the cases when the sound has been passed deep into the abdomen, so that its extremity has been felt beneath the abdominal wall. But surely for such an event to occur, circumstances must be present which are only exceptionally found: latero-version of the uterus bringing the internal opening of the Fallopian tube into a line with the cervical canal, and an abnormal patency of the tubal orifice. This was what occurred in a case described by Bischoff,* where the fact was verified post-mortem, death occurring after the ovariotomy. But in the vast majority of cases which have been described as passage of the uterine sound into a tube, it is easy to recognise that it was rather a case of a uterine perforation: that is often produced without any great exhibition of force, when the uterine walls are softened and thinned by a pregnancy or a recent abortion, and when it is at the same time misplaced. The fact that such lesions are so frequently followed by no symptoms of importance has caused so much surprise that the majority of persons who have witnessed them have felt obliged to seek some more probable explanation. However, that, doubtless, is the meaning of the two cases recently reported by Gönnner (Basle).†

Lastly, the possibility of permanent false passages must be mentioned, allowing the introduction of the sound by one self-same passage into the abdominal cavity (utero-peritoneal fistula). But these are, as a matter of fact, anatomico-pathological curiosities, with which one scarcely ever has to reckon.‡

**Fixation and lowering of the utero.**—This procedure must, I think, be classified amongst the means of exploration, not because it can be used as such alone, but because it is of immense value

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in conjunction with other procedures, in facilitating examination.

Hegar* has shown that it is possible to explore the whole of the posterior surface of the uterus, and even to pass beyond the

fundus by means of rectal examination, if only the cervix be caught by forceps, and the whole organ be gently lowered. I have pointed out above the advantage of simple fixation of the cervix in cases where the sound is passed, without "lowering," properly so called. Now, it will be seen that direct exploration of the uterine cavity is often facilitated by the same procedure.

Many practitioners still express disapproval of lowering the uterus. Before the introduction of antiseptics many accidents were attributed to it which were due to nothing but infection. It is now time to bring about a reaction against this fatal prejudice. Nothing is more harmless than a moderate lowering of the organ, so long as antiseptic precautions be taken, and if rigid disinfection has been performed, there is no danger at all in even forcible lowering (and by that I mean lowering until the cervix is brought down to the vulva, as is necessary not only for exploration, but also in certain operations). Personally I daily have recourse to either one or the other, and I have never seen any accident which could be attributed to it. There is only one point to be borne in mind, and that is that lowering is only harmless when there is no sign of either acute or subacute perimetric inflamation.

I think it is advantageous to draw a line of distinction between simple fixation and lowering. To fix the uterus is to render it immovable by scarcely drawing on it, and certainly without stretching the ligaments; but to lower it, on the contrary, it is, with a slight force, very sensibly removed from its normal level. Now, for exploration it is very rarely useful to go so far as that, or, if it is necessary, the lowering should always be only to a moderate extent.

The method of procedure is very simple: The patient being in the dorso-sacral position, either directly by guiding the forceps over the fore-finger or by means of a speculum, the anterior lip of the cervix is seized. A forceps (identical with the American bullet-extracting forceps) is the best instrument of prehension (fig. 78 A). It only makes two insignificant punctures, which do no harm, and scarcely even bleed. It is only when the lowering must be forcible and long continued that Museux's forceps are necessary, and then care must be taken that they are made after the pattern that I recommend, so that the claws may cross exactly and not ride over one another, as occurs in the case of
the forceps in general use. With this modification there is much less injury done, and the surgeon does not run the risk of wounding himself when passing his finger over the enclosed portion.

Artificial dilatation of the cervix and intra-uterine digital examination.—There are some cases, rare, it is true, where exploration of the uterine cavity with the finger is necessary to confirm a diagnosis, or as a preliminary to interference. This bold conception was introduced by Simpson.* Various methods have been proposed to attain this object. One preliminary remark is necessary: The cervix is not an orifice but it is a canal, having a supra-vaginal opening, a cavity in the form of a defile and an inferior opening. Now the conditions are very different according to the dilatation, and especially the dilatability of these various parts. The chief point for consideration is the condition of the internal os, and the supra-vaginal portion of the cervical canal. In some cases they are dilated, or at any rate softened, and present no obstacle, except the os tincæ below them; as, for example, in some cases of fibromata or intra-uterine polypi, after an abortion, &c. These cases are essentially different from those in which the whole length of the cervix is rigid. The means of dilatation are not on the same lines in the two classes of case. We will first pass these means of dilatation in review, and afterwards I shall point out the most suitable.

They may be divided into two classes:—

1. Procedures not accompanied by bleeding, which comprise:
   (a) Slow dilatation by turgescent materials;
   (b) Forcible dilatation by means of instruments;
   (c) Rapid progressive dilatation.

2. Procedures accompanied by bleeding, which comprise:
   (a) Notching of the external os;
   (b) Bilateral incision of the cervix through its whole length.

(None of these procedures ought to be adopted without absolute necessity, and all intra-uterine exploration must be regarded as dangerous if there is reason to suspect recent suppuration around the uterus or the appendages.)

Procedures not accompanied by bleeding:

(a) Slow dilatation by turgescent substances is brought about by introducing into the cervix cones of different substances. Tents of

prepared sponge, of laminaria stems, gentian-root, decalcified ivory, tupelo stems, &c., have been vaunted each in turn.* I shall not stop to discuss their relative value, but remark simply that it seems to me that the verdict has finally been given in favour of laminaria; and, without absolutely rejecting prepared sponge, rendered antiseptic, I nevertheless hold that its utility is very restricted. Laminaria placed, if necessary, in bundles, fulfils almost all our wants.

This excellent therapeutic agent was introduced into surgery by Sloan.† The following is the way it should be used, after having been left for a short time in iodoform-ether for disinfection.

The vagina is carefully washed, the woman being in the dorso-sacral position, the cervix is rendered accessible by means of a bivalve speculum or of two of Simon's retractors. It is then very advantageous to seize the anterior lip with the forceps already described and to keep the cervix steadied while the tent is being introduced. Care has previously been taken, by means of bi-manual examination and by passing the sound, to ascertain the position of the uterus. If necessary, the laminaria tent may be gently curved to adapt it to the curvature of the uterus which is to receive it. The tent, well vaselined, is placed at the end of a forceps and gently introduced. Its inferior extremity, to which a thread must be firmly attached, must not disappear into the cervical canal. Two or three tents may thus be placed side by side in the cervix, if the introduction of one of a larger size is too difficult; but force must never be used in introducing them. The steadying forceps are now removed, a tampon of iodoform gauze placed over the cervix, and the speculum taken out.

Laminaria requires about ten hours to swell completely. When the tents are to be removed as a rule nothing is necessary beyond drawing on the thread attached to their inferior extremity. But sometimes some difficulty is experienced if they have dilated in an hour-glass fashion (fig. 79 D). Under these circumstances the end must be seized with forceps and traction must be combined with rotatory movements, while the finger furnishes a

point of support at the external os and endeavours to free the dilating tent.

In spite of all antiseptic precautions, slow dilatation must not be regarded as an absolutely inoffensive procedure. Occasionally it is followed by symptoms of acute metritis, with intense pain and high fever. It must, therefore, be adopted with somewhat more moderation than is the custom with some practitioners. I only just mention the supervention of tetanus which has been observed, but which may as a matter of fact follow any operation whatsoever, and which constitutes here, as elsewhere, an accident no less rare than formidable.

(b) Forcible rapid dilatation has given rise to several instruments made on the type of those which Busch has proposed for obstetric purposes (fig. 80). I prefer Ellinger’s dilator with two
parallel blades. Schultze, Sims, &c., have also constructed special dilators of their own (fig. 80 A). Nevertheless all these instruments have the inconvenience of taking their support on limited portions which may yield or be torn under the strain; dilatation, therefore, dare not be pushed very far by means of
them, and by themselves they are unable to open up a passage sufficiently large for the index finger. Personally I never use Ellinger's dilator but to facilitate the passage of the hysterometer or of the curette in cases of cervical narrowing. Then it is very convenient and amply sufficient.

Rapid progressive dilatation.—This mode of dilatation is well known amongst surgeons, who use it in the dilatation of urethral stricture by means of a series of sounds acting on the wedge principle (la série des sondes Béniqué). There are several kinds of graduated dilators: Peaslee's, which are true steel bougies; Tait's, which are conical and of four sizes; Hank's, which are ovoid and of two sizes and made of gum elastic; Fritsch's, which resemble long cauteries concealed in reeds; and, lastly, Hegar's, which are the most convenient. These are cylindrical bougies, made of gum-elastic and conical at their extremity. Their length, not reckoning the flat handle, is from 12 to 14 centimetres; the handle is 5 centimetres long. The diameter of No. 1 is 2 millimetres, and they increase in sizes of 1 millimetre (i.e., an increase in circumference of 3 millimetres). This increase is too great in the larger sizes, and it is advisable to follow Hegar's suggestion, and have for difficult cases bougies whose diameter only increases by half a millimetre per number.

They are to be kept in strong carbolic solution, and the following is their method of use:

The patient being anaesthetised and placed in the dorso-sacral position (Hegar prefers Sims' position) the fourchette is drawn down by means of a short retractor, the anterior lip of the cervix is seized and fixed by a pair of forceps, and the exact direction of the uterus is made out by means of bi-manual examination and passing the sound. The first bougie is now well greased with vaseline and introduced. It must be of such a
size as to pass with gentle coaxing. Immediately afterwards, a second is to be passed, and then a third. If one meets with resistance the bougie should be left in position for from one to three minutes, and, if necessary, the previous one is passed a second time.

By this means it is possible in a very short time—a quarter of an hour, for example—to dilate a cervix sufficiently to introduce the whole index finger, so long as the cervix is either naturally or artificially softened. When the cervix is not so softened, an hour as a rule, or sometimes more, is necessary before such an amount of dilatation can be obtained. Lastly, I wish to add that one may be obliged to stop before obtaining sufficient dilatation in cases where there is a possibility of tearing the tissues. It is therefore advisable not to proceed to the use of Hegar’s bougies unless the cervix is already soft and dilatable. This obtains in the early days after delivery or abortion, or in certain morbid conditions; but it can always be artificially produced, if necessary, with ease, by means of laminaria tents.

This is, finally, the method of procedure I recommend when it is necessary to dilate a rigid cervix throughout its whole length. A commencement of dilatation and dilatability is to be induced by the application of a laminaria tent, ten to twelve hours before operation. At the moment of withdrawing the tent, dilatation is to be completed very rapidly by means of Hegar’s bougies.

Procedures for dilatation of the cervix accompanied by bleeding.—Rapid dilatation by means of cutting instruments is indicated under three conditions: 1, when the external os constitutes the only opposing obstacle to introduction of the finger; 2, when the cervix not having been effaced, it is important to lose no time; or 3, when the surgeon has not at hand the special materials necessary for dilatation unaccompanied by bleeding.

(a) Notching of the external os.—It is occasionally sufficient, to effect an entrance into the cavity of a cervix which has already spontaneously become somewhat increased in size (intra-uterine polypi, abortion, &c.), to notch each side of the external os. The “bleeding” method is then the simplest and the most expeditious. A Simon’s retractor depressing the fourchette, and the cervix being steadied, a long handled pair of scissors may be advantageously used, as they are well under control. The blades
of the ordinary kind of scissors being liable to slip, Küchenmeister's scissors are preferable, though not however indispensable (fig. 82). An incision of from one centimetre to a centimetre and a-half on each side will be sufficient to allow of the passage of the fore-finger, which, if necessary, can itself complete the dilatation. After the exploration and an intra-uterine injection the incisions are to be closed up by catgut sutures.

(b) Complete bilateral incision of the os tincæ.—This is certainly an operation which ought not to be undertaken unless one has already acquired a certain amount of dexterity in uterine surgery. It is at first necessary to proceed to the preliminary ligature of the uterine arteries.* The patient having been anaesthetised, and being in the dorso-sacral position, the four-

chette is depressed by a short retractor, and the vagina drawn down on one side, while a tenaculum forceps draws on the cervix on the other side; one of the lateral culs-de-sac is thus made easily accessible. The pulsation of the uterine artery is now felt for, then taking a thick needle strongly bent (or better still a Deschamps needle) provided with a silk ligature, the surgeon punctures the cul-de-sac a finger's breadth distant from the cervix, taking care not to go beyond a transverse line tangential to the anterior surface of the cervix, so as to avoid the ureter. The greatest possible amount of tissue must now be encircled by the needle, which is to be brought out again into the hinder portion of the vagina as near as possible to its point of entry, and always

at the same distance from the cervix. The object of making entrance and exit points of the needle as near as possible is to enclose the least possible amount of the vaginal mucous membrane. The silk is then to be firmly tied, and the same course adopted on the other side.

I have had occasion to carry out this preliminary ligature of the arteries, and I can recommend it as very efficacious. However, I do not believe that it is the main trunk of the uterine artery that is thus tied, but many of its lower branches. Whichever that may be, the surgical result is excellent. The bistoury may then be used without fear of hæmorrhage. After lowering the cervix an incision is made on each side, reaching to the insertion of the vagina, and the finger then endeavours to penetrate into the uterine cavity. If difficulty be met with, a blunt-pointed bistoury should be slid into the cervix on the pulpy surface of the fore-finger, and while bringing it out the internal surface of the cervix should be notched on each side until the finger is able to pass.

Once the exploration has been made and the uterus irrigated, the cervix must be restored to its previous condition, with great care. In order to do that a needle threaded with catgut is thrust deeply into the cervix, at the level of the vaginal reflexion, and, guided by the finger, the surgeon endeavours to pass the loop of the thread in the cervical canal, at the highest point of the incision. It is advisable to fix the corresponding thread of the other side before tying the first thread in a knot; unless that be done, the orifice being already narrowed, the finger cannot fulfil its office of guide. The two uppermost stitches having been fixed and tied, a sufficient number is placed below—care being taken to bring the mucous surfaces into good apposition, as well on the interior as on the exterior surface.

It is useless to leave the ligatures of the uterine arteries longer in position. If left longer, they might give rise to troublesome ulceration of the vaginal mucous membrane, and ought, therefore, unless there be special indications to the contrary, to be cut at the end of three or four hours. It is unnecessary to add that their removal would be imperative if circumstances arose to make one fear that the ureter had been tied; but that may always be avoided by following the detailed directions I have given.
Permanent dilatation.—It is possible, once dilatation has been obtained by any means whatsoever, to keep it up by plugging the cervical and uterine cavities. The idea has latterly arisen of applying this continued dilatation to purposes of diagnosis, and to the treatment of certain uterine affections, whose evolution might thereby be followed, so to speak, by sight.

The following is the method suggested by Vulliet, * the introducer of this attractive procedure:

The patient being in the genu-pectoral position, and the cervix exposed by means of a Simon's retractor, the cervical canal is explored. If it is narrowed or its direction altered, by preliminary treatment its calibre or its direction is rectified. If it is normal, a small cotton-wool tampon is placed at the external os, and thrust into the canal by means of a metallic sound.

The tampons are provided with a thread; their size varies between that of a pea and that of an almond. They have been steeped in a solution composed of one part of iodoform and ten parts of ether, then dried and kept in a well-stoppered bottle.

The tampons are to be introduced until the whole length of the canal is plugged with them. At the end of forty-eight hours they are drawn out. If they were well packed, the walls have yielded, and have become softened, and a free space has been formed, which the operator immediately utilises by inserting a greater number of tampons than on the previous occasion: Proceeding thus by gradually increasing plugging, after on an average eight or ten occasions, a degree of dilatation is brought about sufficient to render the cavity of the uterus visible in its whole extent. In order to gain time and to make the surface of the uterine cavity more regular, there is an advantage in the course followed by Vulliet himself, viz., the substitution from time to time of bundles of laminaria tents for the tampons.

This procedure is not always applicable, even under the conditions indicated by its author.† There is a certain number of

† Charpentier, loc. cit., p. 706.
cases where complete dilatation cannot be brought about, as is
proved by the observations of Porak and Sabail. Then, too,
there are other cases where a reiterated introduction of tampons
must be renounced, either because they are too painful, or else
because they provoke nervous symptoms. These latter, what-
ever may have been given as their explanation, really seem to
be inherent to the operation itself, and not to the absorption
of the iodoform-ether, with which badly-prepared tampons are
impregnated.

Moreover, I do not think that inspection of the uterine cavity
can give any information superior to that which can be obtained
by the various methods of exploration I have already described.
Nor do I hold that treatment can derive any real advantage
therefrom; it is therefore probable that Vulliet’s method of ex-
ploration, ingenious though it undoubtedly is, will not long
survive the very legitimate interest, coupled with some surprise,
which it awoke when it was first brought into notice.*

Digital examination of the cavity of the uterus permits the
recognition of the softened or swollen condition of the mucous
membrane, which may become the seat of vegetations, tumours,
or other abnormal outgrowths. This exploration ought always
to be combined with hypogastric palpation. It must be
carried out with great rapidity, and followed by an intra-uterine
injection with one per cent. carbolic solution, and the applica-
tion of an iodoform tampon, and the patient must remain in bed
after it for two days. If the haemorrhage exceptionally induced
by this manipulation does not yield to intra-uterine injections of
hot water (45° C. to 50° C.) one would not hesitate to plug the
uterine cavity for several hours with iodoform gauze.

* These remarks in no way apply to hæmostatic or antiseptic plugging of the
uterine cavity (Fritsch), which on the contrary ought to remain in our practice, and
be much more frequently employed than it is.

† I have seen a good example of this: My lamented master, Gallard, sent me for
operation a patient in whom an indurated and irregular cervix, combined with
This mode of exploration has, further, been highly praised by some clinicians of the first rank.* The technique for its performance is most simple: fixation of the cervix, excision of a wedge-shaped morsel, either with the scissors or a bistoury; haemostasis, if it be necessary, by means of the thermo-cautery; in case the application of an antiseptic tampon still allows the flow of a small quantity of blood.

When the question is one of determining the state of the uterine mucous membrane, scraping with a sharp curette will supply sufficient shreds for the examination. Martin,† who is a great believer in this mode of exploration, recommends us not to limit ourselves then to a partial scraping, but to make a complete curettage, followed by antiseptic irrigation and an intra-uterine injection of 2 to 3 grammes of perchloride of iron. The detailed method of carrying out this operation will be described in the chapter on metritis.

Exploration of the ureters.—This question has only arisen quite recently. Tuchmann, in 1874, conceived the idea of collecting urine coming through one ureter by means of compressing the other. With the same object in view, Hegar simultaneously proposed ligature of a ureter through the vagina. But it was only a year later, in 1875, that Simon proceeded to catheterise a ureter by guiding the catheter on the finger introduced into the bladder through a previously dilated urethra.‡ Grünfeld utilised the endoscope with the same object in view. But it was reserved for Pawlik, in 1880,§ to discover a method, we cannot say easy, but at all events practicable and precise, to enter directly into the ureter without any previous operation, and guided by external anatomical landmarks. The subsequent

reddish discharge, had led to the belief that it was cancerous. I myself inclined towards this diagnosis, but with reservation. As the patient begged for my intervention, I excised a small portion of the cervix. The microscope revealed that it was a case of simple inflammation of chronic nature; appropriate treatment was adopted, and the patient escaped the lot of hysterectomy which another surgeon had been on the point of performing.

† A. Martin. Path. und Ther. der Frauenk., 2nd edit., 1887, p. 30.
§ Karl Pawlik. Ueber die Harnleiter-Sondirung beim Weibe (Langenbeck’s Archiv, 1886, vol. 33, p. 717). This work contains the complete history of the subject, and has lately been brought up to date (Wien. Med. Presse, 1886, p. 1425 and foll.).
work of Newman,* Kelly,† and Byford,‡ have added nothing of note to the method suggested by Pawlik. Finally, quite recently, in 1886, Sänger,§ giving precision to the indications already shortly sketched out by Hegar, Chrobak,‖ and Pawlik, endeavoured to introduce into practice palpation of the ureters through the vagina. I have had the opportunity of seeing Pawlik and Sänger demonstrate their methods. Without entering into historical details, which may be found in completeness in their works, and which D. Schultz¶ subsequently summarised in a recent review in France, I shall simply try to give a short account of the methods of these two dexterous gynaecologists.

Inverting the chronological order in favour of the logical order, I shall first describe Sänger’s method.

**Palpation of the ureters.**—The anatomical relations of these ducts with the cervix, uteri, and the vagina have been specially studied of late,** on account of the extreme importance that their recognition has acquired for the practice of certain operations now of daily occurrence. It is well-known that it is possible to feel through the vagina the anterior surface of the pelvic portion of the ureters when they have been injected in the cadaver, starting from the point where they open into the bladder up to the base of the broad ligaments; that equals a length of six to seven centimetres, and is half of their pelvic portion and a quarter of their total length. In pregnant women it is possible to feel them for a distance of ten centimetres, doubtless on account of the hypertrophy of the whole of the smooth muscular system of the true pelvis. Moreover, a point d’appui may be

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‡ W. Byford. The practice of med. and surg. applied to the diseases and accidents incident to women, 4th edit., Philad. 1888.
taken on the foetal head. Sänger was able to feel the ureters distinctly, indurated in some cases of gonorrhoeal ureteritis and calculous pyelo-ureteritis. When there has formerly been inflammation of one broad ligament the ureter is found to be larger and easily palpated on the opposite side, as if it had undergone hypertrophy. Under Sänger's direction I succeeded in feeling these ducts in pregnant women. But since then,

though I have many times tried to repeat these investigations, the result has always seemed to me to be doubtful. I believe that, by reason of the great difficulty of execution which it presents, the lack of certainty in the conclusions, and the rarity of the practical deductions to which it gives rise, this method is not destined to become very common. It is necessary, however, to make it known, even though it were of use to only a small
number of clinicians; I shall therefore shortly describe the technique.

Some anatomical considerations must be borne in mind:

The field of exploration is limited to the upper third of the anterior wall of the vagina. Schematically it is a trapezium, whose oblique and diverging sides are formed by the ureters and the junction of the anterior with the lateral walls of the vagina. The small base of this trapezium (which is rather the rounded summit of a triangle) is horizontal and below; it answers to the inter-ureteric ligament; the greater parallel of the figure, horizontal and above, is formed by the line joining the two ureters at their points of emergence beyond the broad ligaments. In this area the finger meets with, under certain circumstances, at a distance of 1½ to 2 centimetres to the outer side of the os tincæ and in front of it, in the thickness of the vaginal wall, two hard cords, one on each side, directed forwards, from within outwards, and from below upwards, and describing a concavity on their internal aspect. They are not ordinarily felt for the whole of their accessible length, which is at the most 6 to 7 centimetres, starting from the base of the vesical trigone. In pregnant women it is not rare to be able to feel them over a length of 10 centimetres, but, on the other hand, they are occasionally only accessible over an extent of 2 centimetres.

Normally the ureters are symmetrically placed, but in consequence of various lesions they may fail to be so, and then their direction (e.g., in the case of cicatricial contraction) may be so deviated that the ureter of one side may come to be situated on the other side. Again, their concavity may be directed upwards instead of inwards. Lastly, it is very usual for only one ureter to be reached.

Healthy ureters have a diameter of about 1 mm.; when diseased they reach a diameter equal to that of a goose-quill or even a large pencil. They are more or less movable under the finger, or fixed in the tissues by inflammatory exudation taking place in their neighbourhood. Normally they are without sensation, but in a pathological condition they become more or less tender upon pressure.

The mode of feeling the ureters is relatively simple. The following are the steps to be taken when endeavouring to find them by means of digital exploration through the vagina:
The very distinct prominence on the anterior vaginal wall formed by the urethra, to the point where it opens into the bladder, is followed up by the finger, which thus arrives, by taking into account the direction of the cervix uteri, to the anterior fornix of the vagina. It is on the surface comprised between the internal orifice of the urethra and the summit of the anterior vaginal cul-de-sac that the ureters will be most easily felt. This region scarcely exceeds 2½ cm. in extent and always presents a great laxity of tissue. With the palmar surface of the finger, and not passing beyond these limits, the wall of the vagina is to be examined from before, backwards and laterally, in the direction of the broad ligament. To feel the right ureter the right fore-finger should be used in preference, and the left fore-finger for the left ureter. However, this is not indispensable. The right fore-finger can also search for the left ureter, but then to do that properly the pulp of the finger must be turned backwards and upwards, which always causes some inconvenience and never fails to complicate the exploration. One must never rest on the evidence given by one hand alone, for the assertion that the palpation of a ureter—right or left—is impossible.

It is always better to practise digital examination gently, by gliding the finger rather than by depressing the region. A delicate palpation will almost always reveal normal or hypertrophied ureters. When they can be pressed against a hard organ (postero-lateral surface of the pelvis, or the foetal head in a case of pregnancy) they give the sensation of an artery to the exploring finger, and roll beneath it. The more supple, flaccid, and extensible the vesico-vaginal wall, the easier it is to appreciate this fact. Often, also, and more especially in pregnant women, the ureters can be felt to move in the connective-tissue sheath. Following Sänger, we must take care not to confound the ureters with arteries, or with peri-vaginal or peri-uterine bands. The muscular bundles, too, of the levator ani and the obturator muscles may also cause some confusion.

All chance of error will, however, be avoided by paying great attention to the anatomical or anatomico-pathological situation of the ureters. None the less does it remain the fact that it is always somewhat difficult, even after a special apprenticeship, to profit by the means of investigation brought.
forward by the eminent Leipzig gynaecologist. No one must feel surprised if he can only feel one ureter, and that most commonly the right, in women who are not pregnant.

**Catheterisation of the ureters. Pawlik’s procedure.** — It was during his stay at Vienna in the capacity of *privat docent* that Pawlik, now professor at the University of Prague, made his first attempts in Billroth’s clinique, and applied his ingenious method to some cases in which the diagnosis was doubtful. I had then the opportunity of seeing him, and can bear witness to the marvellous dexterity with which he brought this difficult manoeuvre to a successful result. One can conceive how advantageous it would be if it could be brought within everybody’s reach. There are some cases where it is of the utmost importance to determine whether both kidneys are diseased, or if one only is attacked. Pawlik was able to demonstrate this condition on one memorable occasion (Billroth’s case). In another case he was able to empty a hydronephrosis, and even leave a catheter in the ureter. But this last operation (for which he has designed a special instrument, see fig. 84) is not destitute of danger: the metallic portion which terminates, in this instrument, a long gum-elastic catheter became detached, and was only removed thanks to a fortunate combination of circumstances.

Some preliminary anatomical considerations are necessary to the understanding of Pawlik’s procedure.

The orifices of the ureters occupy the two posterior angles of the trigone of Lieutaud, in front of the fundus of the bladder, and on the posterior half of the antero-inferior wall. The anterior angle of this triangle is occupied by the orifice of the urethra. Each of these three orifices is seated upon a more or less prominent eminence, irregularly cylindrical in shape, which is formed by a thickening of the muscular coat, covered with a layer of mucous membrane. The hill-like prominences of the orifices of the ureters serve as landmarks. Further, they are united by a prominent transverse ridge, convex forwards, thick enough and even resistant enough at the middle, where it becomes narrower, to arrest the end of a sound pushed gently forward (Pawlik), and to be sensible to direct palpation (Simon). This ridge is called the inter-ureteric ligament, or the ureteric band or muscle. It forms the curvilinear base of the triangle of Lieutaud, the sides of which are marked by similar but less evident ridges, and
which, as they become smaller and smaller, converge towards the urethral orifice. The dimensions of these lines are naturally variable. However, the triangle is almost equilateral. Its base, the inter-ureteric ligament, varies from 2.6 cm. to 4 cm. (Simon, Quain, Hyrtl), the sides have been reckoned at 2.7 cm. (Simon), 2 cm. to 2.8 cm. (Warnoots), 4 cm. (Hart).

Fig. 84.—Vaginal trigone of Pawlik on the anterior vaginal wall.—L L, Labia minora.—O, Orifice of urethra.—O’O’. Ridge formed by urethra.—V, Os tisre.—B, Transverse fold of the vagina situated slightly behind the inter-ureteric ligament, forming the base of the triangle.—S S, Lateral folds (diverging) of the vagina corresponding to the sides of the vesical trigone.

The altitude of the triangle, which is the distance from the urethra to the mid-point of the inter-ureteric line, is from 1 to 2 cm. (Warnoots), or 3 cm. (Hart).

Pawlik places his patients in the genu-pectoral position, but catheterisation can equally well be carried out in the dorso-sacral
position. Only under those conditions the head of the patient must be low, and the lower part of the body considerably raised, so that the viscera may fall towards the diaphragm. A Simon's speculum, with as wide a retractor as possible, is to be introduced into the vagina, and draw back the posterior wall. The anterior wall will thereby be put perfectly on the stretch.

This tension of the anterior vaginal wall has enabled Pawlik to note the constancy of a certain number of folds, which are of great importance from the point of view of topographical anatomy. He remarks, first of all, near the external orifice of the urethra an elongated ridge passing from before backwards in the middle line, with transverse folds, and well marked, which corresponds to the intra-parietal position of the urethra (tubercle and anterior column of the vagina). This ridge terminates at the level of the vesical orifice of the urethra. Beyond this ridge comes a small triangular flat surface corresponding to the fundus of the bladder or the trigone of Lieutaud. This flat surface is bounded by three prominent folds, of which one (at the base) is posterior, transverse, and situated in front of the convex surface which answers to the fundus of the bladder and to the cervix uteri. This fold is slightly posterior to the inter-ureteric line, and like it is somewhat convex forwards; its extremities answer to the orifices of the ureters. The lateral folds diverge from before backwards, and terminate a little behind (1 cm.), the extremity of the urethral ridge, forming the rounded summit of the triangle thus constituted (fig. 84). As can be verified on the dead body, either by holding up to the light, or by transfixing with pins, the vesico-vaginal wall at different points, the triangle thus marked out from the vaginal side corresponds line for line to the intra-vesical trigone of Lieutaud; it may be denominated the vaginal trigone of Pawlik.*

Pawlik uses a metallic catheter with a bulbous extremity. It is altogether 24 to 25 cm. long, and the beak is about 1·5 mm. in diameter; the eye of the catheter long and narrow, and having rounded edges, is situated at the upper extremity of the beak, where there is a slight curvature; the rest of the stem is very slightly conical. At 1·5 cm. from the open extremity is placed an octahedral handle, with a mark upon that surface corresponding to the terminal concavity.

* D. Schultz, loc. cit., p. 265.
To render the instrument aseptic the stilette is drawn out, water is injected into it, then it is several times filled with ether, and lastly it is passed through the flame of a lamp.

Before the catheter is introduced it is necessary to bring about a certain amount of artificial distension of the bladder. The shortest and best method is to empty it completely, then to inject into it 150 to 200 cc. of lukewarm water, which is the recognised quantity requisite to produce a moderate amount of distension. The urethral catheter is then drawn out, and the ureteric catheter introduced.

As soon as the ureteric catheter has passed the internal urethral orifice the free extremity is raised so as to bring the beak into contact with the vesico-vaginal wall at the level of the trigone. The beak, which is gently pressed onwards, causes a slight protuberance on the vaginal wall, and as the catheter is passed onwards so this protuberance alters in position. It can thus be directed along one of the lateral sides of the vaginal trigone, i.e., from within outwards and from behind forwards, towards the orifice of one of the ureters. It is in this direction that the external portion of the inter-ureteric ligament—the most prominent portion of the ridge—is to be met. If one keep too much to the middle line, the median portion of this ridge—the least prominent—may be passed over. When it has reached that point, and has been held there, small movements of gliding, rotation, elevation, and lowering should be given to the instrument until it penetrates the orifice, but the area of one of the angles of the vaginal trigone, which is kept under constant observation, should never be departed from. When the beak is once engaged it is to be pushed from one to two centimetres towards the posterior vesical wall. That the ureter has been entered will be recognised by the fact that the catheter meets with no obstacle in front; it advances as if into a space; but lateral movements and lowering of the free end are more and more impeded the further the instrument is pressed forward. After a little time urine flows from the catheter in jerks, whereas normally the bladder empties itself continuously, as is well known, especially when evacuation is aided by means of gentle pressure above the pubes. When pushing the catheter forward one ought to be warned that at the level of the upper narrower portion, where the ureter slightly changes its direction, there is a
Fig. 85.—Pawlik’s catheters.

A. Ureteric catheter of Pawlik (the lower ring corresponds to a stilette).
B. Same catheter, designed for retention (gum-elastic catheter capable of being passed without a metal covering).
point where it is likely to be arrested and the manipulation to become somewhat difficult, especially when the urethra is close under the symphysis pubis and but little distensible, as it is in nulliparae; if, on the contrary, the urethra is roomy and flaccid, the catheter may without great difficulty be introduced into the corresponding kidney. It is to be pushed forward very gently while the free end is at the same time lowered as far as possible. On the other hand, this last part of the catheterisation is as easy

Fig. 86.—Catheterisation of the ureters by Simon's method.—The catheter is slid under the finger which makes out the inter-ureteric ligament.

*a a. Fundus of the bladder.—b b. Orifices of the ureters.—Tr. L. Triangle of Lieutaud.

as the first if one has penetrated into the bladder or the urethra by means of a fistula. *

We thus arrive at the false pelvis. The ureter is henceforward perfectly straight in its course. Ordinarily in contact with the

* On one single occasion I was able to introduce Pawlik's sound up to the false pelvis in the living subject, but that was not by passing it through the urethra. I introduced it through a vesico-vaginal fistula, that I rightly suspected of implicating the ureter. When the diagnosis was confirmed, I was able to commence a special line of treatment.
pelvic wall, it runs straight from this point for 4.5 cm. The cellular tissue surrounding it only permits this straight course when it is healthy; hence catheterisation should never be performed but with gentleness and slowly, especially when one has reason to believe in the existence of any inflammation of the ureters.

The sole unpleasant results that have been noted are: fever, abdominal pain, which has never existed longer than twenty-four hours, a little partial peritonitis (in a case where it had already previously shown itself), and finally blood and epithelial débris has been found in the urine from traumatism of the ureter. It sometimes seems possible that this catheterisation is followed by the grave accident of “ureteric fever,” analogous to “urethral fever.” Nevertheless we must wait for this ingenious procedure to be more frequently employed, that writings on the subject may become more numerous.

Simon’s method.—If exploration of the ureter be deemed necessary and difficulty be found in succeeding to pass the catheter according to Pawlik’s method, after several trials, Simon’s procedure* should be had recourse to. This consists of anaesthetising the patient, dilating the urethra, and introduction of the catheter over the finger which is in immediate contact with the inter-ureteric ligament and the orifices of the ureters (fig. 86). There is no fear of consecutive incontinence of urine; that condition is of only short duration. Unless one has had a special apprenticeship this older method is more satisfactory in its result.†

Endoscopy. Methods of Grünfeld and Brenner.—Recently an attempt has been made to pass the catheter under the control of sight, and this has been rendered possible by means of the new lighting apparatus that the progress of endoscopy has placed at our disposal.

† It has over and over again been proposed, as I said above, to compress or ligature temporarily one of the ureters through the vagina so as to isolate for diagnostic purposes the urine poured out by its fellow. Warkalla (Arch. f. Gyn., 1886, vol. 29, Heft 2, p. 289) has recently again extolled exploratory compression by means of a thread passed over the ureter from the vagina. He succeeded ten times out of thirteen attempts on the dead body. According to this writer, the operation would present no danger, because, instead of tying the thread, one would be satisfied with simply exerting a sufficient traction upon it to obliterate the lumen of the duct. I should much prefer catheterisation to this procedure.
The first surgeon who endeavoured to pass the catheter into the ureters endoscopically was Grünfeld of Vienna,* who used for this purpose his apparatus for the use of external light.

The vesical endoscope of Grünfeld consists of a simple metal tube, blackened on its internal surface and having a plane glass at its extremity.

A frontal mirror, with a small electric lamp attached to it (the photophore of Clar), permits a ray of light to be thrown down the tube. This arrangement allows a small portion of the vesical surface to be admirably seen in its normal size and position, and is amply sufficient for exploration and catheterisation of the ureters.

To point the instrument over the orifice of the urethra it must be given an angle of $30^\circ$ to $35^\circ$ to the right of the median line for the left ureter, and vice versa: and in addition its beak must be thrust from 3 to 4 cm. into the bladder and the lower extremity gently raised towards the pubes.

This manoeuvre brings into view the small chink of the orifice of the ureter, whence emerges from time to time a jet of urine, normal as to colour, or tinged with blood or pus according as the kidneys are healthy or diseased.† Exploration of the ureter by Grünfeld's method is carried out with a small catheter, whose extremity is movable at the will of the operator by an arrangement similar to that of the curette of Leroy d'Etiolles. This catheter is introduced into the bladder parallel to the endoscopic tube. Its movable extremity is placed at the right angle and engaged in the ureter under the control of the eye. As soon as introduced the catheter is straightened, the endoscope withdrawn, and the instrument pushed on as deeply as desired.

Catheterisation for the purpose of emptying the ureter is carried out in the same way with a small catheter, the extremity of which is directed towards the orifice of the ureter by the index-finger previously introduced into the vagina.

* Grünfeld. Die Endoscopie der Harnröhre und Harnblase, Stuttgart, 1881; and Ueber Cystoscopye. (Schnitzler's klin. Zeit. und Streitfragen, 1889.)
Since the introduction of Nitze’s* cystoscope all authorities who used this and similar apparatus introduced about the same time, made observations on the orifices of the ureters and drew useful conclusions on the diseases of the bladder and kidneys, but it was only in 1889 that this apparatus, in Brenner’s hands, was able to be put to catheterisation of the ureters, thanks to a modification which this author made in Leiter’s cystoscope. This modification consisted of adding to the cystoscopic tube a fine canal which opens immediately below the objective, and in which is slid a fine catheter whose beak can be admirably seen in the field of view offered by the instrument. This arrangement makes catheterisation of the ureters very easy, even in the male.†


† Poirier (Compte rendu de l’Acad. de Méd., Paris, Sept. 2, 1889) has published the successful attempts he has made with Brenner’s apparatus.
BOOK III.

METRITIS.

CHAPTER I.

PATHOLOGICAL ANATOMY—ETIOLOGY.


According to the simple etymology of the word, metritis means inflammation of the uterus.

I shall keep to that general definition, though it might itself call for a long commentary. But it seems to me to be comprehensive, and certainly from a clinical point of view the word metritis has a very clear signification. The generic term inflammation is applied to all those morbid conditions in which the anatomical sub-stratum is subjected to irritative lesions, without terminating in the formation of specific neoplasms. We shall soon see how numerous and varied these lesions themselves are. But all are united in one class, first, by the infectious nature of their commencement, and, second, by the purely defensive and limiting character of their evolution. Whether it be a case of proliferation of the mucous membrane, or of the parenchyma, the whole process seems to be absolutely circumscribed
PATHOLOGICAL ANATOMY—ETIOLOGY.

in the local irritation, come either from internal or from external surroundings, and to have no tendency whatever to pass beyond certain limits. That is sufficient to distinguish it clearly from the neoplasms, properly so called.

Do there exist side by side with metritis any "morbid states without neoplasms" meriting separation from it? On the basis of dogmatic ideas, and of a restricted meaning to the word "inflammation," ancient writers had no hesitation in placing outside the region of metritis every condition which did not fulfil the old definition, "Tumor, rubor, calor, dolor." As a consequence, granulations, ulcerations, and leucorrhœa became so many separate disorders. We find some traces of this scholastic prejudice even in some recent writers, e.g., Guérin and Courty.* Does not the latter describe in separate chapters, fluxion, congestion, engorgement, œdema, hypertrophy, arrested involution, granulations, and ulcerations of the cervix? One only has to glance at the table laboriously drawn up, with the object of effecting a diagnosis in these diverse morbid conditions, to be quickly convinced of the uselessness of such divisions.†

A more necessary distinction is the following: The notion of a lesion must not be confused with that of a malady. This is what authors have at times wished to point out by the expressions "idiopathic metritis" and "symptomatic metritis"; but they are bad expressions and we shall not adopt them. Metritis ought to remain a clinical and not an anatomico-pathological term. Because there are endometrial lesions in cases of fibromata or parenchymatous metritis in cancer, are we to describe in the present chapter myomatous endometritis or cancerous metritis? That would mean a desire to confuse and entangle the whole subject.

To be sure, our divisions are always somewhat artificial, because they are obliged to be hard and fast, and in nature nothing is absolute. But they are none the less indispensable, and are perfectly justified if the criterion upon which they are based be carefully specified. I have already said clinical medicine alone is our subject; it is the clinical side alone which

† Courty. Loc. cit., p. 894.
provides a disease with an entity and a personality. I shall not, however, dismiss the subject without saying a few words upon pseudo-metritis, or so-called symptomatic metritis.

Inflammatory lesions of the mucous membrane are excessively frequent in cases of fibromata, and doubtless to them are due the hæmorrhages. Wyder studied them in a very complete monograph.* The irritation in these cases is propagated by continuity of tissue, from one place to another close beside it. It is in the same way, but in an opposite direction, perhaps because of reflex congestions leading to a predisposition to infection, that endometritic lesions supervene in cases of diseases of the appendages. These pseudo-metrites, as I am quite ready to call them, have been classified by Czempin† in several categories, according to their source of origin: 1st, chronic inflammation of one of the ovaries, with or without participation of the Fallopian tubes; 2nd, exudative parametritis which has become acute; 3rd, irritation of the pelvic peritoneum, having its origin in cicatrices of the broad ligament after ovariotomy or salpingotomy; 4th, slowly growing tumours of the appendages (pyo-salpinx, sarcoma, and carcinoma of the ovary). What characterises these pseudo-metrites is that the inflammation of the mucous membrane is here nothing beyond an epiphenomenon which supervenes slowly (and not at the first onset) after the appearance of phenomena arising from the appendages or the pelvic peritoneum.

Breunecke‡ had, before Czempin, described a metritis hyperplastica ovarialis, arising especially about the menopause, characterised by the prolongation of atypical hæmorrhages, and anatomically answering to the hyperplastic type on which Olshausen has insisted.

Let us now commence the study of metritis, properly so-called, and its various forms.

If we consult authors, we shall see that they have adopted the most varied departure-points for their several classifications—progress, whence a division into chronic and acute; seat, whence

cervical metritis, metritis of the body of the uterus, endometritis, parenchymatous metritis, meso- or idiometritis; etiology, giving

Fig. 87.—Mucous coat of the body of the uterus. Normal condition—slightly enlarged. (Wyder.)*

(The surface of the mucous membrane is to the right; on the left of the figure are seen the fibres of the muscular coat.)

Even with the naked eye the mucous coat of the body can be distinguished from that of the cervix by its greater smoothness. By the microscope it is differentiated by the fact that its tissue is essentially composed of embryonic connective-tissue cells and of tubular glands. The connective tissue is formed of a homogeneous fundamental substance, richer in round than in fusiform cells. The latter are to be found scattered throughout the deeper layers, along the glands and vessels, while the former are scarce in the thickness of the tissue. Both kinds, and particularly the round cells, are characterised by their large nucleus, which is surrounded by only a small quantity of protoplasm. The inter-glandular tissue is traversed almost perpendicularly by tubular glands, which at the level of the muscular layer often branch and penetrate for a short distance between the connective-tissue bands that separate the muscular bundles. Everywhere else the limit between the mucous and muscular coats is well marked. The surface of the mucous coat is covered with a single layer of cylindrical epithelium, which is ciliated during the whole generative life of the woman. The mucous coat of the body is further distinguished by the richness of its arterial network, compared with its paucity of venous network. The arteries enter it perpendicularly, give off some small branches which surround the glands, then, immediately below the epithelial covering, turn back to form afterwards an irregular network of large capillaries whence spring the venous radicles.

puerperal, post-puerperal, gonorrhoeal, traumatic, constitutional forms, &c.; pathological anatomy, whence come granular,

* To fully appreciate the alterations a tissue has undergone, it is best to remember first of all its normal structure, and that is the reason why I think it advisable to anticipate the figures representing morbid conditions by figures representing the healthy state in various physiological conditions. This mode of comparison seems to me absolutely indispensable.
fungoid, ulcerated, metritis, &c. To our mind, all these classifications have a defect; they are systematic and artificial, as was the Linnean classification in botany. They are based upon one characteristic alone, arbitrarily chosen, and this characteristic is not of so great value that to it all others should be subordinate, that it should be truly dominant. To approach as nearly as

Fig. 88.—Mucous coat of the cervix. Normal—slightly enlarged. (Wyder.)

The mucous coat of the cervix is firmer, and presents a system of pinnatifid folds (the arbor vitae) which are characteristic. The interglandular tissue which in the body was seen to have the form of a granulation tissue has here rather the appearance of a more advanced form of connective tissue, in which, instead of round cells, fusiform and stellate cells predominate. There is no clear demarcation between the mucous and muscular coats, and bands of connective tissue coming from the intermuscular laminae can be traced far into the mucous coat. Consequently, sections of the mucous membrane present a partly reticulated and a partly fasciculated appearance. The cervical mucous membrane is further characterised by a rich supply of vascular papillae. A cylindrical epithelium, which in the adult is ciliated, covers the glands, and in the child extends to the edge of the os tineæ. In the adult, and especially in women who have borne children, the pavement epithelium of the vagina extends more or less high into the interior of the cervix. Between the superficial cylindrical epithelium and the glands are found here and there goblet-cells and cells with colloid contents. The vessels (according to Mœricke), enter the mucous coat perpendicularly, and have in the cervix especially thickened walls. They divide gradually into a network of capillaries less rich than that of the body. Occasionally over a small surface the capillaries become quite superficial and sub-epithelial; then they unite to form veins that pass back from the mucous coat. The glands and the ovula Nabothi are surrounded with vessels.

possible to a natural classification, to apply to nosology the definitive rules laid down by de Jussien in botany, there is but one guide to follow, and that is the clinical. I grant, if the diverse lesions were always circumscribed, and if to such and
such a definite lesion there always corresponded a definite series of symptoms, the anatomical basis would be the most logical and the most convenient. But as such is not the case, this basis only presents a factitious precision and creates illusory entities. I propose, therefore, to classify cases of metritis according to the dominant clinical characteristic, be it derived

![Diagram of the mucous coat of the uterus.](image)

Fig. 89.—Section of the mucous coat of the uterus. Normal—(x 200). (Cornil.*)

from the mode of progress or from the marked predominance of one order of symptoms. We shall thus have—


These terms are the only ones that will henceforward have for us any classification value. All others will be used indifferently, and their worth will be purely descriptive.

For a methodical description of the anatomical lesions that

* I cannot sufficiently thank Professor Cornil for the kindness he has shown me in placing at my disposal the beautiful illustrations in his Lectures, published by the Journ. des Conn. Médicales (1888).
may be met with in metritis, it is necessary for a moment to leave the clinical method of sub-division, and to follow

Fig. 90.—Uterine mucous membrane during menstruation. Normal. (Wyder.)

Preparation made from shreds of mucous membrane removed by a curette during menstruation. By the naked eye small extravasations are to be seen. The drawing represents the upper third of the mucous coat. In the deeper part is seen the inter-glandular tissue and the glands almost in a normal condition, but the glands are a little more sinuous than is ordinary. Vessels engorged with blood penetrate from below towards the surface. The superficial layers are in part intact or more or less strongly coloured by extravasations, or even entirely disintegrated. The epithelium is generally preserved; in some places, however, it is slightly raised, and its surface is covered with bloody detritus; at many points the blood has penetrated into the glands. On the left the superficial part of the mucous coat is seen to be raised by a large extravasation. Nowhere is seen the fatty degeneration that has been described by certain authors (Williams, Kundrat, Engelmann). It is very probable that during menstruation sometimes a portion of the mucous coat is destroyed (Leopold Wyder); sometimes, on the contrary, no desquamation is produced (Morricke). As a matter of fact, this figure shows that these various degrees of alteration may be brought about simultaneously, and that there are great differences in the physiological process.

simply the topographical order: 1. Lesions of the body; 2. Lesions of the cervix.
A. Amnion.
B. Chorion.

C. Zona cellularum

D. Zona exfoliationis

E. Zona glandularum

Fig. 91.—The decidual membrane. Normal. (Friedländer—Wyder.)

This figure is very diagrammatic for the sake of clearness. It represents the decidua at the end of pregnancy. This membrane is produced by two factors: 1, a proliferation of all the elements of the uterine mucous coat; 2, uterine compression of the hypertrophied mucous coat by the growing embryo. Two layers are therefore to be distinguished in it: C. The cellular layer (zona cellularum). E. The glandular layer (zona glandularum). The cellular layer, which is contiguous to the fetal membranes (A and B, amnion and chorion) is composed of cellular elements of from 0.002 to 0.061 mm. in diameter. In the upper layers the cells are round, in the lower fusiform cells predominate. Intercellular tissue is either entirely absent or only present to a very slight degree. The glandular layer presents a large alveolar network, with sometimes a very flattened meshwork, or sometimes larger or longer, not as a rule inter-communicating, and empty or containing granular material. The bands or lamellae which limit these alveoli are formed of fasciculated connective tissue, always presenting a considerable infiltration with lymphatic elements and great vascularity. These lamellae are covered on the internal surface of the alveoli by a single layer of epithelium, sometimes pavement, sometimes cylindrical.

The separation of the decidua at delivery (zona exfoliationis) occurs, according to Friedländer, almost always in the cellular layer, and rarely in the glandular layer, while according to Langhans, Hüstner, and Leopold, the exact opposite is the rule. The above figure from Friedländer has been modified in the direction indicated by his opponents, who seem to be right (Wyder). The glandular cavities thus laid open by the detachment of the placenta, furnish the elements for the regeneration of the glands and of the epithelial covering after delivery.
Lesions of the body.—In most text books, acute and chronic metritis are further sub-divided into parenchymatous, and internal or mucous (endometritis), and anatomico-pathological and clinical study follow this schematic classification. I have already said that I shall not adopt that course for the clinical side of the question. I shall, moreover, not take advantage of it for the description of lesions. As De Sinéty* wisely remarks, "How can we admit that a mucous coat so thin as that of the uterus can present lesions consequent upon an acute condition without the subjacent tissues themselves participating in the disease? Or how admit that the glands are affected without observing at the same time an alteration of their lymphatic sheaths, which communicate so largely with the lymphatic spaces of the parenchyma?"

I shall, therefore, point out in their entirety the lesions of all the coats, consequent upon an acute inflammatory condition, and afterwards these lesions under chronic inflammation.

Acute Metritis.—The descriptions that have been given of

lesions of the parenchyma, in acute metritis, are almost all of them tainted with one defect: acute metritis, not puerperal, not being fatal, and not calling for hysterectomy, it has never been described but from autopsies of women who have died in a puerperal condition; the lesions of the parenchyma, and of the mucous coat, were in reality not in the least degree comparable to what they should be in the acute stages of inflammation in a non-gravid uterus. This old notion, introduced by Chomel, must be therefore put on one side, as he described as "puerperal metritis" all septicæmic conditions consequent upon delivery. When a woman succumbs under these conditions, certainly there exists a septic inflammation of the uterine tissue throughout its thickness, but it is only an epi-

phenomenon which ought not to take away the name from the general poisoning to which the patient succumbs. It is, however, after that which the anatomico-pathologist has only the right of calling metritis (septic) of puerperal women that the vague classification of acute metritis lesions has been sketched out. Also the description, which all writers since Aran repeat, is so hackneyed that it accuses the transposition. There are found noted: increase of volume, softening of the tissue, deep red colour with yellow points scattered throughout it, dilatation of the vessels, desquamation of the mucous coat; and, lastly, to complete the cycle of acute inflammations, there is noted suppuration. Even here writers blindly hand down a certain number of old observations that are all of them open to criticism, and may be differently interpreted. The so-called abscesses of the uterine walls are, some of them, collections of pus close to the organ which have become bound to it, as is so often seen in the case of pyosalpinx, and others, suppurations of dead myomata, which have nothing whatever to do with metritis.* Certainly, if from that people

* Of the two cases related by Schröder, one, post-puerperal, seems to have been a simple parametritis, and the other, opened by the rectum and consecutive to passing the uterine sound, was very probably a case of suppuration of the Fallopian tubes. This interpretation must also be put on Hervéz de Chégoïn's oft-cited case (Soc. de Chir., Dec. 2, 1868, p. 451). A. Martin has described a case of suppurating fibroid that would formerly have been without fall taken as a case of abscess of the uterus (Berl. Beitr. zur Geb. und. Gyn., 1873, vol. 3, p. 83). J. R. Kirkpatrick lately published under the name of abscess of the uterus an undoubted case of parametritic suppuration which had invaded the cavity of Retzius and opened at the umbilicus. (Dubl. Med. Journ. of Med. Sciences, Aug., 1887, vol. 84, p. 152.)
wish to say that suppuration of the muscular coat of the uterus is possible, I shall agree; but I will not admit that it suppurates in the course of that clinical series of symptoms constituting acute metritis.

Our most precise information concerning the acute lesions of the mucous coat are derived from the examination of the membranes cast off in membranous dysmenorrhœa. The mucous coat is soft and thickened; under the microscope the glands are seen not to be altered, but the inter-glandular tissue undergoes a particular change. In it the cells appear in much larger numbers than is customary, and they are packed so closely together that there remains very little space for the homogeneous inter-cellular substance. They preserve, moreover, their normal size, and in that respect, and by the small quantity of protoplasm they contain, they differ from the cells of the decidua. In a word it is a case of an acute interstitial inflammation* (fig. 93).

organ, though, as a rule, the size is not greater than that of the closed fist. This increase in volume is not constant, and in inveterate cases is replaced by diminution.

Since Scanzoni's time* it has been customary to admit—perhaps somewhat theoretically—two periods in the morbid evolution of chronic parenchymatous metritis, those of infiltration and of induration. The first period would correspond to an active or passive congestion of the organ whence the areolar appearance which its wall, traversed by dilated vessels, could present. There is a great number of embryonic nuclei throughout the whole thickness of the tissues. The predominating histological change is the increase of connective tissue. Writers have not come to an agreement upon the question whether the muscular tissue participates in the hypertrophy. Finn† allows this hypertrophy, but denies the importance of the fatty degeneration that has sometimes been noted. De Sinéty, in one specimen which he was able to work at, found a considerable dilatation of the normal lymphatic spaces, and an increase in the vascular connective tissue, diminishing in places their calibre and giving rise to a kind of special sclerosis. The muscular tissue did not appear to be affected. Similar lesions have been described by Fritsch (fig. 94).

When the uterine parenchyma has been thus altered by a profound inflammatory process of long duration, it is rarely that signs of perimetritis do not show themselves at the same time, or adhesions in Douglas's pouch giving rise to malposition of the organ or of salpingitis, perisalpingitis, and periovaritis. The uterine mucous coat is also always more or less diseased.

In several cases of endometritis of the body and cervix, independent of parturition or supervening in old women who had borne children a long time previous, Cornil‡ found a hypertrophy of the uterine wall, due in the main to a new formation of adult connective tissue situated between the muscular fibres. Commonly in those cases the fibrous bands appear pink to the

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* F. W. von Scanzoni. On Chronic Metritis, French translation, by Dor and Socin, 1858, p. 37.
naked eye, and present a series of bridges, or opaque lines, which are nothing but thickened and sclerosed arterioles in a state of atheromatous degeneration. When they are examined under the microscope there is no difficulty in making out the very considerable thickening of the walls of the vessels, which show an increase in the elastic elements, and at the same time cells undergoing fatty degeneration. In such cases the increase in the connective tissue is accompanied by an increase in the adventitia of the arterioles and veins. There is no cicatricial contraction of the connective tissue, but, on the contrary, a permanent increase of its volume.

The microscopic and histological lesions of the mucous coat in a chronically inflamed uterus are now perfectly known, thanks to the operations which allow of the study of numerous recent examples of this lesion.

I cannot do better, in describing the ordinary appearance of a uterine mucous lining thus altered, than reproduce word for word

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Fig. 94.—Chronic metritis. (Fritsch.)

\(aa\), muscular coat traversed on the left by bundles of connective tissue; \(bb\), connective tissue; \(cc\), vessels with thickened walls; \(dd\), lymphatic space.
the description which Professor Cornil has given in his recently published lectures.*

"The mucous coat," he says, "has not the whitish appearance, the smooth surface, and the particular firmness it presents under normal conditions. Its surface is unequal, puffy, soft, pulpy, and in appearance and consistence resembles currant jelly. The colour is sometimes deeper, and then we have the appearance of a layer of blood transformed into blackish soft clots. This flabby layer, formed by the inflamed mucous coat, yields easily under the knife, as if it were a softened tissue. It is easily removed and tears very readily. An intense congestion is seen through the whole thickness of the uterine wall between the muscular fibres, but it reaches its maximum at the deep surface of the mucous coat, where it is extremely well-marked. If the mucous coat be cleanly cut with a sharp knife, and the surface of the section be observed, it is very difficult to distinguish the mucous from the muscular coat, these two parts having an almost identical appearance. But they can always be differentiated by gently scraping the uterine surface with a curette, for the mucous coat is removed while the muscular coat resists the action of the instrument. In that consists the benefit of curettage of the mucous coat, for the curette cannot penetrate into the muscular tissue itself unless it be very much softened by the inflammation, and that is very rare.

"When the specimen has been hardened in alcohol to fix the various parts, and sections have been made, one can readily see that the mucous coat is thickened to a greater or less degree, and when the sections are stained with picro-carmine the thickness of the mucous coat is evident to the naked eye. It has a slightly yellowish tint, which differentiates it from the muscular coat, which is red. Further, it is more transparent, especially in its deeper layers, which is owing to microscopic lacunae, formed by the glandular ducts. To appreciate these details well with the naked eye, it is sufficient to hold up to the daylight a section stained with picro-carmine. It is then found that the mucous coat attains a thickness of 2, 3, 4, 5 mm. (even,
sometimes, 1 cm.), whereas in health it does not exceed 1 mm. Its surface, examined in these sections, instead of being smooth, has become fungoid, and presents bossy projections and flabby-looking depressions. The pathological vegetations of the surface have been called villosities, villous projections, fungosities, and the condition has therefore received the names villous metritis, or fungous, granular, vegetation-bearing metritis. Sometimes these vegetations are of considerable size; they have a rounded, elongated form, and may become true polypi, sessile or pedun-

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**Fig. 95.**—Interstitial endometritis; partial atrophy of the glands. (Wyder.)

...culated. In other cases, side by side with these new productions, small cysts, the size of a pin's head, may be seen exactly analogous to the ovula Nabothi, which are so common in the cervical canal and at the surface of the os tincæ, and which have the same glandular origin. But they differ entirely from these latter by the character of their contents, which are more liquid, more serous, of less consistency, and less gelatinous than those of the ovula Nabothi in the cervix. The small glandular cysts
of the body are found more frequently in the endometritis of elderly than of younger females.

"Such is the microscopic appearance of a chronically inflamed mucous coat of the uterus."

From a histological point of view there exist three types, and they are often quite distinct in the same specimen, while in others they are often combined. I shall follow in this description the recent work of Wyder.*

![Diagram](image)

Fig. 96.—Interstitial endometritis; complete atrophy of the glands. (Wyder.)

A, cystic dilatation, last glandular trace; B, all traces of glands have disappeared.

**Interstitial endometritis (chronic).**—The inter-glandular tissue which we saw in acute metritis so thickly packed with cells that it almost had the appearance of granulation tissue, here is transformed into a true cicatricial tissue, in which the cellular elements become more and more important. The effects of this process is mainly felt by the glands; they are sometimes con-

*Wyder. Tafeln f. den Gyn. Unterricht. (Berlin, 1887, plates 10, 11, and 12.)
stricted at various points and transformed into cysts, sometimes compressed through their whole extent and more or less atrophied. As a result, in certain cases there is produced a connective tissue with a few sparsely scattered glands in its midst (fig. 95); in others cysts are formed (fig. 96 A), or we may find a complete destruction of the glands (fig. 96 B).

In cases where the atrophy is as pronounced as that, the muscular coat is only covered by a thin layer of hardened connective tissue, itself covered by epithelium.

Beneath the surface still covered by pavement epithelium may then be seen fibrous bands, which traverse the mucous coat, anastomose, and constitute a mesh-work enclosing a homogeneous material as a rule, although in the deeper parts it may be found filled with closely packed round cells. Near the surface the inter-glandular tissue is more regularly arranged. It is composed of a series of layers of fusiform cells, with parallel arrangement of their processes. In sections it contains very few glands.

At several points may be seen cyst-cavities, lined here and there by cubical epithelium, and surrounded by fasciculated connective tissue, composed of fusiform cells. In other places may be proved the complete absence of glands, and the mucous coat is represented by homogeneous connective tissue, poor in cells, and wavy in arrangement, which can be sharply differen-
tiated from the muscular layer by the clearness of its outline. Near the surface this mucous membrane is, in part, smooth, and, in part, covered with large flat villous projections. In a word there are present all the signs of an advanced sclerosis of connective tissue (fig. 96 B).

Chronic glandular endometritis.—Ruge,* and after him Wyder, recognise two varieties of glandular endometritis, one hypertrophic, and the other hyperplastic. In the first, proliferation of the epithelium takes place without increase in the number of the glands themselves. Instead of being represented by a more or less straight tube, the glands are then irregular in shape, and are often arranged in spirals.† In the hyperplastic variety, there is increase in the number of the glands. Fig. 97

represents a mixed example of combined hypertrophy, and glandular tissue is absolutely normal as regards structure, but the glands are greatly distorted, or present lateral prolongations.

Polypous endometritis (chronic).—This is characterised to the naked eye by the enormous development of the mucous coat, which has a fungoid appearance, and may sometimes be shaggy

† Professor Corail found in the epithelial lining of a gland phenomena of karyokinesis (fig. 98). He thinks, moreover, that this phenomena must also occur normally at the menstrual period, for it is to be seen in all glandular cells undergoing physiological renewal. Lectures on the Path. Anat. of Metritis (Journ. des Connaiss. Méd., April 26, 1888, p. 131).
from the number of flabby polypoid projections. Récamier* was the first to thoroughly describe the macroscopic appearance of this variety, which has again been studied by Olshausen. From a histological point of view, it is a mixed variety, at the same time interstitial and glandular, with well-marked cystic degeneration. On the surface may be seen with the naked eye small, transparent and slightly prominent vesicles of 1 mm. in diameter. Under the microscope (fig. 99) these cysts evidently are formed by degenerated glands, lined with cubical epithelium. They are separated by bands of connective tissue. In the superficial portion of the mucous coat are to be found diluted glands. In the deeper portion they are often normal but sinuous, and sometimes directed parallel to the muscular fibres, sometimes obliquely. The glandular culs-de-sac most frequently pass beyond the deep layer of the mucous coat, and, according to Cornil, grow down between the subjacent muscular fibres (fig. 100). Here is an excellent example of that condition which in general anatomy was formerly called "hétérotopie glandulaire," and which may be

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* Récamier. Union Méd. de Paris, June 1-8, 1850, p. 266 and foll.
Fig. 100.—Glandular endometritis; section showing the deep penetration of the glands (40). (Cornil.)

a, surface of the mucous coat of which the epithelial covering has in part fallen off; b, gland opening on the surface of the mucous coat; g, glandular cul-de-sac situated more deeply; t, connective tissue of new formation containing many lymphoid cells; h h, glands cut longitudinally, sinuous and dilated in places; m, bundles of muscular tissue. In the midst of this muscular tissue the terminations of the glandular culs-de-sac are to be seen.
brought about under the influence of simple inflammation without any malignant tendency. In this invasion of the muscular tissue the glands are accompanied by a certain amount of connective tissue which surrounds them. The inter-glandular tissue is very vascular. At the situations that correspond to glandular dilatations, sometimes it contains numbers of fusiform cells, with processes which give it a striated appearance. Sometimes it assumes the form of fibrous tissues, relatively poor in cellular elements; these appearances are seen in the immediate neighbourhood of the vessels. Deeper down and around the intact glands, as well as between the cysts, the inter-glandular tissue is replaced by homogeneous substance, rich in round cells, which are pressed one against another (fig. 99).*

* De Sinéty (loc. cit., p. 383) has given a good description of the anatomical lesions of endometritis, although the post-mortem examination only had reference to a single specimen. He has especially studied the vegetations or excrescences that are to be seen on the surface of the mucous coat, and which he examined in shreds removed by Récamier’s curette; but he has laid less stress upon the lesions of the mucous coat itself. He describes (p. 387) three kinds of vegetation: glandular vegetations, composed of dilated and hypertrophied glands, which have become sinusous, but have preserved their epithelium; entirely embryonic vegetations, formed of embryonic tissue with few blood vessels; and vascular vegetations, composed of vessels that are often extremely dilated.

Some writers distinguish a diphtheritic endometritis that it would be much better to speak of as gangrenous, for these so-called false membranes are only the product of a partial mortification. It seems to me that it is an error in nosology to bring into the group of inflammatory diseases of the uterus, which are so well defined, clinically, a simple pathological accident which may attack this organ, as all others, under certain local or general conditions. Thus, diphtheritic metritis following on the use of tampons soaked in perchloride of iron has been spoken of (Zweifel, Soc. obst. de Leipzig.—Centr. f. Gyn., 1888, p. 408), or after the enucleation of a fibroid, or in the course of septicemia caused in an old woman by a cellulitis of the lower limb (Fränkel. Soc. obst. de Hambourg.—Centr. f. Gyn., 1888, p. 347).

Cornil has also observed different particulars of great interest visible only under very high powers of the microscope; longitudinal or transverse sections of the glands show, according to him, generally, a single layer of flattened cylindrical cells on their internal surface. When several layers are superposed the details are difficult to make out, but when the sections are thin and relative positions of the parts well kept often one has in sight only one single row of cells. The vibratile cilia that are to be seen on healthy glandular epithelium are still largely preserved, and this preservation of cilia in glands that have been thus modified by chronic inflammation is a most remarkable fact. Nevertheless it is not always easy to see them; it is necessary to use excellent lenses and perfectly fresh specimens. To obtain good preparations, specimens fresh from the hands of the surgeon should be taken and placed immediately in some preserving liquid, preferably 90 per cent. alcohol. In specimens that are perfectly fresh one can see when the cilia have disappeared, at the surface of the cell, a thin layer of mucous, either clear and homogeneous, or in small globules, or finely striated, as if the vibratile cilia had become agglomerated. The cells which sometimes completely fill the glandular alveoli are cylindrical cells, are identical with those
Lastly, there is a histological variety of endometritis, which assuredly does not deserve to be raised to the position of a special form, but may usefully be specified. It is endometritis post abortum. According to Schröder* it is almost always interstitial endometritis that is seen after abortion; but the glands become also diseased in the long run. But what gives the characteristic appearance to this anatomical variety is the incomplete or defective involution of the decidua vera or serotina, which does not undergo satisfactory retrogressive change, so that more or less extensive islands of decidua are seen to persist, and around them a very active proliferation of small cells takes place (fig. 101). These inflammatory modifications of the mucous coat, Schröder adds, are totally different from the retentions of placenta, which are often wrongly pointed out as endometritis post abortum, and which are neither more nor less than accidental

normally found in the glands of the uterus, or else are modified ovoid and having undergone mucoid degeneration.

The only difference shown between sections of fragments removed by the curette and sections of the mucous lining made on the entire uterus is that the relative positions of the former are more difficult to make out. For this reason it is better to study sections of the mucous lining cut perpendicular to its surface on the whole organ removed by hysterectomy (Cornil, loc. cit., p. 123).

hæmorrhages post abortum, due to insufficient contraction of the uterus and its vessels.

_Lesions of the cervix._—Anatomically, it is not strictly correct to speak of a cervical metritis apart from metritis of the body of the uterus, for these two portions of the womb are never entirely independent of one another. It is even most common for lesions of the two parts to proceed contemporaneously, and on parallel lines. However, it is possible for inflammation to localise itself more specially in one or the other of these regions. Ordinarily cervical metritis predominates, for the cervix is more exposed to injurious causes. If it is the cervical mucous membrane which is quite at the first attacked and diseased, alterations in it are not long in propagating themselves, so to speak, by continuity of tissue, to the musculo-fibrous coat, and a true parenchymatous metritis follows on every cervical inflammation that has lasted some little time. Cornil explicitly points out these

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Fig. 102.—_a b_, simple papillary erosion; _c_, follicular erosion (low power).
lesions of parenchymatous metritis, which may be partial. For example, these lesions are occasionally restricted to the cervix in eversion of this part, caused not only by the thickening of the cervical mucous membrane turned outwards into the vagina and thickened, but also by the thickening of the connective tissue situated beneath the mucous coat, and between the muscular bundles. In this connective tissue signs of recent inflammation are often to be found; the bundles of connective tissue are thickened, and flattened cells are interposed between them.*

The cervix uteri, in cases of metritis, can present special and very different lesions: lacerations, eversion of the mucous coat, hypertrophy, congestion, varicosities, granulations, inflamed follicles, erosions, ulcerations, cysts or ovula Nabothi, &c. As this portion of the uterus is visible, the macroscopic description of these lesions will enter into the clinical description. But it is important to specify the exact nature of some of them, with the aid of histological analysis.

_Ovula Nabothi._ Granulations or inflamed follicles.—The ovula Nabothi are small cysts; granulations or inflamed follicles are small ulcerations (I shall explain later on the exact meaning of this word) scattered over the surface of the cervix. Both simulate at times a kind of eruption, and certain authors have wrongly identified them with cutaneous eruptions (erythema, eczema, herpes, acne, pemphigus, &c.). It is a theoretical assumption, which is purely arbitrary and based upon no serious grounds at all.

_Erosions, ulcerations._—The cervix may present, in the neighbourhood of the os externum, a red surface which has lost its characteristic shininess, but without prominence or depression. This is erosion, properly so called. It may be seen in cases of acute vaginitis with abundant secretion, or, again, in consequence of the contact of a foreign body (pessary); under the microscope it may be seen that a simple substitution has taken place of columnar epithelium for the normal pavement epithelium.

* Péraire (On infectious endometritis. Thesis, Paris, 1889) asserts that he has observed germs, bacteria, and micrococci, in cervical metritis, which had passed through the mucous coat and had become scattered even in the muscular coat. If this fact be confirmed, it would explain the great obstinacy of lesions of the cervix in spite of all treatment.

† Courty. _Loc. cit., p. 1059_.
Fig. 103.—Transverse section of the upper part of the cervix comprising the whole mucous coat (12). (Cornil.) The empty central portion represents the cervical canal; $b\,b$, the internal surface of the mucous coat showing small prominences, superficial glandular depressions, and large depressions; $d$, part between the folds of the arbor vitae; $g\,g$, deep glands; $a\,a$, ovula Nabothi; $m\,m$, muscular tissue, forming the uterine wall.
Fischel* has shown that in the child at birth pseudo-erosion of the os tincæ is occasionally found, due to the fact that at the level of the os externum the epithelium is then cylindrical over a certain zone to the outer side. Later on this epithelium becomes covered with layers of pavement epithelium, but should these be thrown off, from any cause whatsoever, the original condition reappears. In that way would be created a very curious congenital predisposition to erosions. The observations of Klotz† support this view; according to him some women get an erosion or an inflammation under the influence of the least inflammation, while others never present them even when afflicted with an intense cervical catarrh. Further, this author has insisted upon the individual anatomical differences which

the normal structure of the cervix and the line of demarcation between the two kinds of epithelium present, in the adult state, in virgins. It seems, therefore, possible that there are women specially prone to cervical metritis by a true congenital idiosyncrasy.

Ulceration is the name which has been given to another appearance. Over the whole circumference of the orifice, or only over a portion of its extent, there exists an apparent depression, generally bounded by a circular border, the surface of which appears red and smooth, or possibly velvety or even villous. Gynaecologists have long regarded this lesion as a loss of substance with destruction of tissue (whence the names ulceration and ulcerated cervix), and some of them considerably exaggerated the importance of this lesion. Lisfranc made it the chief symptom of his "engorgement of the uterus," and in his eyes it was the principal disease. A reaction set in; Gosselin* was the first to dare, and at the time when he formulated his opinion it was a very bold step, to advance the view that ulceration was not the whole mischief, but that it was only a symptom of that

uterine catarrh which Mélier's work had already made known.* Gosselin asserted, on the other hand, that it was not because they were inflammatory lesions, and as such reacted upon the constitution (as Récamier and Lisfranc taught), that ulcerations were serious, but because of the enfeeblement produced by their secretion; and it was in consequence of experiments made upon the absorption of iodide of potassium by ulcerated cervices, that this eminent clinician later, through over-estimating the importance of these experiments, went so far as to believe that it was "by opening the door to deleterious absorption."

Tyler Smith,† followed more recently by Roser,‡ only saw in this lesion a hernial protrusion of the mucous coat from the interior of the cervix, and, to use the expression of Roser, an ectropion comparable to that of the eyelids when the conjunctiva is everted or inflamed. This writer distinguished a traumatic or cicatricial ectropion due to lacerations of the cervix and an inflammatory ectropion due to protrusion of the cervical mucous membrane. A certain amount of importance undoubtedly attaches to this kind of descent of swollen intra-cervical mucous membrane beyond the orifice and over the external aspect of the cervix; in cases of profound laceration it may constitute the larger part of the exposed surface, or the "ulceration." But in many cases the closed os tinctæ would only allow a narrow border of the internal mucous coat to protrude, and since the ulceration nevertheless covers a large portion of the convex surface of the cervix it is absolutely necessary to recognise that alteration has taken place on this very surface itself.

What is the exact nature of this alteration? Is the old view of ulceration true, and does it answer to an anatomical reality or only to an appearance?

The work of Veit and Ruge,§ first confirmed in France by De Sinéty, has thrown much new light on this question. These authors have asserted that no destruction of tissue takes place, but, on the other hand, a new formation; while cylindrical

epithelium replaces the stratified epithelium, at the level of the "ulcerated" external surface, glands are produced in close juxtaposition and the inter-glandular substance between these depressions takes on the appearance of the stakes of a palissade, which gives rise to the papillary aspect of the surface. When a bilateral laceration of the cervix allows this glandular new formation to spread itself largely outwards, it juts beyond the external os like a crimson velvet frill on a sleeve.* At other

Fig. 106.—Follicular hypertrophy of the cervix.
A, anterior lip, internal surface (view on section); B, follicular hypertrophy (surface view).

times these glands become cystic and form small eminences at the base of the ulceration, which then takes on a follicular appearance (better seen on a section than by direct inspection)†

* It is certain that laceration of the cervix greatly favours the occurrence of ulceration, but it is nevertheless going too far to say with Bouilly (Semaine méd., Sept. 5, 1888, p. 345) that true ulceration of the cervix does not exist independent of a laceration caused by parturition.—Bennet (Pract. treatise on inflammation of the uterus, transl. by Peter, 1863, p. 142) long ago clearly described ulceration in virgins and nulliparae. I have myself seen many examples of the fact.
They are small semi-transparent pinkish or violet masses, more or less freely pedunculated in the cavity or beyond the orifice of the cervix; they are extremely like nasal mucous polypi, but are infinitely more vascular. When the cystic* transformation of the glands take place in the very substance of the cervix it can, by penetrating and dilating it, bring about an increase in length by follicular hypertrophy (fig. 106 A). Finally, glandular vegetations and cystic transformations can also occur inside a patulous cervix and then form in its canal sessile projections which, I think, may be fairly likened to a tonsil (fig. 106 B).

But Ruge and Veit’s theory, though true in the great majority of cases, is not however so absolutely true as these writers made out. Fischel has opposed their exclusiveness, and has shown that occasionally there is a real loss of tissue—ulceration in the proper sense of the word. The epithelium is then cast off and the mucous coat in places is covered with inflammatory granulations having their starting place at the papillae. Döderlein† has verified the existence of these two processes, i.e., the pseudo-ulceration of Ruge and Veit and the true ulceration of Fischel.

Lacerations of the convex uteri (or as they are called in French, déchirures, rents) are one of the most frequent lesions after delivery. They have even been observed after abortion at two months, when the elasticity of the ovum would have been thought—a priori—little likely to render this lesion probable; but even at that early period the only circumstance necessary for laceration to occur is an insufficiently softened and dilated cervix. According to Mundé’s statistics it is almost always at the first delivery that the laceration seems to be made. Nevertheless, it is possible that the cervix, in that respect comparable to the perineum, though left intact by previous deliveries, may rupture later on. Although often there does not exist the smallest crack

(Comptes rendus de la Soc. de biologie, and Assoc. franç. pour l’avanc. des sciences, 1880, p. 975).

* It is incorrect to describe mucous polypi of the uterus in a separate chapter, as so many authors do. From the triple standpoint of pathological anatomy, of practice, and of treatment, these lesions form a part of hemorrhagic metritis. Cf. on this subject: A. Gomet. Thesis, Paris, 1889.

in the cervix of women who have borne children, nevertheless the frequency of lacerations is very great. But their pathological importance has been put much into the foreground and certainly exaggerated by Emmet, who went so far as to say that "half, at least, of the uterine affections from which women who have borne

children suffer, arise from lacerations of the cervix." Pallen estimates the proportion in such cases at 40 per cent., Goodell reckons it at one-sixth. Mundé, in 2,500 women who had borne children, found 612 lacerations (about 25 per cent.), but only 280 (slightly over 11 per cent.)* were deep enough to be likely to have a pathological influence. The rest were either very little complained of or cicatrised.

The varieties or degrees of laceration are very variable; they may be distinguished as unilateral, bilateral, anterior, posterior, and stellate. The bilateral laceration is the form most usually met with, then follow in order the unilateral, the stellate, the

* The author says 50 per cent., but that is evidently an error of calculation.
multiple, the posterior, and, lastly, the anterior. Unilateral laceration is most often seen on the left side, doubtless on account of the predominance of the left occipito-anterior presentation, the rupture taking place at the level of the occiput. When the laceration has been deep and is partially cicatrisated a nodulated line is to be felt along the cervix, which is itself inclined in this direction; occasionally, in the vaginal cul-de-sac at the base of the broad ligament the existence of a small hard cicatricial nodule may be made out, which doubtless owns the same traumatic origin.

In stellate lacerations the rents are, as a rule, less deep.

Lastly, the idea of laceration has been extended to cases which, in all probability, have nothing to do with it; I mean those cases where the cervix is patulous but in which, nevertheless, the finger can feel no cracks at the periphery. The supporters of the pathological rôle of laceration have not failed to see herein

![Diagram](image-url)
a laceration of the internal or endo-cervical mucous membrane, which has led to a sub-involution of the whole cervix and the patency of the cervical canal; it would then be exposed to the air and sometimes to friction, by which a cervical catarrh would be also kept up. According to Mundé this variety must be regarded as a sub-involution of the cervix, with paralysis of the muscular fibres, dependent upon their sub-mucous rupture.

For convenience of description it has been proposed to divide lacerations into three degrees, according to their depth: the first, which only slightly involves the cervix (fig. 110 A); the second (fig. 110 B), which divides the cervix through half its length; the third (fig. 110 C), going right up to the vaginal cul-de-sac, and even beyond it. (Mundé.)

Fig. 109.—Intact cervix. Normal orifice of the cervix in a multipara.

It is possible for a laceration not to be accompanied by ulceration and for its whole surface to be covered by pavement-epithelium, as the rest of the cervix. This cicatrisation over the spot of solution of continuity, without reunion of its lips, is seen particularly after surgical division, followed by rigorous anti-septic treatment. When such a condition obtains after delivery, we must conclude that the laceration has escaped all infection. In the opposite case, ulceration supervenes. Then, the deeper the laceration the greater the gaping of the lips and the greater the eversion of the internal mucous membrane. This exposure of the mucous membrane to the various sources of vaginal irritation—secretions, friction, contact of air—is doubtless a very effectual condition for the maintenance of that morbid process which constitutes the so-called "ulceration." The papilliform
and cystic alteration may then extend so far and be so largely spread over the everted lips that it presents the appearance of a fungating malignant growth (fig. 112 B).

At the same time there occur in the lacerated cervix important histological alterations. In the first place the work of cicatrisation itself may, in cases of considerable laceration, have inconvenient consequences, owing to the contraction of the

* Figs. 110, 111, and 112 are taken from Mundé (Minor Surgical Gynaecology, pp. 436, 440, and 447).
fibrous tissue, which compresses the glands, brings about their cystic degeneration, and produces hypertrophy of the tissue

(cystic hyperplasia). The dense tissue of the cicatrix, by compressing the nerve-endings, is, according to Emmet and his followers, a source of the most varied nervous symptoms.

According to this gynaecologist (and without doubt he has
exaggerated the influence of this slight lesion) it is especially the pressure exerted at the upper angle of the laceration by what he calls the "cicatricial plug" that is the "root of the evil." He finds in it a frequent cause of neuroses, even in cases where the injury to the cervix is itself but little complained of.*

Another early lesion caused by laceration of the cervix is eversion of the lips of the cervix, the principal cause of which is the traction exerted by the vaginal insertion on the divided cervix. It pushes the ectropion of the mucous coat to an extreme limit, and that ectropion is the more marked the more diseased the mucous coat. Lastly, a third result of laceration would be arrest of post-puerperal involution, giving rise to passive congestion, catarrh, &c.

**Pathogenesis.**—Most classical authors describing successively the various forms of metritis in complete fashion, the study of its causes is found parcelled out in several sections, as if each type was different from all others in all respects. It seems to me that there is no object gained by following this tradition. Just as I united in one single paragraph the anatomico-pathological discussion, so I shall treat of the etiology, and thereby I shall avoid much useless repetition.

From a pathogenic point of view it may be said that all inflammations of the uterus are of infective, or bacterial origin. Direct proof of this statement has now been obtained, and for a long time the process of induction left no doubt on the subject. This opinion, which is now commonly held,† was very categorically set forth some time ago by Schröder.‡ Here is what this eminent gynaecologist said on the subject some years back:

"Modern ideas compel us to place a special importance on the penetration of noxious agents into the cavity of the uterus, from without. All that we absolutely know in this connection is that gonorrhœal infection can become the cause of acute and chronic metritis. Personally, I believe that this infection plays

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* Dolériis (Nouv. Archives d'Obst. et de Gyn., 1888, p. 50 and foll.) lays great stress, following Emmet, upon this *cicatricial plug*, and attributes in its formation a certain amount of influence to the parametritis secondary to infection of the laceration, of which it brings about the ulcerous degeneration.


a considerable part in the etiology of endometritis. There is then found, as a rule, at the same time, vaginitis and cervical catarrh, recent or of old standing. Nevertheless, cases of endometritis of undoubted gonorrhœal origin are found, in which the vagina is quite normal, either because it has not been attacked by the infection, or because symptoms are no longer present in it, though they persist in the womb. Endometritis which comes on after delivery, is probably, in a large number of cases, also due to puerperal infection, exclusively limited to the mucous coat, and as a consequence powerless to produce a general disease. It is to bacterial origin that must be referred chronic metritis, often met with in nulliparae who have never been tainted with gonorrhœa, and even in young virgins. Inflammatory agents can, even under such conditions, penetrate into the uterine cavity, and for my part I believe that this penetration is often the result of masturbation."

More recent researches have confirmed these conjectures.* The proof, first of all, was put beyond question of doubt in the case of metritis of gonorrhœal origin. Steinschneider,† in his interesting work upon the seat of gonorrhœal infection in women, showed that long after the gonococcus had disappeared from the urethra it was to be found in the cervix or the body of the uterus, whose mucous coats are far more favourable for their culture than that of the vagina. In this cavity unfavourable circumstances exist in the thickness of its pavement epithelium, the acid character of its secretions, and the concurrence of numerous bacteria which normally inhabit it. Of these latter G. Winter has given a detailed description.

Since then even direct demonstration of the fact has been also obtained in the case of the micro-organisms of post-puerperal endometritis.

Gönner‡ (of Basle) found in cases of puerperal fever streptococci, which he was able to cultivate with ease. Döderlein§

* I do not include amongst metrites tuberculosis of the uterus; this will be described in the chapter upon tuberculosis of the genital tract. Of course this special infection depends upon Koch's bacillus.
more recently collected with great care the lochia of women who had been confined, in the uterus itself, after safeguarding them from all vaginal contamination. The lochia were examined microscopically, and controlled by cultures on gelatine and agar-agar. The result of these researches was that there were no germs found when the temperature of the patient, after delivery, did not rise beyond 38° C. (100·4° F.). But, on the other hand, when fever was present bacilli and micrococci were found, which, when the temperature fell, were eliminated by the secretions now more abundant, and become purulent. The pathological sequelæ of delivery (and doubtless also the consecutive metritis) are therefore due to infection by a pathogenic microbe, which is the streptococcus pyogenes. Döderlein thinks that these micro-organisms are carried from the vagina into the uterus by the finger or instruments during exploration. Straus and Sanchez Toledo* have published researches confirmatory of these facts. But their attempts to infect with septic lochia the uterus of rabbits which had recently littered, failed partly from the lack of a decidua, and partly from the special characteristics of the placental site in these animals.

Péraire † observed, and was able to make cultivations of a bacillus, and some micrococci found in the secretions of metritis. When inoculated upon rabbits his cultures were followed by fever and vaginitis. It is, therefore, a well-established fact that the symptoms of septic metritis, or, more accurately speaking, of infection of the uterine mucous membrane, which may follow on delivery or abortion, depend upon the proliferation of pathogenic micro-organisms, and the metritis, properly so-called, which arises after the puerperal condition, is due to the persistence of these germs.

A question more open to discussion is the following: Whence come these micro-organisms? Do they always come from without,

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† Péraire, loc. cit.
or do they come from within? In other words, does hetero-infection or auto-infection take place? I cannot here enter into a recapitulation of the long discussions that have lately taken place upon this subject.* I shall content myself with briefly stating the conclusions which seem to me to spring from them.

Hetero-infection, which has also been called contact-infection (Kaltenbach) or exogenous infection (Fehling), is much the more common, and, in fact, is the rule. Leopold found an enormous diminution of disease in his practice after he forbade any examination of parturient women; for, in spite of all precautions, the exploring finger can always be the means of introducing germs. In the healthy puerpera the vagina must be considered to be aseptic (Bokelmann, Dührssen). As we have already seen, there are no germs in the lochia of the normal puerpera; there are none even in the upper portion of the vagina immediately after delivery, according to Von Ott‡, and he attributes this fact to the extreme cleansing brought about by the rupture of the membranes and the friction of the foetal head over the distended vaginal walls. Therefore, if everything goes on well, without retention of any débris of the ovum, without accumulation of clots through uterine atony, without premature rupture of the membranes hindering the physiological cleansing of the genital canal, there is no chance of infection. It is this fact which explains the happy termination of so many deliveries carried out with no sort of antiseptic precaution whatever. We may almost say that Nature herself has provided for the asepsis of this act. We should, therefore, be very chary of interfering in simple cases, and should abstain from harmful manipulations and from unnecessary, and therefore dangerous, antiseptic injections.‡

There is nothing specific—if one may say so—in bacterial infection of the uterus. It is an error, long ago refuted, to

‡ Von Ott. Zur Bakteriologie der Lochien (Arch. f. Gyn., 1888, vol. 31, Heft 3, p. 435). Winter has, on the other hand, shown that the germs are numerous soon after parturition, but that these germs are innocuous.
† Bokelmann, speaking of excess in this direction, calls it furor antisepticus (loc. cit).
believe that for each special infection there is a corresponding special pathogenic element.* It is perfectly well known at present that it is one single species, the streptococcus pyogenes, which causes all the diseases of puerperal women, and that it is this species which also causes erysipelas and cellulitis.†

Puerperal infection of the uterus, which is so often the starting point for consecutive metritis, may therefore be produced by pathogenic organisms coming from the most varied sources. It is known at the present time, not only by clinical experience, but also by microbiological observation, that the germs which produce surgical infection (cellulitis, erysipelas) can infect women recently delivered, and are then found in their genital secretions. When I was house-physician (interne) at the Old Hôpital des Cliniques, in Broca's wards I several times saw small epidemics of erysipelas in the surgical wards follow on epidemics of puerperal fever in the adjacent maternity wards, or vice versa. This mixed infection (German, Mischinfection) was latterly the subject of some very interesting work from a pathogenic standpoint. Pfannenstiel,‡ while investigating a small epidemic which occurred in the Women's Hospital at Breslau, and which followed upon an epidemic of follicular tonsillitis,

* Bouchard. Practical utility of pathogenic idea. Opening lectures (Semainé méd., 1889).
† E. Czerniewski (St. Petersburg). Zur Frage von der puerperalen Erkrankungen (Arch. f. Gyn., 1888, vol. 33, Heft 1, p. 73). This paper was read before the St. Petersburg Obstetrical and Gynecological Society, April 14, 1888 (Centr. fur Gyn., 1889, p. 836).
* Widal (Investigation upon puerperal infection, phlegmasia dolens, and erysipelas. Thesis, Paris, 1889) found streptococcus pyogenes in the lymphatics even when there was no suppuration in cases of puerperal infection. To produce erysipelas experimentally, with the streptococcus, its pyogenic properties must be removed, while at the same time its virulence is increased by passing it through rabbits. He concludes that to the ideas ordinarily admitted with regard to the part taken by microbes in the production of infective diseases, i.e., 1, the nature of the germs; 2, the number present; 3, their point of entrance; 4, the soil; must be added a fifth — i.e., virulence.
‡ Pfannenstiel Kasuistische Beiträge zur Aetiologie des Puerperalfiebers (Centr. fur. Gyn., 1888, No. 38, p. 617).—See also Hartmann. Ueber die Aetiologie von Erysipelus und Puerperalfieber (Inanig. Dissert., Münich, 1887).—It is moreover known by the experiments of Maierowicz (Zur Aetiologie des Erysipelas, Inanig. Dissert., St. Petersburg, analysed in Centr. f. Bakter., 1888, vol. 3, Heft 1) that one can obtain in animals according to the method of inoculation sometimes erysipelas, sometimes cellulitis, with the same microbes (Strept. erysipel'atis of Fehleisen). Inversely von Eiselsberg (Arch. f. Chir., 1887, vol. 32, Heft 1, p. 1) obtained similar results by inoculation on animals of different but closely-allied micro-organisms (Strept. erysip. and strept. pyogenes).
clearly showed their bacterial relationship. The streptococcus erysipelatis (Fehleisen) and that of cellulitis (Str. pyogenes, Rosenbach) are moreover very closely allied (Fränkel), and both appear to lead to puerperal infection.*

Winter's researches now present the subject in quite a new light; they are extremely valuable, not only from the competence of their author, but also from the abundant material he had at his disposal, thanks to the frequent hysterectomies and salpingotomies that are performed in the Berlin hospitals. He made his researches on fresh specimens, while at the same time he scrupulously avoided all causes of error. They led to the conclusion that in the female generative tract there is what I think may be called a "dangerous zone," rich in micro-organisms. Not only do the vagina and cervix contain germs in great numbers, as was proved by Hausmann, Küstner, Lomer, and Bumm,† but in half the cases, according to Winter,‡ they harbour pathogenic micro-organisms, viz., three kinds of staphylococcus (Staph. pyog. albus, aureus, and citreus) and various kinds of streptococci. This fact is of immense importance, as it demonstrates the possibility of auto-infection. One would entirely fail to understand how it is that this does not occur more frequently, especially at each confinement, a period at which the numbers of the germs greatly increase, were it not that inoculations made by Winter with cultures taken from this source showed that, curiously enough, these staphylococci, which are, so to speak, domesticated by their residence in the genital canal, have lost their virulence. We have here a case of spontaneous attenuation, which is most remarkable, and at the same time most fortunate. But it is very possible that they may become once again virulent, and very rapidly so, if they are placed under certain favourable circumstances, as, for example, when organic detritus is present with them. One can, therefore, understand the extreme danger of miscarriages, when portions of the ovum are retained within the cervix; it does

not then take long for the uterus to become infected by continuity of tissue.

In the same way it is evident how dangerous it is to explore the uterine cavity without previous cleansing of the genital canal, even though the finger or the sound be absolutely aseptic, for they may carry the staphylococci of the cervix along with them into the body of the uterus. The frontier of what may be called the dangerous zone is situated at the uterine orifice of the cervix.

Certain mechanical conditions greatly favour uterine infection. Thus Schultze [199] believes that in women with gaping vulva (a condition frequently seen in multipara, even without any rupture of the perinæum), a slight leucorrhœic discharge is sufficient for the introduction of germs from the external air. Even in women in whom the labia are well apposed the menstrual period may render infection possible. And therefore the necessity, according to Schultze, of protecting the vulva in such cases with a pad of wadding, which filters the air. But it is not only the micro-organisms normally inhabiting the vagina and cervix that can be introduced into the uterus by passing the sound. In large towns we are living in the midst of pathogenic organisms. Von Eiselsberg [199] found staphylococcus pyogenes aureus in the wards of a hospital, Fürbringer [199] demonstrated it in the scrapings of the nails, and Passet in dish-water; the last experimenter also found staphylococcus pyogenes albus in beef that was slightly tainted, &c. Biondi [199] even met with it in normal saliva. The chances of infection are, therefore, very great, and were it not for the “vital opposition” of the living tissues, which constantly guard against it, it would be well nigh inevitable. Everything, therefore, that disarms this defence opens the door to infection.

We have here, certainly, one of the most curious examples of what Professor Verneuil has called “microbisme latent,” with this peculiarity, that here we do not have to do with an extinct infection, but with a potential infection, which hitherto has not

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existed, but only needs for its development that the surroundings from being physiological should become pathological. Auto-infection, which would be better called "endogenous infection" (Fehling), therefore reduces itself, in a word, to a question of a nutrient medium calling into activity the virulence of a germ which had hitherto been inactive. It was thus that Chauveau* restored its virulence to attenuated anthrax bacilli, by cultivation under diminished atmospheric pressure in broth, to which blood had been added.

But could not this increase of the harmful properties of pathogenic micro-organisms which are slumbering in the healthy female generative tract be called into action by other means? Could not general debility, which lessens the vitality of cells, and traumatism, which suspends it by an inhibitory action, demonstrated by Brown-Séquard, raise the barrier which keeps the germs far from the uterine cavity, in the region where they are innocent, by putting obstacles in the way of phagocytosis? Perhaps in this way may be explained the undoubted influence of illnesses, and especially of the exanthemata, venereal excesses, &c.

Lastly, it seemed proved that the presence of one species of pathogenic germ often favours the development of another species. Thus women having a gonorrhoeal metritis (gonococcus of Neisser) are easily attacked by a more or less attenuated septic infection by staphylococci or streptococci, or by tubercle bacilli. Here we have what might be called "conjunction" or "combination of infection." It is in a similar way that pneunomic lesions convert the lungs into a favourable site for the invasion and development of Koch's bacilli.

Let us now pass to the etiology, properly so-called, or the study of the mediate causes of metritis.

They may be arranged under four chief headings in relation with: 1st, Menstruation; 2nd, Coitus; 3rd, Parturition; 4th, Traumatism.

1. Menstruation. — The very establishing of this function may be the signal for the manifestation of uterine inflammation, on account of the intense congestion which occurs at this time, and which occasions the peculiar vulnerability of the organ. To it is generally added in some degree the influence of malforma-

tion of the organ leading to stasis of the menstrual flow, viz., incomplete development, congenital anteflexion, conical cervix, stenosis of the os, or, as a complementary cause, catching cold, or masturbation. To this metritis of virgins, which was recently carefully studied by one of my pupils,* there corresponds at the other extremity of the genital life of women a metritis of the menopause. Here, also, the same predisposing cause—intense congestion—comes in and hands the womb over to all causes capable of exciting uterine inflammation.

Between these two extremes, each menstrual period is particularly favourable to the appearance of metritis, and any excessive fatigue or chill may bring it on if there be any misplacement of the organ, if the cervical canal be narrowed, or if it has been deeply lacerated and left patent by a previous delivery.

2. Coitus.—Excessive coitus, especially if occurring during the menstrual periods, or if coincident with other fatigue, as for example during the wedding trip,† is capable of provoking metritis quite independently of any contamination. But how often does gonorrhœal infection, more or less unknown, the most fruitful source of metritis,‡ come into play in the case of the newly-married! How many husbands think themselves quite cured of their gonorrhœa, and attach no importance to a slight urethral oozing, to a gleet, or a "goutte militaire," as it is popularly called in France. And yet this gleet will contaminate, if not the vagina or the urethra, at all events the cervico uterine cavity, and even the Fallopian tubes of the young wife.

Gonorrhœal infection can long remain latent in women, attenuated and localised to the cervix uteri. But often, under the influence of an untimely examination, an abortion, or parturition, the infection reaches the uterine cavity and even passes beyond it. Nöggerath§ says that in women affected with gonorrhœal parturition is followed by endometritis, and perimetritis in 75 per cent. of the cases. Substituting the word

† Alph. Guérin. loc. cit., p. 28.
"salpingitis" for "perimetritis" I do not think this percentage is much over-stated.

It is also to this cause, much more than to injury produced by excessive coitus, that the metritis of prostitutes must doubtless be attributed. Also the frequent unknown abortions of women who indulge in excesses must be taken into consideration. Later on sterility supervenes as a consequence of the extension of the inflammation to the Fallopian tubes, whose canals soon become obliterated.

3. Parturition.—This is by far the most frequent cause. After normal parturition, spontaneous or induced abortion, whether recognised or not, the uterus is in a particular condition of hyperplasia and congestion which needs for its progressive disappearance special hygienic conditions. Now these conditions are very frequently neglected, from carelessness in the upper classes or from necessity in the working classes. It was not very long ago that the foremost obstetricians, with Cazeaux at their head, considered a rest of fifteen or twenty days as sufficient. On this subject there is no fixed rule, but, speaking generally, one ought to wait until the uterus has regained its normal size. Otherwise, what Guérin calls post-puerperal engorgement may supervene, and that is identical with the post-puerperal metritis of Chomel, the arrested involution of Simpson, the chronic metritis or the uterine infarct of other writers (catarrhal metritis and painful metritis).

It is especially when parturition has not been normal, and in particular when there has been difficulty in delivering, or when portions of placenta have remained for a longer or shorter time in its cavity, that the uterus is likely to become inflamed. One cannot doubt that there has then been a true local infection, and if rigorous antiseptic treatment be not early undertaken (intrauterine injections, curettage, &c.), there is danger that this infection, which commenced acutely, will perpetuate itself afterwards in a chronic form. The same applies in a case of abortion, where it is so common to find portions of the membranes, sometimes almost imperceptible, which have become engrafted upon the uterine mucous coat and which represent so many centres of infection.

One particular upon which latterly great stress has been laid in the setting up and maintaining of metritis is, to use Emmet's
expression, "laceration of the cervix." It was this American gynaecologist who first, in 1869, recognised its importance, though it was foreseen long before by Bennett. Perhaps, however, they are inclined to somewhat exaggerate the importance of this lesion on the other side of the Atlantic.

The following are the numerous results ascribed to it: retardation of the normal involution of the uterus after delivery, then hyperplasia, sclerosis, and compression of the nerve-filament; congestion and even inflammation of the ovaries; parametritis; extension of the sclerosis to the cervix beyond the cicatrix where it arose, compression of the glands and nerves, formation of cysts and production of neuralgic pain and reflex neuroses; ectropion and inflammation of the cervical mucous membrane in consequence of the friction to which it is exposed; lastly, tendency to retroversion and prolapse of the uterus.

But this is not all: Mundé, Olshausen, Hegar, and Kaltenbach regard old lacerations as a frequent cause of repeated abortion, and Breisky has suggested that they predispose to cancer as being loci minoris resistentiae.

Emmet's assertions upon the pathogenic rôle of lacerations have been the subject of much discussion, some of which is quite recent. Nöggerath, at the meeting of German scientists held at Wiesbaden in 1887, presented a long statistical work tending to reduce to nothing the part played by cervical laceration, and to demonstrate the following points: 1. Women with laceration of the cervix conceive more easily, and abort less frequently than others. 2. The position of the uterus is in no way influenced by laceration. 3. The uterine axis is not increased in length. 4. Erosions and ulcerations are not of greater frequency. 5. Ectropion is never a result of laceration. 6. Ulceration of the

* The first work of Emmet was a paper read Feb. 8, 1869, before the Medical Society of New York: Surgery of the cervix (Amer. Journ. of Obst., Feb., 1869). His second paper, on the same subject—the only one ordinarily quoted—on Sept. 28, 1871: Laceration of the cervix as a frequent and unrecognised cause of disease (Amer. Journ. of Obst., Nov., 1874). It was this paper, translated into German by Vogel, that introduced the subject first into Europe, especially after the favourable criticism of Breisky in the Wein. Med. Woch., 1876, Nos. 49—51.

† J. H. Bennett. Practical treatise on inflammation of the uterus, Paris, 1850.


cervical tissues is not more frequently met with. And 7. Laceration has no influence upon the frequency or intensity of uterine diseases. In the discussion which followed upon the reading of this paper, Sänger, Skutsch, and Ahlfeld expressed an opinion that Nöggerath went too far in his criticism. A little after, Mundé, who constituted himself one of the chief champions of Emmet's doctrine in America, published in his journal a refutation by Brooks H. Wells,* one of his pupils, of Nöggerath's paper, point by point. There also statistics were called in to prove diametrically opposite conclusions. Wells, above all, insists upon the important part that lacerations play in causing reflex neuroses.

It is very difficult to pronounce a categorical opinion in the midst of assertions so contradictory, and emanating from such authoritative sources. Nevertheless, it seems to me that the rôle of laceration has in turns been too much exalted and too much cried down. It has in its turn passed through something like that which another generation saw in the case of deviations of the uterus: to them very nearly all the possible inflammations of the uterus and its appendages were attributed. Happily, we have retraced our steps, for it is now generally agreed to recognise that, if alterations in the position of the uterus are sufficient of themselves to give rise to reflex nervous phenomena, yet they cannot start metritis, though they certainly predispose to it and serve to keep it up. Without doubt this is also the limit to the rôle of lacerations in the production of reflex morbid states: they predispose to and prolong cervical catarrh. But just as uterine retroversion exists without morbid symptoms, so there are many cases of laceration without metritis; but these are scarcely very deep lacerations which have extended right into the cellular tissue of the cul-de-sac, or again bilateral lacerations with marked ektopion, which constitute an etiological factor that must not be neglected. †

Traumatism.—The chronic bruising, produced by a badly applied pessary, either too large or placed before the flexion has been reduced, and pressing with too much force against the organ has

† Cf. the paper by Th. Smith on lacerations of the cervix uteri (Amer. Journ. of Obst., Jan., 1891, p. 46).
occasionally given rise to symptoms of acute metritis that have disappeared after the removal of the instrument; this is especially the case with pessaries having an intra-uterine stem, which are very dangerous instruments unless most carefully watched by the surgeon.

Lastly, any operation whatsoever in the interior of the genital canal, digital examination, passing the sound, lowering, cauterisation, dilatation, incision, may become the starting point for metritis (complicated with peri- or para-metritis) if antiseptic precautions have not been taken. These accidents, which were very frequent formerly, and with justice made gynaecologists very fearful of intervention, no longer exist in the practice of those who conform to the rules—the sacred rules one might almost call them—of modern surgery. If inflammation of the uterus, at the present time, supervenes on violent operations in its cavity (curettage, enucleation or piece-meal removal of fibromata) this inflammation may to a certain extent be kept aseptic and rapidly subside without leaving any traces.

For the development of metritis, vaginal injections too hot or too cold have been also blamed; personally, I attach very little importance to this cause. Injections can only do harm if the canula be not absolutely clean, or if it be inserted in such a way as to injure the cervix. It is true that cases have been seen of the canal penetrating into the cervix where there has been prolapsus uteri, and the injection then giving rise to serious symptoms; but these latter have nothing whatever in common with metritis.

Various causes.—Are we to follow the example of many writers,* and mention as causes of metritis the exanthemata, variola, measles, scarlatina? I think further observations are needed on this point. We cannot deny that the female generative apparatus is particularly vulnerable during the convalescence from any illness which has enfeebled the whole organism.

Some diseases (icterus gravis) and some poisons (phosphorus) give rise to acute fatty degeneration of the uterine tissues. We have here lesions only, and not diseases of the uterus, and it would be out of place to insist upon them while considering metritis.

The influence of diathesis has been greatly exaggerated. Martineau,* went so far as to divide metritis into two classes: 1, constitutional; 2, traumatic. Constitutional metritis, according to him, is partly proto-pathic and partly secondary, or deutero-pathic, and he would regard its origin as: scrofulous, arthritic, herpetic, chlorotic, syphilitic, and, lastly, tuberculous. Dyscrasias, really, according to Martineau, play the part of local predisposing causes.

But it is, I think, quite a misapplication of language to describe a scrofulous, herpetic, &c., metritis, as if each one of them possessed well-defined characters. I will readily grant that the question of general condition, and of soil, plays a considerable part, if not in the production, at least in the permanence of local inflammations, and in particular of metritis; that, in consequence, we must carefully enquire into this general condition from a therapeutic point of view. But that is all I will grant to the doctrine of diathesis. We must not misconstrue, by exaggeration, the advanced views of Bazin and de Verneuil in general pathology.

CHAPTER II.

SYMPTOMS, PROGRESS, AND DIAGNOSIS OF METRITIS.


When we study the diseases of the female internal generative organs, it is impossible not to be struck by the similarity of the ordinary symptoms, furnished in each of them, by questioning the patient. This collection of symptoms is very nearly common to cases of chronic metritis, catarrhal endometritis, or even fibroma, cancer, or salpingitis. Of course I do not go so far as to say that they are absolutely identical. It is certain that, however precise the interrogation, sensible differences will appear, if it be only in the intensity of one symptom or another. But if one symptom be more complained of in certain diseases—haemorrhage in cases of fibroid, leucorrhœa in cancer, nervous troubles in misplacements, or diseases of the appendages, &c.—it is none the less true that the principal features are identical; just like the different states of the same plank which has received several coats of paint. This is the idea I wish to express by the phrase "symptoms accompanying uterine disease" (syndrome utérin) applied to this common basis which appears throughout. It was thus that Bean grouped under the term "asystole" all the phenomena of heart disease when cardiac failure set in, whether the primary lesion was mitral,
tricuspid, or aortic. In the same way, I think, we shall find much advantage for clinical description in the method I propose to follow. Once this outline has been traced, it will be sufficient for the completion of each special picture to add a few after touches, and we shall thereby avoid needless repetition.

The study of the symptoms accompanying uterine disease naturally falls here, as it coincides almost exactly with the ordinary signs of metritis. And it could hardly be otherwise, since, as a matter of fact, it is the metritic element, superadded to almost all the diseases of the uterus and its appendages, which causes the train of symptoms to appear in almost every case.

The principal features of this train of symptoms are: pain, leucorrhœa, dysmenorrhœa and metrorrhagia, with symptoms from the side of neighbouring organs (bladder, rectum), or of more distant organs (digestive apparatus, nervous system). I will now pass these successively in review.

_Pain._—This pain is spontaneous: it has its seat in the true pelvis, but, and this is a point to note, it does not always have its principal focus at the uterus; often it is not in the hypogastrium that the patient suffers most, but in one of the iliac regions, and particularly the left, close to the ovary. To explain this fact it seems to me rational to admit that there is very frequently a little catarrhal salpingitis concomitant with the metritis. For the tubes are really nothing more than prolongations of the uterine cornua, and with them they are anatomically and pathologically one. When we speak of metritis we ought almost always to say metro-salpingitis, with unequal distribution of the inflammation, preponderating in the uterus, but having an echo, sometimes very faint, but very real, in the tubes. Hence arises pain in the region of the appendages, which have a very rich, nervous network. With regard to its frequency on the left side, it is as difficult to explain as is the predilection of epididymitis for the same side.

Another seat of the pain is in the lumbar region.

The pain is increased by fatigue, by stumbling, carriage jolting. Perhaps, under these mechanical influences, it may not become increased immediately, but the exacerbation may only appear at the end of some time. Though riding in
ordinary carriages is not well borne, riding in tramways is; but
railway travelling is not well borne on account of the particular
jolting of the carriages. The pain is dull, persistent, and
increases in intensity; it causes a sensation of weight and fulness
at the perinaeum and in the true pelvis. The patient feels as
if she had there a foreign body which was about to escape; in
a word, the patient knows she has a uterus. Her bent gait, in
acute cases; is characteristic; instead of sitting down quickly
she sits down carefully supporting herself on the neighbouring
furniture, or on the arm of an arm-chair, for fear she should
recall the dormant pain. The pain is increased by pressure, and
especially by palpation, in conjunction with digital examination.
But one can satisfy himself perfectly during examination that it
is not direct pressure on the cervix which is painful, for, as is
well known, this part is quite without feeling (except in cases
of lumbo-abdominal neuralgia), but rather the shaking produced
by "ballottement" of the uterus itself. Gosselin very wisely
laid stress on this distinction.*

Leucorrhœa.—This is a constant phenomenon. It may be
more or less masked by blood, increased by sanious pus, &c., but
in one form or another is always present.

Leucorrhœa (or "the whites") is so important a symptom in
gynaecology that some of the older writers† constituted it a
separate disease, the principal disease of the uterus, grouping
about it the other phenomena of inflammation. Courty himself
makes of certain forms of leucorrhœa a morbid entity, an
idiopathic affection.‡

Leucorrhœa is an exaggeration and morbid alteration of the
physiological vaginal and uterine secretion. The uterus and
vagina normally secrete a very small quantity of a mucus
liquid, which always contains a few leucocytes. It is an oozing,
dependent upon the slow destruction of the epithelial covering.
If it gets beyond a certain degree, becomes more abundant and
purulent, it is a morbid product and constitutes leucorrhœa.

Leucorrhœa comes from two sources: the vagina and the
uterus.

Vaginal leucorrhœa, which often exists alone, is caused by

‡ Courty. Loc. cit.
the flow of a very fluid milky secretion, which only stiffens linen to a slight degree. Under certain special circumstances this liquid may become charged with pus and take on a greenish yellow colour. It is acid in reaction. Leucorrhœa from the body of the uterus is yellowish white, and only slightly viscid; that from the cervix is gelatinous. Normally it is translucent and resembles white of egg or ground glass. It stiffens linen very considerably. When pathological it is purulent and of a greenish yellow colour. Its reaction is alkaline.

O. Küstner* made careful researches upon the uterine secretion, normal and morbid. He introduced glass tubes into the uterine cavity, taking care to thoroughly close the os with diachylon and collodium. He examined in this way six women free from uterine catarrh. The secretions of the cervix and of the body had the characters I have just pointed out. He afterwards examined women with uterine catarrh, purulent and non-purulent. He found that most often there was a simultaneous catarrh of the cervix and of the body, but that if they occurred separately, catarrh of the cervix alone was more common than of the body alone. In all these cases Küstner made microscopic examination, and found a large number of micro-organisms present, which were of four or five different kinds, and for the most part were of oval form. The recent researches of Winter, as was said above, have shown that several of these organisms are, so far as form is concerned, identical with pathogenic germs.

The leucorrhœa flow is rarely quite continuous; not that the secretion is not continuously poured out, but that the secreted fluid is only evacuated at intervals. It accumulates in the vagina, and from time to time escapes from the vulva in small quantities.

Lastly, in certain cases veritable secretory crises may be seen, and a large quantity of liquid may make its appearance almost suddenly after somewhat strong pains. Such cases have often been mistaken for intermittent evacuation of dropsy of the tubes (hydrops, tubae profuens). But this phenomenon certainly may exist in cases of metritis without any collection of fluid in the tubes, as I have seen many times. It is, properly speaking, a reflex pathological hyper-secretion.

Some authors have tried to find a means of differentiating

* Küstner. Beiträge zur Lehre der Endometritis, Jena, 1883, p. 87.
between vaginal and uterine leucorrhoea. Schultze* proposed to introduce into the vagina a plug of cotton-wool, which he left over the cervix for 24 hours; on removal one can, from the liquid with which it is saturated, determine the quantity of the secretion that comes from the uterus.

Leucorrhoea may simply depend upon a defective general state of health, e.g., anaemia, chlorosis. This symptomatic leucorrhoea is so frequent that M. Despines† asserted that two-thirds of the women in Paris suffered from it. Many of the female working-classes in Paris do certainly have leucorrhoea. As they all drink café au lait they readily attribute their ailment to the use of this article of diet, and some medical men have, seriously, accepted this extraordinary explanation. What ought really to be said is that certain women have "the whites," because they breakfast upon café au lait for the simple reason that they cannot afford better nourishment.‡

Dysmenorrhoea, Metrorrhagia.—Menstrual troubles may be met with in uterine diseases, but one must not think that they are constant. Dysmenorrhoea, or painful menstruation, is often met with in metritis on account of certain mechanical obstacles to the expulsion of the menstrual blood (flexions, narrowness of the cervical canal) which themselves predispose to inflammation. Amenorrhoea is sometimes the result of anaemia; if ever so slight a degree of metritis has existed for some time it debilitates the patient; and it is thus that the uterine diseases act, and not directly. Metrorrhagia, on the contrary, is most certainly directly dependent upon the metritis. It is especially when the mucous lining of the body of the uterus is affected with interstitial endometritis (whether primary or consecutive to fibromata or cancer) that metrorrhagia is likely to occur. These losses of blood may arise either during the menstrual period, when they constitute menorrhagia and the periods are prolonged, or after the catamenia have ceased for the time, when they constitute metrorrhagia.

Most uterine diseases are a bar to conception. Sterility is not absolutely certain, for pregnancy has been observed even in cases of cancer and fibroma, as is well known. The same holds good in metritis, but under such circumstances abortions are frequent.

*Symptoms of neighbouring organs and reflex symptoms.*—In all uterine affections are to be observed symptoms of neighbouring organs (independent of pressure symptoms, which cannot be considered in this general description, and which, moreover, never arise from metritis). The woman often experiences pain in passing water, micturition is increased in frequency, and vesical tenesmus may supervene. Every disease of the uterus, as a matter of fact, reacts more or less upon the bladder, and occasionally even the patient only draws the physician's attention to her vesical trouble. When catheterisation is called for it is common to find cystitis arise, unless all antiseptic precautions be taken.

As the patients often suffer during defaecation from the exertion which this act demands, and the shocks it gives to the diseased uterus, they get into the habit of restraining themselves as much as possible, and constipation soon becomes habitual.

*Uterine dyspepsia.*—There is no function upon which uterine affections react with more constancy than digestion. Failure to recognise this fact has often led to grave errors of diagnosis. The dyspepsia is here very readily explicable by reflex action dependent upon the nervous system; it is quite sufficient to recall to mind the richness of the sympathetic nervous supply of the uterus and stomach to render this fact intelligible. Dilatation of the stomach is very common in metritis of long duration, with all the train of symptoms that has so well been described by Bouchard and his pupils;* this subject is worthy of further study, for dilatation of the stomach depending upon uterine causes has nowhere been fully pointed out. I have collected several examples of it. As to dyspepsia, or sluggish digestion, it has long attracted the attention of gynaecologists, who have briefly mentioned it. Henri Bennet and Courty speak of it without laying great stress upon it, but mo"}

recently some important papers* have been written on the subject. Want of appetite and nausea are very often accompanied by flatulence, and in particular by a state of chronic tympanites, which causes patients to say that their abdomen has increased in size since the commencement of their illness, though they themselves have wasted. This meteorism is a great hindrance to palpation of the abdomen and bi-manual examination.

Respiratory reflexes. Uterine cough.—Very often in women afflicted with uterine disease, apart from all affections of the respiratory tract, and without any suspicion of hysteria, we may observe a dry cough, occurring sometimes in paroxysms, sometimes in single explosive efforts, but so frequently that it seems to constitute a kind of "habit." It is generally small and stifled, but exceptionally presents a sonorous and metallic character which disturbs the patient and her friends. Aran† shortly mentioned it; one of my pupils, following my lectures, devoted to it a more complete study.‡ What characterises it is that it is accompanied by no physical signs in the chest and gets well with the care of the uterine lesion, be it metritis, displacement, &c.

Reflexes of the central and peripheral nervous system. Neuralgic and neuroses of genital origin.—The pathology of these reflexes may also be readily explained by the rich innervation of the generative organs, which are united to the sympathetic system by the hypogastric plexus and to the spinal cord by the pudic nerve. Neuralgic reflexes are very frequent. Inter-costal neuralgia is so common that Bassereau asserted this neuralgia was almost always conjoined with metritis. Facial neuralgia and lumbo-abdominal neuralgia, with radiation of the pain into the cutaneous nerves of the left thigh, especially, are of frequent occurrence. Simpson and Scanzoni§ have laid stress upon sacral neuralgia, which they made the subject of monographs under the name of coccydynia. Peripheral reflexes

† Aran. Clinical lectures on diseases of the uterus, Paris, 1858.
have even been thought to extend so far as to the nerves of special sense. Clifton S. Morse* has described an asthenopia dependent upon uterine disease.

Lastly, I only mention palpitation of the heart, which may be referred both to nervous reflexes and to anemia.

I shall not insist upon the troubles of the general nervous system, which are of extreme variability. "Nervous troubles" says Courty, when treating of chronic metritis, "assume all forms of hysteria, not because they belong to true hysteria (which may coincide, but only rarely), but because in women alterations of the nervous system, and especially those of which the uterus is the starting point, most often take on this character." This truth is so common that the very etymology of the word "hysteria" is a witness to it.

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On the other hand, it is certain that in women predisposed to hysteria the least trouble about the internal generative organs is sufficient to call forth a manifestation of nervous symptoms. And this must be the explanation at the same time of the intensity of the symptoms that it has been thought justifiable to attribute to insignificant causes, such as the "cicatrical plug" of Emmet in lacerations of the cervix, and also of the marvellous success attending certain operations. How can we avoid a diagnosis of hysteria when reading observations such as those of Mundé, where a sharp attack of sciatica or catalepsy supervened upon simple pressure with the finger upon a cicatrix in a laceration of the cervix, and where all the symptoms disappeared on suturing the laceration? *

One ought almost to say that there is a special uterine pathology in hysterical patients, and perhaps also special therapeutic success; in such patients we may expect marvellous results from intervention, which would be absolutely useless in the case of women with a less unstable nervous system.

There is yet one other consequence of genital affections which is observed, especially in diseases of the uterus (metritis, misplacements, &c.), which have lasted for a long number of years. It is a state of peculiar asthenia, of excessive depression of the nervous system, which renders the woman incapable of any effort, but without the weakness of the muscles or the alteration in health having any relation with this state of languor. It must, therefore, doubtless, be attributed to a pathological reflex action.‡

Lastly, as we shall see when studying misplacements of the uterus and diseases of the appendages, severe nervous troubles, chorea, epilepsy, &c., are occasionally dependent upon these conditions directly, and are cured at the same time with them. But metritis alone never produces such effects.

General condition.—The pain by preventing exercise, dyspepsia

† A certain portion, in these latter cases, falls into the category of the phenomena arising from lack of fixation of the abdominal viscera which have been united under the name of "Enteroptosis" (F. Glénard).
by presenting an obstacle to alimentation, and the state of the nervous system by its depressing influence upon nutrition, all conduce to a rapid alteration of the general health of a woman afflicted with uterine disease, and give her the usual appearance of anaemia, to which are added an earthy tinge of the complex, brownish circles around the eyes, and an expression of suffering characteristic of what has been termed the uterine aspect.

Such is the collection of ordinary symptoms which is fairly common to all diseases of the internal generative organs, but which is never so well marked as in cases of metritis. Study of the physical signs revealed by direct examination will now allow us to give precision to the characters proper to inflammation of the uterus.

Physical signs.—By digital examination (which ought always to be performed in conjunction with bi-manual examination) we find the cervix increased in size and altered in consistency, except in those very rare cases in which the body of the uterus is alone affected with inflammation. The cervix is larger than normal, and more patulous, sometimes oily and velvety when it presents an ulcerated surface. At certain points it may be felt to be studded with hard granular masses, which are glandular cysts. The finger discovers, also, the lacerations which I described at length when treating of the pathological anatomy. By pressure on the cervix, either at one of its lips or at the site of the laceration, very sharp pain may sometimes be produced, which may present the acute character of neuralgia. If this examination does not produce pain it may occasionally be produced by giving a movement of "ballottement" to the uterus by jerking up the cervix. Gosselin* lays much stress upon the clinical importance of this sign. Digital examination also furnishes information upon the freedom of the culs-de-sac, in cases not complicated by circum-uterine inflammation. In such cases the uterus is freely movable.

The initial examination with the speculum should preferably be made with Cusco's bivalve speculum, or with the two separate retractors of Simon. It shows the cervix increased in size, sometimes filling the upper end of the vagina, and changed in

* Gosselin, loc. cit.
form. In nulliparae, instead of being conical, as it should be, it is cylindrical; in women who have borne children, club-shaped; and if lacerations be present it assumes the most diverse shapes, described above. It varies in colour from bright red to purplish. A viscid mucoid stream, either purely pus or streaked with pus and blood, flows from the orifice, especially if one take care to gently press the cervix several times with the valves of the speculum, in order, so to speak, to "milk" it. The surface of the cervix often appears ulcerated. These apparent losses of substance are sometimes of very small extent, disseminated (folliculitis of authors) or superficial, resembling small blisters (erosions) or deep, when they may be like a cicatrising ulcer, smooth and glossy, or like a granulating wound (ulcerations). Occasionally yellowish granules, like small acne pustules, are the indications of a superficial cyst (ovula Nabothi).

It should be remembered that lacerations of the cervix are
much better perceived by digital examination than by sight, at the extremity of a speculum, and that their ulcerated surface is much better spread out by means of a bivalve than a cylindrical speculum.

To separate the two lips and see into the interior of the cervix, Courty's forceps, with divergent blades, may be used, or simply small hooks (fig. 114). Rectal examination is a useful adjunct to vaginal examination. In cases of metritis, however, it would yield negative results.

The introduction of a sound will afford information upon various interesting points.

The increase of size of the uterine cavity, as a rule, may reach to 8 cm.; when the sound may be inserted more deeply, and there has not been antecedent pregnancy or abortion, one ought to fear something more than simple metritis. Nevertheless, in those cases one ought always to guard against one source of error. When the uterus is slightly deviated to one side (which occurs very often in cases of deep laceration, when the uterus is drawn to the side of the laceration) the sound does not measure in reality the length of the organ, but the length of an oblique line from the deviated portion of the cervix to the opposite corner; in such cases there is an apparent lengthening. When this source of error is suspected it will suffice to bring the uterus back into its normal position, either by bi-manual palpation or by placing the woman in the genupectoral position, which readily allows the uterus to right itself.

The sound often awakens pain, but it would be going too far to say, with Veit, that we may thus determine the exact points where the endometritis is most marked. In reality it is much rather the movement given to the entire organ that is the usual cause of the pain than the rubbing of the mucous coat. Flow of blood when the sound has entered with ease is a sure sign of alteration of the mucous coat. If there are any very prominent fungosities they may even be occasionally felt with the instrument.

Various forms of metritis. Acute form.—At the commencement of metritis, following, for example, upon dilatation of the cervix or passage of the sound without antecedent antiseptic precautions, &c., we may observe acute symptoms (rigors and
fever), as well as during the course of chronic metritis after fatigue or even at the time of menstruation. However that may be, when metritis takes on this form from the outset, or by slow steps, direct examination allows us to recognise a peculiar tenderness of the organ, a special heat of the vagina, in which the finger occasionally perceives arterial pulsation, redness and swelling of the cervix—in a word, all the classical signs of acute inflammation. As a rule these symptoms quickly diminish in severity, but they may reappear with a fresh exacerbation of inflammation.

Catarhhal form.—This form is characterised by the prominence of two symptoms, ulceration of the cervix and the intensity of the leucorrhœa. The appearance of an ulcerated cervix has been already described in detail, so I shall not return to the subject.

This form of metritis is most frequently seen in young women, and is often accompanied by reflex nervous phenomena (dyspepsia, palpitation, neuroses). The trouble is ordinarily localised mainly in the cervix; it forms the "cervical catarrh" of certain writers. It has been described, wrongly I think, as a circumscribed lesion; there is always some concomitant alteration of the mucous coat of the body of the uterus, and this must be reckoned with to avoid mistakes and disappointment.

Hæmorrhagic form.—Here, on the contrary, the body is diseased principally, and the cervix may present a relatively healthy appearance. This form is seen in young girls at the establishment of menstruation and in women at the menopause; finally, it is the most common form taken by metritis post abortum, when small particles of decidua, almost invisible, become engrafted upon the uterine mucous membrane and keep up there an obstinate inflammation. One must bear in mind that early abortions are very often not recognised at all, and that this pathogenic condition is of much more frequent occurrence than is usually thought.

It is in the inveterate catarhhal and hæmorrhagic forms that profound alteration of the mucous coat of the body of the uterus is met with, and it then becomes vegetating fungous or polypoid. This excessive proliferation of the interstitial and glandular element may also occur in the mucous coat of the
cervix, which then becomes visible beyond the external os, and constitutes a new symptom, though the affection does not thereby deserve to have its name changed. Mucous polypi and follicular hypertrophy of the cervix are lesions of metritis, and ought to be described with it anatomically and clinically. Their histological nature I have already described above. The appearance of these polypi recalls that of the soft nasal polypi; they are pinkish or violet, of the size of a pea or a small nut, sometimes sessile and sometimes dependent from a very thin pedicle. It is easy to recognise their nature by the speculum and digital examination.

Follicular hypertrophy of the cervix takes place at the expense of the glandular tissue in the very thickness of one of the lips, which thereby undergoes a hypertrophic elongation, of soft consistency and of scored (fendillé) or rugged appearance, which may be sufficient to bring it right down to the level of the vulva, or even beyond it.*

Polypi often induce severe intermittent hæmorrhage; hypertrophic elongation of the cervix is especially likely to be accompanied by catarrh. The hæmorrhagic form may cause serious loss of blood for several weeks, almost without cessation, leading, in some cases, to an extreme degree of anæmia. The flow of blood often occurs without any uterine pains, the patients only complaining of more or less intense lumbar pain, and presenting various neuralgic painful spots.

Chronic painful form (synonyms, chronic metritis, engorgement, infarctus uterinus, &c.).—I have characterised this variety by the name "painful," because the painful condition of the organ and the production of great weakness are its principal symptoms.

It is absolutely wrong to regard chronic metritis as the sequela of an acute metritis. It is much more exact to speak of it as the result of an infection which has proceeded slowly, insidiously, and unsuspected, sometimes having even become dormant before making its definite appearance, long after the cause of infection has disappeared. The facts are, therefore, analogous to those which Verneuil described under the name of

* A. Pullicit (Bull. de la Soc. anat., Dec. 26, 1890) showed a specimen of follicular hypertrophy of the cervix which passed beyond the vulva.
“microbisme latent.” Such cases exhibit insidious progress, deceptive retrogression, and unexpected exacerbation; so much so that there is more than one point of similarity between the clinical course of a focus of long-standing osteitis and that of chronic metritis. In the interval between the acute exacerbations, which are always imminent, both constitute an infirmity rather than a disease.

The ultimate cause is most often a localised puerperal infection not tending to run a very rapid course. Interference with normal involution, “engorgement” as the old writers said, characterised by the abnormal size of the organ, the sensation of weight, pains in the loins, rendering walking and standing painful, and dysmenorrhœa are the first symptoms. They may even be unnoticed during the early months, and the woman who has only felt ill after some extra fatigue, attributes the origin of her affection to this occasional cause, disregarding the effective influence of a confinement or a miscarriage which occurred at a much earlier date. Later the pain becomes greater, and may condemn the patient to almost complete invalidism.

Direct examination of the parts yields very different results, according to whether it takes place when acute symptoms are present or absent. If they are present the signs I mentioned above, when treating of the acute variety, are to be made out. If absent, one ordinarily finds the cervix a little swollen, hard, as if sclerosed, often irregular, in consequence of old laceration, in parts of an almost wooden consistence, and in parts as if it had small nodules, like shot, scattered over it (glandular cysts). The speculum confirms the existence of swelling and exhibits a variable degree of congestion; often a very characteristic mottled and pimply appearance is to be seen. If there be lacerations of the cervix, ectropion of the mucous lining may be seen, but ulceration is not so fungoid as in the catarrhal form; it is rather smooth, like a cicatrizing ulcer. On digital examination, concomitant deviation of the uterus is very often made out. The sound does not show any greatly increased length.

There is one variety of chronic painful metritis which deserves a special description: it is that which has been designated

under the names of membranous dysmenorrhœa, exfoliative endometritis, and decidua menstrualis. The chief sign is the elimination, accompanied by pain, of the whole or part of the uterine mucous coat, at the commencement of menstruation, and this mucous membrane presents the histological characters of an acute inflammation [interstitial endometritis] (fig. 93). The patients may suffer very little between the periods, but they nevertheless present undoubted signs of metritis, in addition to leucorrhœa. Many writers, however, have failed to recognise this relationship, and make membranous dysmenorrhœa quite a distinct affection to metritis. But others have discerned it. Thus Schröder says that then "chronic catarrh is so often met with that, as a general rule, one might regard it as the cause of the evil."* If the origin of the affection be sought after, one almost always finds that it dates from a confinement or a miscarriage, and this is the general rule, or more rarely from the establishment of menstruation, and the importance of these phases of generative life in the causation of metritis is well known. We might, therefore, define membranous dysmenorrhœa as a chronic metritis, with acute exacerbations and inflammatory shedding of the mucous coat during menstruation. And that is the reason why, clinically, it must come under the chronic heading, but, anatomically, falls into the category of acute metritis.

Sometimes only shreds are eliminated, sometimes the mucous membrane is expelled entire, forming a complete cast of the uterus, in which are to be seen the smooth internal surface with small holes scattered about, and an irregular and ragged external surface. This membrane must not be confounded with the product of an abortion; a careful examination (after a short immersion in picric acid) in the latter case would demonstrate the existence of chorionic villi.† On the other hand, the presence or absence of decidual cells is not pathognomonic, as one might, perhaps, imagine.‡

This special manifestation of certain cases of chronic metritis generally persists till the menopause, if energetic treatment be not undertaken, and it may be accompanied by hæmorrhage.

It often induces sterility, but pregnancy has been known to intervene, and the disease to return after delivery.

**Progress. Prognosis.**—All forms of metritis are very obstinate; when the mucous coat has been diseased for some time, the muscular coat, the parenchyma, is not long in undergoing alteration in its turn, and even if the mucous lining be afterwards cured, the modification of structure, the sclerosis of the uterus, the formation of cysts in the cervix, &c., remain none the less definite. Now, these factors are quite sufficient to keep up the morbid condition which constitutes chronic metritis, and that is why every metritis which is not quickly cured threatens to become incurable, though at the same time it changes its form. Scanzoni asserts that he never saw chronic metritis cured, but he did not differentiate chronic metritis from salpingitis with sufficient care. Does metritis predispose to cancer? We have seen that many foreign authors do not hesitate to admit that cervical catarrh, kept up by a laceration, is a favourable condition for the appearance of epithelioma. It has also been held that a long-continued inflammation of the mucous coat of the uterus, when it takes on the glandular form, may easily end in becoming adenoma. Now if the epithelial growth pass the limits of the culs-de-sac, if the typical adenoma become atypical, and, by a progressive transition, a malignant new-growth, one can see that a true cancer of the body of the uterus is formed.

**Diagnosis.**—Sources of error may arise from the marked prominence of one symptom, accompanying symptoms being relatively less marked. The increased size of the uterus, combined with dyspeptic symptoms, might lead to a suspicion of early pregnancy, especially if temporary amenorrhœa is present to increase the difficulty. But a little time will soon dissipate these doubts; under such circumstances, however, one ought to be very careful in making examinations.

The abundance of the leucorrhœa, combined with the ulceration of the cervix, may give rise to a suspicion of cancer of the cervix; but the characters of each of the phenomena are, however, different. In cancer the flow of secretion is not muco-purulent and viscid, it is serous, reddish, and has a very characteristic faint fœtor; the ulceration is irregular, has yellowish points scattered throughout it, and has hardened edges when it is not
surrounded by cauliflower excrescences. It destroys the subjacent tissues, so that it gives rise to a loss of substance, which is not found in the pseudo-ulceration of metritis. The hard and irregular swelling of the cervix, brought about by the development of cysts, and the concomitant sclerosis, occasionally give to the finger an impression similar to that of cancerous nodules. But puncture of the cervix by emptying the cysts, and removing some of the blood from the overloaded tissues, by which they become more supple, will readily negative the diagnosis of cancer. If necessary, a small portion of the suspected tissue may be excised, so as to examine it microscopically. Very sharp and regular pains, combined with a flow of fetid very tenacious muco-pus mixed with blood, a considerable increase in the size of the body of the uterus, with, finally, histological examination of the small pieces removed by the curette, will be sufficient for the recognition of cancer of the body of the uterus.

Hæmorrhagic metritis must not be confounded with metrorrhagia dependent upon early abortion. Diagnosis will be effected by consideration of the previous history and examination of the clots expelled. Fibrinous (or, speaking more accurately) placental polypi* are only remains of the placenta or chorionic villi, which have been engrafted on the uterus and have lived, unnoticed, for several weeks, and it may even be months † after a delivery or a miscarriage. They are valuable guides to diagnosis, and examination of the small tumour, which must be removed with the blunt curette as soon as recognised, will quickly demonstrate its origin.

Fibroids, the intra-uterine fibroid polypi, also give rise to a train of symptoms analogous to that of metritis, and, moreover, to abundant hæmorrhages. Bi-manual examination and passage of the uterine sound, aided, if necessary, by dilatation of the cervix, will sufficiently guard us against error.

Salpingitis, as I have already said, co-exists most frequently with metritis. The diagnosis, therefore, consists in recognising which of these two lesions predominates, and consequently ought to characterise the disease. Careful examination, bi-manually,

must be made, aided, if necessary, by the administration of an anaesthetic, in order to recognise the condition of the appendages. If their size be not increased, but if they be only a little tender on palpation, while the uterus presents the objective signs I have described, the diagnosis is metritis.

I have already mentioned metritis symptomatic of, and secondary to, non-inflammatory diseases of the appendages. It is quite sufficient for a lesion of the tubes, ovaries, or broad ligaments to be adherent to the uterus for it to react thereupon.* It is difficult to determine by what path the uterine mucous coat then becomes diseased, but that it does undergo alteration cannot be denied. Thus, a small ovarian tumour has been observed to be apparently the chief starting point of profuse haemorrhages, combined with a hyperplastic endometritis that was anatomically verified. Brennecke† and Löhlein,‡ who report observations of this kind, believe that the reflex hyperaemia dependent upon the ovarian irritation is sufficient to produce the hyperplasia of the uterine mucous coat. It would be more nearly right to say that this condition of permanent congestion causes a veritable morbid receptivity, in consequence of which the innumerable causes of infection—micro-organisms indigenous to the vagina, and micro-organisms coming from without—are able to exert their noxious influence upon the weakened organism, and bring about a uterine inflammation.

However that may be, two facts seem to be clear, and the practitioner should not forget them from a diagnostic point of view:

1. There is a very close connection between uterine inflammation and inflammation of the appendages (ovaries, tubes, &c.); consequently the latter ought always to be sought for, as, be it primary or secondary, it may ultimately become of the chief importance from the point of view of operative interference.

2. Alterations of the ovaries, of whatever kind, even non-inflammatory, may, from their very commencement, simulate metritis, by their indirect reaction upon the mucous coat of the

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uterus. The alteration, at first simply congestive, even tends to become transformed into a true inflammatory lesion.

Cystitis may be conjoined to metritis, or of itself give rise to symptoms simulating metritis. It is the same with inflammation of the rectum, with tenesmus, and even a glairy secretion (anal leucorrhœa) that is sometimes noticed at the same time as an acute metritis, upon which it is dependent. It is then necessary not to miss the original cause through paying too much attention to the result.

In one case I have seen sphincteralgia, not accompanied by fissure of the anus, which yielded to the treatment of cervical metritis. More exceptionally, disease of the rectum inversely induces symptoms of pseudo-metritis, but it may be seen. I published* a case of rectal polypus which gave rise to symptoms that were for a long time attributed to metritis, and the patient had undergone very energetic treatment for the suspected disease, without finding the least benefit. Rectal examination disclosed to me the cause of the evil, and removal of the polypus completely cured the patient. A fact that had contributed to the error was that the patient wrongly attributed to metrorrhagia a discharge of blood that really came from the rectum.

Troubles in general health, or reflex symptoms, are often so marked that they disguise the local lesion, and cause it to be misconstrued. A woman may complain of a persistent cough, of shortness of breath, or of progressive wasting, and scarcely mention her leucorrhœa and abdominal pain. One is almost tempted to suspect pulmonary phthisis at the outset, until auscultation of the chest, and especially local examination, have dispelled the error. In other cases the striking symptoms arise from the side of the stomach—loss of appetite, vomiting, flatulence, gurgling, added to signs afforded by percussion and succession, rightly leading us to recognise dilatation of the stomach. It is true that it is present, but it is symptomatic of a metritis that must not be looked upon as of secondary importance, when in reality it is of the first importance. Then, too, a great number of women think they are affected with chlorosis, or heart-disease, because they suffer from pre-cordial anxiety or palpitation, and because auscultation reveals cardiac and vascular murmurs. Let the uterus also be examined, and in such persons

metritis will very quickly be recognised, or at any rate some lesion of the appendages.* I can say the same concerning various neuralgias, and even of certain nervous conditions simulating hysteria.

In every woman who is suffering from chronic disease an examination of the uterus must never be omitted.

CHAPTER II.

TREATMENT OF METRITIS.


The prophylaxis against uterine inflammation will take a great step when antiseptic treatment is everywhere carried out at confinements. For it is really to puerperal infection, more or less attenuated and localised, that the vast majority of metritic cases are due.

Thorough cleansing of the uterus, which contains, after delivery or abortion, débris of membranes or of placenta, is here of the first importance. To my mind there is no reason for a discussion whether anticipation is better than active intervention, or no. Budin* speaks too strongly against what he calls the exaggerated fear of accidents as the result of abstaining from interference. He takes his stand upon statistics made of cases treated at the Maternité de la Charité during three years, and consisting of 46 cases of retention in 210 abortions; he only saw septicæmic

accidents occur four times, and only one patient succumbed (septic pneumonia).

Budin combats haemorrhage by plugging, and septic complications by vaginal and intra-uterine injections of sublimate (1—2,000 to 1—3,000) or of carbolic acid (20 to 30 per 1,000); at the same time he administers quinine internally. Of course it is certain that in this way the immediate danger may be combated; but is it so with the ulterior dangers of metritis and salpingitis? Are the patients really cured, because they have escaped death? Certainly not. I cannot, myself, sufficiently oppose this timorous action. However little one has to believe that some fetal débris has been left behind in the uterine cavity, it must be examined, cleansed, and disinfected before one is obliged to have recourse to such measures on account of haemorrhages, for when these occur the mucous coat is already infected. The blunt curette of Récamier and weak sublimate solutions are the best means, but the finger itself may suffice if one intervenes at a time not far distant from delivery or abortion.

After thorough curettage (completed by a haemostatic injection of ferric perchloride, and by antiseptic irrigation) one sees in cases of hyperpyrexia the temperature fall two or three degrees (centigrade), one prevents its repetition, and feels assured that recovery will be rapid in the cases where decomposition of the débris has not already set in. The brush (l'écouvillon) that has been recommended is an instrument quite insufficient in such cases, as is shown by an instructive case, followed by death, published by a supporter of its use.* Moreover, a priori, one

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Cf. on this subject (curettage for retained débris of membranes and placenta):—
would imagine that it would not be sufficiently strong to remove by scraping the portions, which are often extremely adherent.

Before describing in detail the therapeutics of the various forms of the affection, I must mention the general treatment that is common to all of them.

We must recommend immobilisation of the belly by a belt made of bed-ticking, elastic tissue, or simply, in cases of necessity, of a broad band of flannel, making two turns round the lower abdomen, somewhat obliquely from above below. This immobilisation is a great comfort to patients while walking.

![Fig. 115.—Abdominal belts.](image)

A, Elastic abdominal belt, made of the same material as the stockings for varicose veins.

B, Knitted abdominal belt, especially designed for women who are somewhat stout and who bear compression badly.

All fatigue and all violent efforts must be forbidden; sexual intercourse must be discontinued.

Constipation is to be met preferably by the use of diet (green vegetables, rye-bread, prunes) and gentle purgatives (laxative mineral waters, Seidlitz, Pullna, Birmenstorff, Hunyadi-Janos, Montmirail, &c., given in small doses in the morning, and taken fasting; rhubarb, calcined magnesia at meal times) and emollient enemata, to which may be added a few spoonfuls of glycerine. Some patients derive advantage from taking at each

meal a tablespoonful of linseed or mustard-seed in a glass of water. The small foreign bodies mechanically produce hyper-secretion and peristaltic action of the bowel. The use of drastic purgatives (aloes, podophyllin, &c.) for any length of time is disadvantageous; however, they must be had recourse to, if necessary. In a word, it is of the highest importance to regularly unload the large intestine, so as to diminish the pelvic congestion.

We must try to improve the general nutrition, which is often very bad, by tonics appropriate to the constitution of the patient: in lymphatic women, cod-liver oil, phosphate of lime; in those of arthritic tendency the preparations of arsenic; and in almost all, iron, combined with cinchona and rhubarb, will be given with benefit. Hydro-therapeutics, also, are a powerful auxiliary that must not be despised, especially if the metritis has induced anaemia and nervous symptoms, as it so frequently does.

There is no other disease in which the warm mineral waters have been more extolled. It is certain that they have a very salutary effect upon the general health primarily, and upon the local condition secondarily. I believe that the principal indications for the choice of one or other kind of water should be drawn from the general state of the patient, and from the reflex troubles which the uterine affection has induced in other organs.
For very anaemic patients one would order ferrugineous waters in preference, or sulphurous, arsenical, or sea-water baths; for dyspeptic, alkaline or slightly purgative waters; for neuropathic patients, indifferent or undetermined waters, choosing preferably those situated in an agreeable position and at a somewhat high altitude. Lastly, waters containing sodium chloride have an incontestable action not only upon the lymphatic or scrofulous constitution, but also upon visceral congestions, and may prove of real help at the commencement of some forms of chronic metritis when engorgement of the uterus predominates without any great alteration of the cervix.*

I now come to the special treatment of each particular variety. In acute metritis, rest in bed is absolutely necessary; hip-baths are to be prescribed, with application, while in the bath, of a small speculum which will allow the liquid to reach the cervix; also repeated gentle purgatives are to be given. If the pain is very acute it may be subdued by enemata containing laudanum or by opiate suppositories. The daily application of glycerine tampons, † left in situ for twelve hours, allays the inflammation excellently; glycerine, having a great avidity for water, produces a considerable flow of serum, constituting, in fact, a true white bleeding. The patient can quite well be taught how to place the tampon in position with the assistance of a small speculum, through which she inserts the tampon by means of a long stem, and this keeps the tampon in position until the speculum has been removed.

Prolonged warm (45° to 50° C.) injections or douches in the vagina will be of great use. This therapeutic agent, already

* I purposely desist from citing proper names in this rapid enumeration; so many other writers have given them that the reader can easily fill up the omission.

† These tampons are made by rolling absorbent cotton-wool into balls of the size of a pigeon's egg; a thread attached to the tampon should just pass beyond the vulva that the tampon may be easily withdrawn. To the glycerine is added one tenth part of boracic acid, and the tampon may be gently powdered with iodoform, whose odour is disguised with oil of peppermint, &c.

Fig. 117.—Speculum for use in baths.
praised by Sédillot and Trousseau, but of which the bringing into
general use is due to Emmet and the American and English
gynaecologists, may be used in very many cases, and therefore it
will be advantageous to give precise directions for its use, for if
one be satisfied with raising the temperature of the contents of
an irrigator, and giving to the woman, seated or crouched down,
an injection of half a litre, one will obtain no result and will
be likely to throw on one side an excellent procedure after an
illusory experience of it.

The injection—or rather the warm irrigation or douche—should
be taken by the woman when lying at the edge of a bed, the legs
being supported on each side by a table or a chair, and the pelvis
slightly raised. For more convenience, a receptacle, such as that
shown in fig. 5, or a large piece of mackintosh, should be placed
under the hips. This mackintosh should have its ends arranged
so as to form a gutter, which at its lower end should be placed
over some receptacle. The irrigator (fig. 2) should contain at
least 3 litres, and should be filled with water at 45° C. (there is
always a loss of about 2° during its passage through the
apparatus) and raised one metre above the patient. The vaginal
canula should be inserted gently as far as the cervix. Before
commencing the irrigation it will be well to smear the vestibule,
the vulva, and perineum with vaseline; this renders the action
of the warm water less disagreeable. Three litres at the least and
ten litres at the most should be given at a sitting, and the injec-
tion should be repeated twice a day. When it is ended, two
fingers are inserted into the vagina, and the fourchette is strongly
depressed, so as to facilitate the outflow of the water behind it.
It is well to introduce a glycerine tampon immediately after.
The recumbent position must be retained for an hour after
irrigation.

Lastly, if the acute condition is at all prolonged, local
bleeding must be resorted to. For that purpose, special
instruments may be used, but they are scarcely necessary. An
ordinary bistoury, wrapped round with plaster to within 1 cm. of
the end of the blade, is amply sufficient. After having well
irrigated the vagina, a Fergusson's speculum is inserted into the
vagina; it must be short, of large diameter, and bring the cervix
well into view. This must then be punctured in about a dozen
places with the bistoury, taking care not to wander far from the
external os. For the double purpose of making this small operation antiseptic, and of favouring bleeding, continuous irrigation with a carbolic solution of 1 per cent., previously made luke-warm, is practised. This is greatly facilitated by the use of the small funnel that I have adapted to the speculum (fig. 66 C). When the amount of blood that has been emitted is deemed

sufficient (at the end of about a quarter of an hour) the speculum is removed, the vagina emptied, and a tampon of iodoform gauze placed over the cervix, and this is sufficient to stop the outpouring of blood.

This method is much to be preferred to the use of leeches. It is painless and does not require anaesthesia. The blood-

Fig. 118.—Instruments for scarifying the cervix.
letting must be repeated several times (about every other day) to render it efficacious.

Exfoliative endometritis or membranous dysmenorrhœa is anatomically and clinically an acute metritis, or rather an exacerbation upon a chronic affection. All treatment other than curettage usually fails completely, but curettage has, on the contrary, yielded excellent results* if it be completed by injections of tincture of iodine; the method of operation will be described later. If stenosis of the cervix co-exists, the pain will be at the same time combated by dilatation with laminaria tents, or by a kind of divulsion with Ellinger's dilator.

Landowski † has published some cases treated successfully with the galvano-cautery; the method seems good to me, but I prefer curettage, which is more certain and more expeditious.

Acute gonorrhœal metritis must be treated energetically with vaginal and intra-uterine injections, at the same time antiseptic and slightly caustic. Guérin ‡ has pointed out the good effects of intra-uterine injection of a weak solution of nitrate of silver (5 cgm. of the salt to 30 gm. of water). Fritsch has recently § recommended chloride of zinc (1 per cent.) for vaginal injections and more concentrated for intra-uterine cauterisation. In such cases the vaginitis and the endometritis, which co-exist and keep each other up, must be treated simultaneously. Nevertheless, it must be remembered that gonorrhœa may have long disappeared from the vagina and yet lurk in the uterine cavity and in the urethra, and it is here that the last traces must be sought to characterise the nature of the uterine affection. In vaginitis and urethritis, excellent results have been obtained by me from the combined use of sublimate injections (1 in 2,000) and iodoform pencils. To my mind, acute gonorrhœal metritis calls for curettage, followed by intra-uterine cauterisation with chloride of zinc; the latter may be effected by wrapping a little cotton-wool impregnated with the caustic solution around the end of a sound (fig. 119).

Catarrhal metritis.—The general treatment I have sketched out above will first of all be carried out. This variety is one of

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those in which anaemia supervenes most rapidly, and in which general treatment must in the highest degree supplement local treatment.

It is, moreover, the form of metritis that necessitates, above all,

Fig. 119.—Cotton-wool tampon rolled round a sound.
Fig. 120.—Doléris's brush.

perfect cleanness and rigorous antisepsis of the vagina, for in this way, indirectly, it is true, but very efficaciously, we treat the cervix, which is often the most affected region. Further, if
we order the patient to maintain the recumbent position after the morning injection, and not to rise again after the evening injection, they keep a certain quantity of the therapeutic application in the upper portion of the vagina, and that constitutes a kind of local bath that is most advantageous. Sublimate solution, 1 in 3,000, forms the best injection, but it cannot conveniently be used for any great length of time. I also recommend boracic injections (2 tablespoonfuls of boracic acid to a litre of water) or tannin (a dessert spoonful of powdered tannin to a litre of water) or alum (half a tablespoonful to the litre).

But to cure completely any inflammation of the mucous membrane of the body of the uterus it is absolutely necessary to attack the interior of the uterine cavity itself. Intra-uterine medication is itself divided into three principal procedures: 1. Swabbing (abstersion) with antiseptics; 2. The use of caustics; 3. The use of the curette. These three procedures have been employed singly or in combination. Intra-uterine medication is, however, often insufficient, and surgical treatment for lesions of the cervix must be resorted to, as the influence of lacerations and ulcerations upon the catarrhal form of metritis is so considerable. I shall follow the above order in the complex description of the various procedures.

Swabbing of the uterus—(a) Irrigation (Intra-uterine).—The large, slightly antiseptic irrigations which are now under consideration must not be confounded with the alternate injections, more or less caustic, which are given in very small quantity. These latter come under the second heading of intra-uterine medication.

Schultze* is the great supporter of this method. He always combines it with dilatation of the cervix by laminaria tents, then he introduces a canula into the cavity of the uterus, and washes it out with a large quantity of 2 per cent. carbolic acid solution.

This treatment is quite insufficient for obstinate cases. It seems to me that it should be reserved for slight cases of endometritis, in which the change undergone by the mucous coat is not great. An injection of half a litre should be given every day by means of a double-channel canula, which, as a rule, is introduced without any difficulty. If necessary, the cervix must be dilated with a dilator, or with laminaria. When recovery is

slow under these simple measures, no time should be lost in having recourse to caustics or the curette.

(b) Drainage.—Fehling has invented glass drainage tubes pierced with small holes; Ahlfeld, hollow gutta-percha cylinders; Schwartz,* bundles of spun-glass, acting by capillarity. It seems that these inventions have only given good results to their authors and a few pupils. I think them very likely, as they are foreign bodies in an inflamed uterus, to keep up the disease rather than to cure it. It is quite otherwise with the drainage by the capillary attraction of iodoform gauze, but its description must not be severed from that of plugging.

c) Plugging.—Fritsch † has used a method since 1882, which he applies especially to gonorrhœal metritis. He inserts into the uterus a strip of lint, 75 cm. in length and 2-3 cm. in width, and he packs the cavity "as if he were stopping a hollow tooth." He then removes the strip and repeats the operation, so as to thoroughly cleanse the uterus. He often introduces a strip powdered over with iodoform, and this he leaves in situ for from 24 to 48 hours, but removes it earlier if it produces uterine pain, by drawing on the free end, which is left just beyond the vulva. This method plainly has for its object the combined cleansing and antisepsis of the uterine cavity, but I consider it as far less potent than a simple curettage, followed by the use of caustics; and, personally, I reserve plugging for cases where energetic disinfection is necessary (cancer of the body of the uterus, or sphacelated fibroma). I also use it as a means of arresting haemorrhage after enucleation of fibroids, or their removal in pieces.

(d) Mopping with tampons, brushing (Balayage au tampon, écouvillonage).—Many gynaecologists are satisfied, after having dilated the cervix, if necessary, with swabbing the uterine cavity by means of small sticks, around the end of which is rolled a little absorbent cotton-wool. This method is very simple, and if a few scratches be made at the end of the stick the cotton-wool keeps in position very satisfactorily; or if a thread be tied around the extremity of the tampon. Fritsch ‡ has made some sticks which offer no advantages—save elegance—over the first splinter

† Fritsch. Deut. Chr., 1885 (Lief. 56, p. 438).
‡ Fritsch. Ibid., p. 424.
of wood that comes to hand. The same may be said of Tenneson's intra-uterine cotton-wool holder, of Ménière's graphidometer, and of Sims' and Mundé's* instruments, &c. An ordinary sound does quite as well (fig. 119). Tampons of various sizes can easily be made so as to penetrate into cervices which are scarcely dilated at all. Before use it is advisable to steep them in sublimate solution (1 per 1,000), or carbolic solution (20 per 1,000), then to squeeze them gently before introducing and rotating them in the uterine cavity, so as to thoroughly dry its walls. This cleansing may be made the first occasion of causticising, which should be done by means of a fresh tampon.

Doléris† prefers the use of brushes (fig. 120) to this simple procedure. These brushes are like those used for cleansing bottles, and before fulfilling their purpose in the uterine cavity are to be disinfected by immersion in sublimate solution (1 per 1,000). They are introduced in corkscrew fashion, and are moved about in various directions so long as necessary. They may be charged with therapeutic agents, exactly like the cotton wool tampons. Doléris believes that by using brushes with softer or harder bristles he either cleanses the mucous coat or scrapes and destroys it. There is no doubt in the minds of those who are accustomed to the use of the curette, and know how much force has to be expended in removing the mucous coat with a blunt curette, that Doléris is quite mistaken on this latter point. It is impossible, I believe, to destroy by simply rubbing the mucous coat with a brush, by attrition or laceration, all the elements of this diseased membrane, the expulsion of which, theoretically, would be brought about by the softening of the tissue, the vitality of which had been thus interfered with. This is a mistake, and the brush, like the intra-uterine tampon, can only be useful as a means of cleansing, or for the purpose of applying remedies. From this double point of view it is not to any great extent superior to the tampon, which I usually reserve for use in the cervical canal, preferring to cleanse the intra-uterine cavity by irrigation.

There are some cases, especially in nulliparae, in which, the

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* Mundé. Minor surg. Gyn., p. 239.
cervical canal being dilated and full of muco-pus, the external os is very small, and is an obstacle to the exit of the secretion. It is then better, instead of dilating, which would have to be frequently carried out de novo, to notch slightly the external os; a crucial incision should be made in the cervix of about 1 cm. in extent in each direction, with scissors curved on the flat, or a blunt-pointed bistoury. It will thenceforward be easy to apply intra-cervical treatment, and constantly to explore the mucous coat, so as to ascertain whether more energetic treatment has become necessary. These small incisions cicatrise spontaneously.

Intra-uterine application of caustics.—I shall first describe the use of solid caustic agents: the medicated pencils of Becquerel and Rodier, the silver nitrate pencils of Courty, left in the uterine cavity or removed by a sound and a metal thread (Spiegelberg), the uterine "pistolet" of E. Martin (senr.), imitated by Storer, and Dittel's instrument. All these methods have one common defect, viz., they allow caustics whose action is too strong or too weak, and in any case quite indeterminate, to remain in the uterine cavity. Direct and momentary application of the caustic, introduced on some form of holder, is certainly preferable, but the cavity of the uterus must have been well cleansed by injections and plugging. A kind of fenestrated sound, containing nitrate of silver, may be left in the cavity for two or three minutes (fig. 121).

Dumontpallier,* as Polaillon had previously done, introduces into the uterine cavity a pencil of Canquoin paste (1 gr. of zinc chloride to 2 or 3 grs. of rye-flour). He thereby produces a destruction of the tissues that undoubtedly is able to extend beyond the mucous coat, and which is liable to cause obliteration of the tubes and narrowing of the cervical canal. I have twice been obliged to remove the appendages,

and once to perform vaginal hysterectomy for accidents, consequent upon this treatment.*

Cauterisation by the galvano-cautery has been employed by Spiegelberg † for a long time. Apostoli has extolled it anew.‡ I regard this method as less convenient and less certain than curettage. It seems to me, moreover, to present the danger of inducing sterility by endowing the uterus with a lining composed of cicatricial tissue.

Application of liquid caustics may easily be made on the uterine walls by means of a cotton-wool tampon, rolled round a piece of wood or a special sound. This procedure has been adopted by many gynaecologists since Miller, and, particularly, Playfair § recommended it. According to the particular case, Professor Pajot ‖ uses, for causticising, a solution of argentic nitrate containing up to cent. per cent. of the salt, or the salt in powder (as is the custom of Professor Richet) or in paste, or acid nitrate of mercury, anhydrous nitric acid, chloride of zinc, perchloride of iron, the thermo-cautery and the actual cautery. He has never seen any serious accidents, except four cases of metro-peritonitis. Pajot does not lower the uterus; he applies the caustic with or without previous dilatation, by means of a long, flexible piece of whalebone, with cotton-wool attached


‡ Apostoli. On a new treatment of chronic metritis, and in particular of endometritis by intra-uterine chemical galvano-cautereisation. Paris, 1887.—For the method of using the electricity, see the chapter upon the medical treatment of fibroids of the uterus.
to the extremity. This method is very similar to that of Sims.

Rheinstödter and Bröse* have recently again brought into notice the chloride of zinc as an intra-uterine caustic. It is dissolved in an equal weight of water, and introduced into the cavity on cotton-wool, wound round the end of a sound. This means of causticising, according to Bröse, would never produce narrowing of the cervical canal, and he repeats it every week, or at most twice a week, without imposing the recumbent position on his patients. Usually there is no need of fixing the cervix, and the caustic is quickly introduced through a cervix that is sufficiently dilated, before any contraction can take place to impede its entry into the uterine cavity. It is to be kept in position for one minute. Drops of caustic, which might corrode the vagina, are to be carefully wiped away.

Weak nitric acid and concentrated carbolic acid are much used in America. The cervix must first be dilated, otherwise, whatever precautions may be taken, it is the cervical mucous membrane which is principally acted upon, as the tampon only reaches the uterine cavity when part of the caustic has been expressed, and its too energetic action on the cervix is very likely to cause secondary stenosis. After having passed the caustic over the internal surface of the uterus, this latter must be carefully wiped out.

Peaslee has invented a kind of speculum to protect the cervix from the action of caustics, but it is inconvenient to use. A simple piece of glass tubing bent at an angle, such as Woodbury (of Washington) uses, may be used. With the same object in view, J. Hoffmann envelopes the canula of a syringe, pierced in several places, with cotton-wool, and introduces it, like a tampon, into the uterus; he then saturates the cotton-wool with the medicament by the action of the piston.

Personally, I do not follow this method of treatment. In spite of the greatest precaution it is difficult, whatever may be said to the contrary, to guard against contraction of the cervix after causticising the whole circumference of its orifice. But this is not the principal objection: unless before each time the caustic

is used the cervix be dilated, and that is very painful, or unless plugging be resorted to to keep up the dilatation between the applications of the caustic, one cannot be certain to reach well beyond the cervix, and most assuredly the fundus of the uterus is not touched. Only a portion, therefore, of the diseased mucous membrane is treated, and while that of the cervix is acted upon too much, that above the cervix is not treated at all.

Causticising by means of caustic injections was long ago carried out by Lisfranc and Vidal de Cassis.* Lengthy discussions followed to demonstrate the greater or less danger of the passage of the liquid into the Fallopian tubes. This passage of liquid, which in the dead subject can be very readily obtained, only occurs with great difficulty in the living, where the conditions are different, if two conditions are observed: 1. The injection canula must pass easily through the cervix, so that the fluid may return around it easily; and 2, the injection should not be carried out at any great pressure, and the jet should not be directed in the axis of the uterus. These two conditions are perfectly realised in various types of syringes for intra-uterine injection, and particularly in that of Collin, or of C. Braun, which, being made of hardened gum-elastic, has the advantage of serving for the injection of all kinds of liquids without undergoing alteration (fig. 122). The operation is very harmless. Certainly one must not lose sight of a few unfortunate cases, but, without doubt, in many of these there were exceptional anatomical peculiarities (dilatation of the tube);† in others the mode of operation was perhaps not perfect.

Many kinds of fluids have been injected, of which the best seem to be tincture of iodine, glycerine and creosote, and iron perchloride. About 3 grammes are sufficient, and this is the contents of

† V. Haselberg. Monatsschr. f. Geb., 1869, vol. 34, p. 162.—Barnes. Obst. opera-
Braun's syringe. I use tincture of iodine very often, but only some days after preliminary curettage, itself followed by an injection of perchloride of iron. I commence iodine injections five days after curettage, and in very severe cases of catarrh I give one every other day for a fortnight. I prefer tincture of iodine to solutions of beech-wood creosote in glycerine (1 in 3 and 1 in 10) used by Doléris.

The nozzle of the syringe may be introduced into the uterine cavity by sight at the end of the speculum, but the direction must always first be made out with the assistance of the sound. If any difficulty be met with, the cervix should be steadied by the proper forceps, and gentle traction should be exerted on the lip in the opposite direction to that of the uterine deviation; the vaginal walls must be kept on the stretch by retractors the while. The fluid is to be gently injected while the canula is gradually withdrawn from the fundus to the cervix. There is usually no need to dilate this latter; it would not be done unless the canula could not be freely moved about in it so as to allow free reflux of the liquid around the canula. While the caustic is being injected into the uterus, a copious vaginal irrigation must be given to prevent any action of the caustic upon the vaginal walls.

I have sometimes seen intra-uterine injections followed by sharpish pain, vomiting, or swooning; but I have never seen any serious accident.

The objection has been raised to tincture of iodine that it precipitates the albumen and forms clots and shreds in the uterine cavity. Nott's experiments have refuted this error.* The iodine simply forms a very finely-divided precipitate (like whitewash) upon the mucous coat, and its well-known antiseptic action is thus prolonged for a very considerable time. The essential oils and aromatic compounds, such as creosote, &c., have a much less lasting action. As to iodoform, it would be dangerous to inject it in solution into the uterine cavity, for it might cause serious accidents from its absorption.

Curettage.—Along with many writers† I adopt this word,
which means etymologically the use of the curette. I prefer it to the more widely-spread term "curage," which means too much, and to "curettement," a term general in Germany, which is a heavy and barbarous expression, like many Germanised words taken from the French.

Curettage of the uterus, which was invented by Récamier and immediately fell into disrepute, has again come into favour with the antiseptic modification of gynaecological operations. At the present time, in France and abroad, it occupies an important position in the treatment of metritis.*

The choice of a curette is not a matter of indifference. There are several varieties, of which the chief are: Simon's spoon with cutting edge (which should be reserved for cancer of the cervix and large fundosities of the uterus); Sims' curette, in the shape of a sharp-edged ring (excellent for detaching polypoid growths); Thomas's flexible and blunt curette, modified by Simpson, and much used in America; the blunt curette of Récamier-Roux,† which Martin has adopted, and which I also prefer (Collin has constructed one for me with a slight modification). This latter has an advantage over the ring curettes in that it draws out from the uterine cavity the greater part of the material it has just detached ‡ (fig. 125).

I am strongly in favour of blunt § curettes in endometritis, for it is not here a case, as it is in cancer, of removing a resistant tissue. It is only necessary to scrape somewhat strongly a hard muscular wall covered with a tissue which, naturally soft, has become yet more softened by the inflammation. Hence one can understand that it is sufficient to scrape with a thin blade the interior of the uterine cavity to be certain

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† Récamier's original model had a slightly curved extremity, which I find unsatisfactory.

‡ Curettes have been made with a hollow handle and a perforated bowl that allow of intra-uterine irrigation being given at the same time that curettage is being performed. I regard this as a complication rather than a simplification of the method. The instrument, moreover, is difficult to keep perfectly clean.

§ The term "blunted" would be more exact than that of "blunt"; the edges of the curette must be very thin without being cutting—like the blade of a knife that has not yet been set.
of detaching all that which is but little resistant, and that is precisely the diseased mucous coat. Blunt curettes have, moreover, the advantage of being far less likely to wound the uterine parenchyma, even when a fair amount of force is exerted. If care be always taken to insert the curette in an oblique direction with regard to the uterine tissue, all danger of perforation will undoubtedly be avoided, save in the post-puerperal state. The whole thickness of the mucous lining is never removed by curettage. It is known that the glands penetrate just into the

Fig. 123.—A, Simon’s curettes or spoons (cutting).—B, Sims’ cutting curette; the stem is of beaten copper.—C, Blunt curette for the removal of débris from uterus.—D, Récamier-Pozzi’s curette with blunted edges.
muscular layer; their blind terminations and a small amount of mucous tissue remain attached to the parenchyma in spite of the most energetic scraping, and act as a foundation for the very rapid renewal of the membrane.* It is this consideration which has led me in my lectures, and Despréaux,† my pupil, in his thesis, to qualify with the term "modifying" all curettage employed in metritis, in contradistinction to "destructive curettage" (which is called for in cases of malignant new-growth), and "exploratory curettage" employed for the removal of a fragment for diagnostic purposes. In the two latter cases the cutting curette should be used.

The uterine mucous membrane cannot be compared with other mucous membranes; it possesses an entirely special power of regeneration. The course of events during menstruation and pregnancy shows that a large portion or even almost the whole thickness of this mucous membrane may be eliminated and rapidly become renewed. Curettage is an artificial provocation, for a therapeutic purpose, of a shedding of the mucous coat analogous to that of the decidual membrane; as has been said, it substitutes a new mucous coat, regenerated under antiseptic conditions, for a membrane affected with micro-organisms, which has undergone profound changes, whose retrogression would be most painful and most tedious. The fertility of the woman is no more affected after curettage than after parturition or abortion. That might have been foreseen, a priori, and the very numerous observations of Schröder, Martin, Düvelius, Bénicke, Heinricius, ‡ &c., have placed this important fact beyond the possibility of a doubt. The observations of Heinricius are especially convincing. Out of 52 patients whose after-history he was able to learn, 16, or 30 per cent., conceived. Pregnancy ensued twice, five weeks, and once, eight weeks after curettage.

However, it must be remembered that menstruation often does not occur at the first period when it should return, and even the second and the third. In one case under my notice, amenorrhoea lasted for four months.

The operation.—By preference the first days after menstruation should be chosen for the operation. Although it occasions but little pain, and although I have sometimes operated without anaesthesia, I prefer the patient to be anaesthetised as a rule. Preliminary antiseptics of the vagina and vulva must be performed according to the directions already laid down (p. 4). The patient is placed in the lithotomy position, and the assistant, holding the right leg of the patient, depresses the fourchette with a short flat retractor; the other holds the steadying forceps in position and the canula for continuous irrigation. The knees of the patient being pressed into the axillae of the assistants, their left hands are free, and can, if necessary, hold the vaginal walls on the stretch with suitable forceps (fig. 11). The cervix is drawn down to the vulva by Museum's forceps with opposing claws, not riding over one another (fig. 124), which lays hold of the
anterior lip. The operator passes the sound, to determine once more the direction and depth of the uterus, and then presents the curette at the external os. Nine times out of ten, at the least, the curette passes without any effort. However slight the resistance, it is at once overcome by the use of Ellinger's dilator or of two or three Hegar's bougies. The curette is then directed to the fundus of the uterus, and the walls are scraped by passing it successively over the anterior surface, the posterior, the fundus, the angles, and the lateral borders. After this has been done a few times with sufficient force to make the uterine tissue "weep" the instrument is withdrawn and immediately plunged into a glass full of strong carbolic lotion, held at the right of the operator, to cleanse it. The same spot ought always to be passed over twice, and, finally, a curettage of "revision" should be carried out over the whole internal surface of the uterus. The operation should be rapidly carried out, occupying in its entirety scarcely three minutes. Immediately after, Bozeman-Fritsch's double-channel canula should be introduced, and the surgeon, taking hold of the canula for continuous irrigation, which has all along flowed gently upon the cervix, fixes it to the lower end of the double-channel canula (which has a small piece of india-rubber tubing attached) and freely washes out the uterine cavity with the warm 1 per cent. carbolic solution used for the continuous irrigation. A quarter to half a litre should be injected, until the water, at first deeply blood-stained, returns almost clear; this injection is hæmostatic, antiseptic, and besides, expels the shreds of mucous membrane and the clots that had remained in the uterus.

The intra-uterine canula is withdrawn and replaced by the tube of a Braun's syringe (filled with a solution of ferric perchloride at 30° C., or tincture of iodine) and thrust to the fundus of the organ. The fluid is injected slowly while the tube is gradually withdrawn, so as to end the injection in the cavity of the cervix after having commenced it at the fundus of the uterus. While this is proceeding continuous irrigation is carried out in full stream upon the cervix, to dilute and fetch away the caustic liquid which escapes from it and which would irritate the vagina and vulva.

Bozeman-Fritsch's canula is immediately re-introduced and the uterine cavity is again freely washed out, as before. This
expels the excess of caustic, whose action on the uterus should be rapid, and its length of duration in the cavity very short. If any difficulty be found in inserting the double-channel canula through the cervix, which has just been astringed by the action of the caustic, an injection can without danger be given by intermittent jets through the long and narrow canula that is used for the continuous irrigation, but care must be taken not to distend the uterus and not to obliterate the cervical canal by inserting the canula too deeply.

The operation is ended; the steadying forceps are removed and the uterus replaced. A tampon of iodoform gauze is placed at the summit of the vagina and must not be withdrawn till the third day, and then, night and morning, a full vaginal injection of corrosive solution (1 in 2,000) should be given. If the catarrhal metritis was very obstinate, and the mucous coat removed, largely covered with vegetations, if there are signs of slight concomitant salpingitis, one would begin intra-uterine injections of tincture of iodine, which, carried out every other day, on from four to eight occasions, would complete the treatment.

When the catarrhal metritis is of recent origin I use tincture of iodine for the first injection, following immediately upon curettage. In more obstinate cases, or when the oozing of blood requires it, I use perchloride of iron.

Preliminary dilatation with laminaria, which was at one time recommended in France by the majority of operators, may, as a general rule, be omitted in women who have borne children (except in cases of pronounced malposition or of stenosis of the os). It is useless for the introduction of the instrument, illusory with regard to its affording facilities for the out-flow of secretions, for artificial dilatation does not persist beyond a few hours, and as to the débris of the mucous coat and the blood clots, they ought to have been removed at the outset most carefully, by intra-uterine douching. Now, the saving of this preliminary time is by no means a matter of indifference. Slow dilatation of the cervix is often extremely painful; the woman who has undergone it on the night before operation has generally not slept at all; she is in a state of great nervous irritation, to which slight fever is sometimes added, caused by the exacerbation of the metritis, consequent upon dilatation.

After having always practised this dilatation during my
earlier curettages, I have for the past four years decided to omit it, except there be some special indication. In that respect I am following the example of Martin, Fritsch, * &c. The latter has even seen preliminary dilatation cause serious symptoms in a case where a polypoid intra-cervical vegetation had become gangrenous from pressure.

Perforation of the uterus, so much dreaded by surgeons who have not become familiar with this small operation, is in no way to be feared in endometritis, if a blunt curette be always used, and always be directed obliquely to the direction of the uterine fibres, after thoroughly having made out the direction of the cavity in which one is operating. Nevertheless, the firmness of the uterine wall must always be suspected after delivery or recent abortion; it is then very soft and thinned, and may be perforated with extreme ease. But, as a rule, one is warned of this danger, first, by the history, and secondly, by the increase of the uterine cavity and the softness of the cervix. In a case of this kind I believe that I, myself, perforated the uterus. I recognised the fact immediately, for I felt the curette suddenly disappear to an excessive depth in the direction of the umbilicus. I simply refrained from any intra-uterine injection, and the patient recovered without presenting any other symptom than bilious vomiting on the day after the operation. Doleris has thought that some analogous cases might be regarded as false perforations, the error arising from the fact that the atonic and flaccid wall of the uterus allows of depression by the curette.† Personally, I regard this as an error. To my mind reported observations of this kind prove much rather the harmlessness of what may be called antiseptic puncture of the uterus.

Amongst possible accidents after curettage has been mentioned hæmorrhage. I have never seen it in several hundreds of operations. The terminating astringent injection only allows of an insignificant subsequent oozing.

The same can be said of peritonitis, even sub-acute and localised. I have never seen a single example; thorough antisepsis quite guards against it.

Curettage of the uterus is the true rational treatment, the

† Doleris. Loc. cit., p. 40.
procedure of election for catarrhal metritis. So soon as simple means have failed (general treatment, vaginal and intra-uterine injections, local dressings), we should not hesitate to have recourse to it. Longer delay would be only giving time for the lesions of the mucous coat to accentuate themselves, and it would also expose the parenchyma of the body of the uterus, and especially of the cervix, to sclerotic alteration, and to follicular degeneration. Lastly, the possible propagation of lesions to the tubes must not be forgotten, which is so common in inveterate cases of catarrhal metritis.
Mucous polypi of the cervix are to be removed by means of flat catch forceps, rotation of which will suffice to break the pedicle. If they are very numerous and sensile they may be torn away by Sims' or Simon's cutting curette, and the bleeding surface should be touched with perchloride of iron or the thermocautery. Lastly, if the cervix is profoundly altered, and especially if it has undergone follicular hypertrophy, Schröder's operation should be resorted to (excision of the mucous coat, described below).

Ulcerations of the cervix, which are only, as has been seen from their pathological anatomy, glandular neoplasms more or less hypertrophied, scarcely exist, independently of a more profound inflammation of the mucous coat of the body of the uterus, as Gosselin long ago pointed out, thus combating the erroneous doctrine that dissociated these two elements. It therefore follows that to cure ulceration when it appears, it is generally sufficient to treat the endometritis. Ulcerations disappear after curettage, just as the tongue ceases to be coated after the administration of an emetic. But that only holds good for cases taken at their commencement. Later the glandular proliferation is an acquired lesion which, for its disappearance, needs to be modified in position by local applications, or even removed by the knife.

To cure ulceration of the cervix we must, therefore, first treat the concomitant endometritis, and, in the second place, touch the spots with nitrate of silver, or tincture of iodine, every other day. In America weak (not fuming) nitric acid is much used, with which a very small pledget of cotton-wool, on the end of a stick, is saturated. I should prefer this caustic to chromic acid, which has occasioned symptoms of poisoning, but all powerful caustics may lead to contraction of the cervix, and I am very suspicious of them. Chloride of zinc (1 in 10) has been said to be very effective. Rheinstödter * advises, where the ulceration is considerable, to increase the action of this caustic by previously puncturing the surface of the cervix at various points. Hofmeier † has recommended acetic or pyroligneous acid. He encircles the cervix with a Ferguson's cylindrical speculum, pours into it a certain quantity of pyroligneous acid, and leaves the cervix immersed for some minutes in this bath of very slightly caustic

liquid, which attacks almost exclusively the cylindrical epithelium of the ulceration. After several applications the epithelium becomes stratified and pavement in character, and the ulceration gets well. Nevertheless, it may persist or light up afresh if the lesions penetrate into a cervical canal having a narrow orifice. Then, it has been recommended to introduce some caustic into the interior of the cervix by means of a tampon, but that I regard as a dangerous procedure on account of the stenosis of the cervix which might result; and also, in such cases, weak caustics should only be used, such as creosote, acetic acid, nitrate of silver, tincture of iodine, and even they ought not to be continued in use for too long a time.*

When other means have failed, or when the patient cannot carry out a treatment which would last over months, and calls for a rapid cure even at the cost of an operation, surgical treatment is of the greatest service. Schröder's operation of excision of the mucous membrane should be then performed; the method of its performance will be described later. This operation, which I perform very frequently, gives excellent results; it substitutes a healthy for a diseased surface, and at the same time allows of the removal of sclerosed portions of the cervix or of such parts as have undergone cystic degeneration. It leaves no scar, and cannot, in consequence, prove an obstacle to parturition, as numerous cases have shown. I, at the same time, always supplement it by curettage of the uterine cavity. It seems to me to be specially indicated in cases of ulceration of long duration accompanied by hypertrophy of the cervix, and in cases where there is either constriction of the infra-vaginal cervix or profound laceration. Schröder's operation is far superior to Emmet's; it fulfils all the indications of the latter and presents, in addition, some further advantages.

* It is dangerous to persist in the treatment of inveterate ulceration by caustic agents. One produces thereby sclerosis of the cervix and leads to the formation of cysts by the obliteration of the openings of the glands. But when the ulceration is recent, cervical cauterisation following upon curettage for the endometritis is an excellent course of treatment, which can give rapid and durable success. This distinction is an important one. It is not made by Doléris and Mangin (cervical metritis in the Nouv. Arch. d'obst. et de gyn., Oct. 25, 1889), who condemn in toto all attempts at "epidermisation" even "for hastening the cure of a recent or slight lesion."

Cf. further on this subject:—Doléris. Metritis of the cervix; metritis of the body. Communication made to the Acad. de Médecine (Nouv. Arch. d'obst. et de Gyn., 1890, p. 541).
Ulcerations complicated by lacerations.—The capital importance given to lacerations in uterine pathology by Emmet is well known. But this evident exaggeration has at any rate shown that the lesion which till then had been neglected could not always be reckoned of no account. Is it the previous inflammation of the cervix that prevents the cicatrisation of the laceration, as Schröder holds, or is it the laceration that provokes the catarrh and keeps up the ulcerations, as Emmet believes? I should be inclined to think that these two opinions may be reconciled, and by their union form one of those vicious circles that are so common in general pathology. However that may be, it is evident that freshening combined with suture of the cervix, or Emmet's operation (to which Dudley, of Philadelphia, has given the name of trachelorrhaphy) cannot be undertaken on an ulcerated cervix until the ulceration has been cured, under the penalty of shutting up the wolf in the fold. As a matter of fact, Emmet prescribes a preparatory treatment which often lasts several months. There is, therefore, no parallel between Schröder's and Emmet's operations, as has sometimes wrongfully been supposed. The former is designed especially for the cervical catarrh; the latter for the treatment of the fibroid tissue dependent upon the laceration. In Emmet's eyes catarrh and ulceration are only secondary phenomena, the principal pathogenic element being the fibrous tissue which compresses vessels, nerves, and glands. Consequently, I shall not describe trachelorrhaphy along with the treatment of ulcerated lacerations dependent upon catarrhal metritis, but along with cicatrised lacerations seen in cases of chronic metritis.

Lacerations of the cervix co-existing with much ulceration, as I have already said for the latter alone, call for Schröder's operation or excision of the mucous membrane, which brings about prompt healing of the ulceration and at the same time restores the external os better than does trachelorrhaphy. It might, therefore, be described here, but as it is also applicable in painful chronic metritis, I reserve it until dealing of the treatment of that variety, when it will be found along with Emmet's operation.

When the ulcerated laceration is of small extent it may sometimes be made to heal by simple cauterisation by the thermo-cautery. But this method, good in simple cases, ought not to
be resorted to if the ulceration is of considerable extent and the lacerations deep. The scar-tissue which it would produce would then itself become a pathological element; and this fact some gynaecologists who use and abuse the actual cautery do not seem to have comprehended.

_Haemorrhagic metritis._—The treatment may be divided into two sections. That for the haemorrhage which must be palliative and which may at the outset imperatively demand attention, and that for the affection itself, which should be curative.

_Palliative treatment for the haemorrhage._—The patient must be kept in the recumbent position. Prolonged vaginal injections of very hot water should first be tried; they are greatly preferable to cold injections, which were formerly used. Ergot of rye is here rarely useful. Gallard* has recommended the use of digitalis, which, according to him, would act at the same time upon the symptom and on the inflammatory state. He advises a prescription of from 30 to 50 cgr. of the leaves infused in 125 cc. of water, which should be taken by tablespoonsfuls through the day.

A remedy that is actually in great use† is the fluid extract of Hydrastis canadensis, in 20 drop doses, three times a day. I have tried it with encouraging results; the drug is also an excellent stomachic. I shall return to the subject when discussing fibromata.

To cause arrest of the haemorrhage for several days it is sometimes sufficient to dilate the cervix by a laminaria tent. This doubtless occurs by reason of a contraction of the body of the uterus or of reflex vaso-motor action. The respite, however, thus obtained is only short.

The same may be said of intra-uterine injections of perchloride of iron, which only give rise to a temporary improvement, in spite of the fact that "cures" have been published after their use; the patients were not watched for a sufficiently long time

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† J. Jermans. Ueber Hydrastis canadensis. Inaug. Dissert., Berlin, 1886.—A. Cabanès. The use of preparations of Hydrastis Canadensis (Thesis, Paris, 1889).—E. Falk (Hydrastininae bei Gebirnmutterblutungen, in Centr. f. Gyn., 1891, No. 8 p. 157) recommends hydrastinine in preference: it may be given by hypodermic injections, which are less painful than injections of ergotine. This writer relates 28 cases in which he obtained satisfactory results. Dose, of a 10 p. c. solution, half to one Pravaz syringeful (i.e., from '05 cgr. to '01 cgr. of hydrastinine).
for these observations to be convincing. In cases of distressing hæmorrhage we may be obliged to plug the vagina; this should be effected either with tampons of cotton-wool soaked in a solution of alum or with long strips of gauze; the ordinary iodoform-gauze should not be used as it is too permeable, but Lister's carbolized gauze, which contains some resin. It is well to powder it with iodoform.

I will mention a palliative method which has rendered good service to Fritsch,* and which I have seen practised by Martin. I mean ligature of the uterine arteries. The operation may be done "en masse" through the culs-de-sac, without incising the vagina. For greater certainty, Fritsch recommends an incision on each side of the cervix, 3 cm. in length. Two vaginal branches are then met, which are tied; then proceeding deeper the trunk of the uterine artery is cut across, and the two ends are tied on the open surfaces. I should have no hesitation in following out this course in an urgent case.

The best hæmostatic treatment in hæmorrhagic metritis is curettage, which is at the same time the curative treatment. It should be performed as soon as possible, according to the rules laid down, and followed by an injection of iron perchloride (at 30° C.). The operation may be performed while the hæmorrhage is in full swing, and I have often seen it arrested instantaneously after curettage, and this fact I attribute not only to the destruction of the bleeding surface, but also to the contraction called forth by the scraping of the muscular walls and the vessels. A single intra-uterine injection usually suffices, and by following this course the cure is rapidly brought about.

There are some rare cases, qualified by the name of hæmorrhagic metritis, in which everything fails, and where the metrorrhagia persists and threatens the patient's life. In such cases we have no fear in resorting, as an ultima ratio, to ovariotomy (with the object of producing an artificial menopause), and even to vaginal hysterectomy,† so as to dry up the very source of the

† L. Landau. Discussion at the Gynecological Soc. of Berlin, June 24, 1887 (Centr. f. Gyn., 1887, No. 31, p. 498).—A. Martin (Clinical Treatise upon the diseases of women, trans. into French, 1889, p. 636) was obliged in one case to perform first ovariotomy and later hysterectomy for uncontrollable hæmorrhage caused by a glandular endometritis.
haemorrhage. It has not been clearly shown whether cases thus treated with success have not depended upon a haemorrhage provoked by some unrecognised lesion of the appendages with symptomatic pseudo-metritis. However that may be, this last resource should not be proscribed in cases where every other means has proved of no avail, and where really it is a question of life or death.

_Chronic painful metritis._—Local bleeding by scarification of the cervix may often be resorted to in chronic painful metritis. In these cases it is not only the immediate antiphlogistic effect which is sought, but the evacuation of the small superficial and deep cysts that at times riddle the cervix, and, from having been one of the effects of the inflammation, in their turn, keep up the congested state. As to cauterisation with the actual cauter or the thermo-cautery, and in particular as to ignipuncture, so much praised by some writers, and the advantage of which I myself doubt, I think them all much inferior to puncture and scarification with the knife, for the scars which follow on their use add to the sclerosis of the cervix and favour cystic degeneration, narrowing of the cervical canal, and compression of the nervous filaments, which is such a fertile source of morbid reflex symptoms.

Benefit will be derived from antiphlogistic applications, which are at the same time antiseptic, of a wash of tincture of iodine to the cervix, followed by the application of glycerine tampons, with a very small quantity of iodoform. Some surgeons use glycerine containing 5 per cent. of potassium iodide, but I fail to see therein any real advantage. The application of a simple glycerine tampon, acting through the medicament with which it is saturated, must not be confounded with complete vaginal plugging or "columnisation," as the Americans say. I remember that that was first recommended by Bozeman before it was brought into general use by Taliaferro.* For many American gynaecologists it is a sovereign remedy in chronic metritis and perimetritic exudation. The column of ordinary cotton-wool which fills the vagina is to the viscera what the elastic bandage is to soft parts (Engelmann).† It gives support

* V. H. Taliaferro (of Atlanta). On the application of pressure in diseases of the uterus, 1878.
† G. J. Engelmann. Dry treatment in gynaecology (Amer. Journ. of obst., 1887.
to the uterus and ovaries, prevents traction on the ligaments, and brings about the absorption of plastic products.

Pallen, regarding cotton-wool as unsatisfactory, does not hesitate to fill the vagina with clay. Reeves Jackson rejects cotton-wool, which becomes matted, and uses wool from which the fat has been removed, and which is more elastic. Without exaggerating its use, we should be wrong in not paying great attention to the mechanical effect of tampons. I have often found it of great benefit, even when there was no uterine deviation to correct, to carefully place a number of small glycerine tampons around the cervix, in the culs-de-sac, gently packing them together so as to form a ring similar to a pessary. The best position for the patient to assume during their application is the genu-pectoral, as it allows the viscera to fall back, and makes more certain of their ulterior support. The tampons may be left in place for four or five days, if care has been taken to add a little iodoform to the glycerine. Martin* is very distrustful of iodoform in the vagina; it is true it may give rise to accidents if its use is too long continued. It should be discontinued on the appearance of the least symptom of its absorption, and these are general malaise pains in the head, distaste for food, alteration of the urine. But these troublesome effects will never be seen if iodoform be used with care, and intermittently, and if constipation (which has seemed to me to specially predispose towards the absorption of this drug) be guarded against.

Warm injections are often a great help, and that under two conditions. 1. In cases where the chronic metritis is complicated by perimetritic inflammation, more or less marked, and when the patients highly sensitive complain of much pain; and 2. In cases such as those which Lisfranc called hysteralgia, chronic metritis without hypertrophy, and which Routh has qualified by the expressive name of irritable uterus. Under such circumstances I have obtained admirable results, and I cannot sufficiently recommend this special application of warm irrigation.† Some

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vol. 20, pp. 561 and 685). See the discussion at the Gyn. Soc. of Chicago, Ibid., p. 649 and foll.  
* A. Martin. Path. und Chir. der Frauenkrankheiten, 1887, p. 213.  
practitioners have obtained great amelioration of the pains by electricity,* introducing the electrodes into the uterus.

Massage has been recommended in chronic metritis, as in prolapse, misplacements, chronic perimetritic inflammation, &c. General massage, which is a kind of passive gymnastic exercise favouring nutrition, and which, properly carried out, could not but be useful, must be distinguished from local massage, having for its object the removal of congestion of the diseased organ and the diminution of its size. This local massage is carried out by introducing two or three fingers into the vagina or rectum to support the posterior surface of the uterus, while the other hand, resting on the pubis, gently and gradually presses upon the organ in such a way as to knead it. In spite of the facts that this method is much in vogue in Sweden,† and that good results have been published by Reeves Jackson, Runge, Prochownik,‡ &c., for my part I have hitherto hesitated to make use of this two-edged weapon, which might so easily give rise to sudden accidents in the uterus or its neighbourhood. I could not, however, proscribe a therapeutic procedure which is approved of by some serious gynaecologists, and which I have not myself tried. I content myself with stating some objections.

There remains a large number of cases of chronic painful metritis, in which everything has been tried in vain, the cervix remains large, turgid, hard and nodulated in spite of scarification, local application, and warm baths; the size of the body of the uterus is increased, heavy and painful on ballottement. The patients are invalids that are knocked over by the slightest walk, and all sort of exercise is painful. It is in these cases that surgery can be of the greatest use by a small operation which acts upon the cervix and reacts upon the body; I mean amputation of the infra-vaginal cervix.

Amputation of the cervix in metritis has an already long history. Lisfranc used and misused it.§ Then a legitimate

† Brandt. New gymnastic and magnetic method of treatment of diseases of the pelvic organs, and particularly of the uterus. Stockholm, 1868.
reaction set in against its use in excess, and the operation fell completely into discredit. G. Braun, of Vienna,* may be said to have the merit of having revived and established it upon a really scientific basis. The chief work of Braun was pointing out the involution of the body that was indirectly brought about by the operation on the cervix. After amputation of the hypertrophied cervix Braun observed an enormous diminution in the size of the body of the uterus. The autopsy of a patient upon whom he had long previously operated seemed to him to demonstrate that this involution was due to fatty change in the hypertrophied connective tissue, but that opinion is open to considerable doubt; it is very possible that it is due less to the depletion produced by the loss of blood at the operation, and to subsequent rest in bed, than to a true reflex vaso-motor and trophic action brought into play by the traumatism of the cervix. Whatever may be the real explanation, the fact itself is undeniable that the volume of the body is diminished after all operations on the cervix, and I have had occasion to observe this very often after Simon's, Schröder's or Emmet's operations. Braun's work roused but little interest, and in reality it was Aug. Martin† who showed the great advantage to therapeutics that could be derived from it, and who adopted a method for its performance much superior to that of his predecessor, who used the écraseur and the galvano-cautery.

Amputation may be said to be indicated as a last resource in cases of chronic metritis with augmentation of the size of the uterus. Further, in cases of extreme stenosis of the cervix, it gives to the external os a diameter and a suppleness which remove the dysmenorrhœa which is sometimes occasioned by rigidity and constriction of this portion of the organ.

A formal contra-indication to operation would be any acute peri-metritic inflammation, but I do not consider as an absolute contra-indication the existence of old quiescent perimetritis which has left either some plastic deposits or adhesive bands around the uterus. However, after an operation performed


upon the uterus, even with perfect antiseptic precautions, there is always a fear that some old lesion may light up afresh, and that, whether the operation be either amputation of the cervix, curettage, or simple lowering; we must therefore, if not always abstain from cutting operations in such cases, at least be always on our guard, and especially make perfectly certain before attacking the cervix that the cause of the symptoms does not rather lie in the appendages or in the adhesions.

The operation itself for amputation of the cervix has been greatly improved, and at the same time simplified, by the use of cutting instruments. The fear of haemorrhage was a legitimate one at the time the surgeon was performing a tedious operation at the inmost end of the vagina. And, moreover, they did not dare to amputate the cervix but with haemostatic means of removal, temporary ligature, the wire écraseur, the galvano- or thermo-cautery. Previous compression of the cervix by means of an india-rubber ring, which is still recommended by some gynæecologists, bear witness to the same exaggerated prudence. When the operation is performed rapidly the loss of blood is insignificant and suture arrests the haemorrhage quickly and completely; care must be taken, however, to tie the knots firmly, and when catgut is used to tie the ends three times.

I shall not stop to describe these procedures, for I disapprove of them. All sections by an écraseur or an incandescent instrument have moreover the very great disadvantage of infallibly giving rise to a fibrous scar and concentric retraction, which ends in stenosis. Circular amputations without flaps, either with the bistoury or with a kind of guillotine, like the tonsil guillotine, present the same objection, though to a less degree, but they are dangerous on account of the difficulty of arresting the bleeding.

For amputation of the cervix the only methods that can be recommended are those which, by the exact apposition and the perfect reunion of the cut mucous surfaces, allow of the re-constitution of a uterine orifice that is insusceptible of contraction. Two methods of this kind can be employed according to the special indications: 1, amputation by two flaps (for each lip); 2, amputation by one flap (which can be graduated at will), so as, if necessary, to remove only the internal mucous membrane,

1. *Amputation of the cervix by two flaps (conical excision or*
TREATMENT OF METRITIS.

excision by conical flaps).—This method, first introduced by Simon, generally is called after the name of Marckwald, who first described it methodically.* It should be resorted to when the internal mucous coat of the cervix is healthy and does not call for excision.

Here is a short description of the mode of its performance:

Anæsthesia. Patient in the lithotomy position; vagina irrigated;

fourchette drawn down by a short retractor. Continuous irrigation with a small stream carried out by an assistant, either by means of Fritsch's irrigation speculum or by a long canula held by an assistant along with the fixation forceps. Incision of the commissures of the cervix up to the vaginal

reflexions with a strong curved bistoury or strong scissors. Incision of the anterior lip from the internal mucous coat towards the middle of the tissue of the lip and inclined obliquely from below upwards. Second incision starting from the external mucous membrane and meeting the preceding incision in such a way as to remove a conical segment of the anterior lip, having its base below and summit above. Suture of the two flaps thus obtained with a strong needle threaded with catgut, taking care to pass the needle beneath the whole bleeding surface. Five or six stitches are generally necessary.

The same procedure on the posterior lip, after having removed the fixation forceps, and keeping the cervix lowered by traction on the threads that form the sutures of the anterior lip; suture of each commissure by one or two stitches; cutting of the ligature ends, vaginal irrigation, return of the uterus to its normal position, iodoform-tampon (fig. 126 A, B).

At the end of three days the tampon must be removed and an antiseptic irrigation (sublimate 1 in 2,000) given night and morning. It is necessary to keep the patient in bed for at least a fortnight. The healing is then complete, and there is no need to disturb the catgut ligatures, which fall out spontaneously.

This method is easier of performance than Hegar's, which differs especially in the absence of any preliminary incision of the commissures. As to Sims' operation, in which the vaginal mucous membrane alone was sewn over the wound, it was an advance on previous operations when it appeared, but has itself now been out-distanced.

2. Amputation of the cervix by one flap, or removal of the mucous membrane (Schröder's operation).—This operation is particularly applicable to one special form of metritis—the catarrhal variety, with obstinate ulceration and more or less profound follicular degeneration of the cervix. Nevertheless, it may be performed in cases of chronic metritis, when it seems more convenient, on account of the configuration or consistency of the cervix. I shall describe it here so as not to divide the description of the operative procedures into two parts.

This method, of which Schröder* was the inventor, became

common very quickly abroad, and is commencing to become so in France, where I was one of the first to use it.*

It is somewhat more difficult of performance than the preceding. The cervix is rendered accessible, as in the previous case, and the bilateral incision is also made. From this moment the following is the method of performance: Transverse incision of the internal mucous membrane of the anterior lip, marking off a layer of the tissue of the cervix, which is dissected off by proceeding gradually up to the transverse internal incision where the layer becomes


Doléris, in the hope of sparing the cervix, attacks the whole of the endo-cervical mucous membrane with a special instrument (called une herse, a harrow). This penetrates deeply into the tissues, cuts the mucous membrane into shreds, and tears up the gland terminations. The first and second fingers of the left hand are first of all placed in the right vaginal cul-de-sac on the right lateral portion of the cervix. These two fingers prevent the cervix from giving before the instrument when t, having been introduced up to the os interum, is about to operate from above below upon the right side of the endo-cervical mucous membrane. Cf. Pichevin, Gaz. des Hôp, April, 1890, No. 46, p. 427. I look upon this method as untrustworthy and far inferior to amputation by Schröder's method.
completely detached. This layer is made of varying thickness, according to the hypertrophy or alteration of the tissues; turning inwards (entropion) of the external flap thus obtained; suture of this flap to the internal mucous membrane by five or six catgut sutures; the curved needle must pass beneath the whole bleeding surface; two or three supplementary superficial stitches are, as a rule, necessary; same dissection and suture on the posterior lip; during its performance the bundle of ligature ends of the anterior lip may be used for fixation of the cervix; suture of the commissures, &c., as above (fig. 127).

Occasionally, on account of the conformation of the cervix, it may be found advantageous to perform the double-flap operation on one lip and the single-flap on the other.

In most cases it is advisable to precede or follow this operation by curettage, as the uterine mucous membrane is always more or less altered. Personally, I always perform curettage afterwards, so as not to be troubled with the oozing of blood, nor to be obliged to operate on a cervix hardened by the perchloride injection.

Trachelorrhaphy, or Emmet's operation,* should, as I have said, yield to excision of the mucous membrane or amputation of the cervix by Schröder's method, whenever unilateral or bilateral laceration co-exists with cervical catarrh. To my mind, therefore, Emmet's operation ought to be exclusively reserved for chronic metritis without ulceration of the cervix. One can then hope, by removing the cicatricial tissue and restoring to the cervix its normal form, to cause the disappearance of one source of pain and irritation. Moreover, there is no doubt that the injury done to the cervix by the operation has generally a beneficent effect upon the body of the uterus, and that, whether the operation be freshening the edges or amputation; this latter result is even, perhaps, the chief cause of the success that has been obtained.† The patient being anaesthetised, the assistants are placed as for amputation of the cervix. The cervix is lowered by means of forceps (the Americans prefer two threads passed


† This indirect action upon the uterine tissues may be so great as to lead occasionally to super-involution.—Virgil O. Hardon (Amer. Journ. of Obst., Oct., 1888, vol. 21, p. 1009) has reported two such cases (which were cured, he says, by faradisation).
through the lips). One pair of forceps seizes the cervix by the anterior lip, near to the laceration; the other at the corresponding point of the posterior lip. The whole surface of the laceration is then dissected off in one piece, and particular care is taken to clear the angle itself, and to remove all the cicatricial tissue. The wound is then trimmed, if necessary, by curved freshening scissors. The first suture is passed by a strong and much curved needle, close to the angle of the wound. The suture traverses the whole thickness of the lips to 2 mm. from the external surface of the cervix, and to 1 mm. from the internal. It is best to tie each ligature immediately after it has been inserted, so as to ensure perfect co-aptation of the edges. Five or six sutures are thus inserted successively. I use catgut, which is very rapidly absorbed. Catgut of two sizes should be at hand, and finer sutures must be used for the complementary sutures, which are rendered especially necessary when the laceration extends up to the vaginal cul-de-sac (fig. 128).

Of late, gynaecologists, with Lawson Tait at their head, have undergone a reaction against freshening with loss of tissue in all plastic operations. The principle of removing the lining (dédoublement) has been applied to gynaecology. Sänger and Fritsch* advise the following procedure: Excision of the upper

angle, then removal of a portion of the internal surface of the lip of the laceration by an incision from above downwards; suture at the external surface alone. I consider this mode of operation as defective, in that it preserves the thickened tissues, which, precisely, it is important to remove with the greatest care. An iodoform tampon, left in position for three days, is sufficient dressing. Afterwards antiseptic vaginal irrigation will be prescribed night and morning; and rest in bed for a fortnight.

When the laceration is bilateral, it is well-nigh impossible to avoid narrowing the cervical canal, if trachelorrhaphy be performed. I then prefer Schröder's operation, which, under these conditions, is much more expeditious, and allows of a more free removal of the thickened tissues.

After every interference of this kind it is advisable to explore the cavity of the uterus with a curette, and, if its mucous membrane be soft and friable, to perform a supplementary curettage, which does not complicate the principal operation in the least.

There are few operations which have had more vehement partisans and opponents than trachelorrhaphy. While some writers have accused it of producing sterility, and complicating labour,* others have declared that it was a remedy for sterility,† and yet others have not hesitated to perform the operation even during pregnancy, plainly demonstrating at the very least, by this boldness, that the operation is perfectly harmless.‡

It seems to me incontrovertible that trachelorrhaphy, if well performed, can have no bad result, even when it has no advantages, and it is very probable that it has often been performed uselessly.

The various plastic operations on the cervix (amputation, resection, suture of lacerations) cannot possibly affect its dilatability injuriously, for they give rise to cicatrisation by first intention, without any production of inextensile fibrous tissue. Many observations support this theoretical consideration, and prove that neither sterility nor dystocia is to be feared.§

‡ Doleéris. Bilateral laceration in a pregnant woman. Emmet's operation without interference upon the pregnancy (Med. Congress of Washington, Sept., 1887, analysed in Repert. univ. de gym., et d'obst., 1888, p. 137). This author says that he has had several similar successful cases.
Can ovariotomy be legitimately performed for chronic metritis? I do not hesitate to reply in the negative. Nevertheless, there has been perhaps a quarrel, more of words than of fact, between those who reject and those who accept this radical method. It is sufficient to analyse carefully some published* cases to see that the spaying has owed its incontestable success to the fact that it has been resorted to far less as a remedial measure against the uterine lesion than against the well-marked alterations of the appendages (periovaritis, perisalpingitis) which had followed upon inveterate or badly-treated metritis. Under such conditions the metritis assumes secondary importance, and the treatment instituted really only attacks the complication, which now has become the preponderating morbid element. But on the sole indication of painful exacerbations arising at each menstrual period, to remove at the outset the ovaries and tubes in order to establish an artificial menopause,† is certainly to give an alarming extension to ovariotomy. In many cases of this kind all the methods of conservative treatment do not seem to have been sufficiently considered before proceeding to a line of treatment which is only legitimate when it is indispensable.

Péan‡ has several times performed vaginal hysterectomy, which he then calls "uterine castration," for painful metritis, when, as he says, it is accompanied by "those morbid states described under the name of utero-ovarian neuralgias, which have resisted all medical treatment." He found in effect that "ovarian castration" performed in these cases did not always stop the pain, "as if the uterus had been a centre whence reflex actions started, independent of those which have their origin in the appendages." In patients whose uterus he has removed, and whose appendages he left, on the contrary, the results appeared more satisfactory. It is thus seen that Péan aims at neither more nor less than the substitution of vaginal hysterectomy for Battey's operation in cases of chronic and painful inflammation of the utero-ovarian apparatus. However, he recognises that after the removal of the uterus we may be obliged to open the abdomen for the removal of altered appendages difficult to reach through the vagina.

It does not appear to me proven that the complementary operation ought not to have preceded the principal operation in such a case, and would not often have rendered it unnecessary.

Vaginal hysterectomy has been several times performed by other surgeons for obstinate haemorrhagic or painful metritis. There have certainly been here operative abuses, but such an action is not always unjustifiable. The most recent researches have shown that every hypertrophic glandular metritis which resists a course of curettage for several months shows by that very fact a tendency to pass into epithelioma.

Analogous facts occur in what the Germans call adenoma, which form the transition between hyperplasia (benign adenoma) and the commencement of cancer (malignant adenoma.) Exploratory curettage does not then always solve the difficulty,* for if the positive indications which it gives as regards the formation of an epithelioma are decisive, the negative indications are not so (as the glands could not be thus examined in their whole length).† Here the greater weight ought to be given to the clinical history. Nevertheless, we ought to be very careful about performing hysterectomy for a "cancerous tendency" of endometritis, when no actual degeneration has manifested itself.

* Cornil and Brault. Note on the lesions of chronic endometritis (Bull. de la Soc. anal., Jan., 1888, p. 57).
BOOK IV.

FIBROMATA OF THE UTERUS.

CHAPTER I.

PATHOLOGICAL ANATOMY.


The names of fibrous bodies, fibrous tumours, myomata, fibromyomata, fibro-liomyomata, fibroids, hysteromata (P. Broca) have been given to new growths of the uterus, of which the structure recalls that of the uterus itself. They are benign, that is to say, do not tend to become generalised and infect the organism; but although the immense majority of these neoplasms pass more or less unperceived, and constitution either a hidden deformity or a slight infirmity, a sufficiently large number of them are grave, and death may result from accidents brought about by them.

Histogenesis of fibroids.—Velpean,* and after him many writers, have sometimes attributed the development of fibrous tumours to

Fig. 129.—Small interstitial fibroid.—Fig. 130.—Pediculated sub-mucous fibroid.

a, Hypertrrophied walls of the uterus; b, Fibroid; c, Uterine mucous membrane affected with endometritis and polypoid vegetations.

Fig. 131.—Sub-mucous fibroid (œdematous) with hypertrophy of the uterine walls.*

* Figs. 131-3 represent tumours I have successfully removed by abdominal hysterectomy.
a morbid parturition resulting from the presence of "a drop of blood, plastic lymph, or even pus" in the meshwork of the uterine tissue. At that time the spontaneous organisation of clots after ligature of arteries was held, and this notion was applied to various neoplasms. Actually, experimental research has shown that this organisation of clots is simply due to the growth of elements come from the walls of the vessels, and the theoretical edifice built on this fact, which itself was wrongly observed in the first place, has completely fallen to the ground.

Klebs* imagines that fibroids arise from a proliferation of the connective and muscular tissues of certain vessels; the various nodules thus formed coalesce to form a tumour. Kleinwächter† attributes the evolution of fibroids to certain kinds of round cells which are met with along the capillaries, operating by slow obliteration. These cells are first of all transformed into fusiform bodies, which themselves become grouped into nodules. Really, our information on this point is extremely limited.‡

These new-growths are very common. According to Bayle, who in 1813§ collected some interesting anatomical peculiarities which are most remarkable in reference to the time at which the observations were made, one-fifth of all women are affected with fibroids after the age of 35.

Their number is very variable; some uteri are studded with such an infinity of small interstitial or pedunculated nodules that they might almost be said to have undergone myomatous degeneration.

Generally, there are three or four distinct tumours; sometimes only one; but even when, clinically speaking, only one tumour exists, it is rarely that there is not another smaller tumour in the thickness of the walls, or on the surface of the organ, which may either remain latent for an indefinite time or take on ulterior development; this fact is often evident during laparotomy.

The size of fibroids may reach considerable proportions. It is particularly in cases of fibro-cystic tumours that enormous

Fig. 132.—Sub-peritoneal and interstitial fibroids of the fundus uteri (sections show the multiplicity of the nodules).

Fig. 133.—Interstitial fibroids of the fundus uteri.
weights have been found. Stockard* removed from a negress such a tumour, which weighed 135 lbs. (American). Even solid fibromata may reach a similar weight. Thus Hunter (New York)† recently saw a fibroid weighing 140 lbs., while the cadaver apart from the tumour only weighed 95 lbs.

Fig. 131.—Uterine polypus become vaginal and having preserved the triangular form of the uterine cavity.

Fibroids of the body.—The body is more frequently affected than the cervix. The situation of the new-growth relatively to the various coats of the organ allows of our distinguishing the following varieties: 1, Interstitial fibroids occupying the thickness (which is generally increased) of the muscular parenchyma; 2, sub-mucous fibroids, directly or almost directly covered by the mucous membrane; 3, polypi or pedunculated fibroids on the mucous side of the uterus, simply hanging by a pedicle formed of a fold of mucous membrane, a few muscular fibres, and some vessels; 4, sub-peritoneal fibroids with a large base or a thicker or thinner pedicle; it is generally agreed even when

† Hunter. Obstet. Soc. of New York, Nov. 15, 1887 (Amer. Journ. of Obst., 1888, vol. 21, p. 62). The measurement of the abdomen was 6 ft. 2 in. Never any haemorrhage: symptoms of compression; death from exhaustion at 53 years: the tumour had been recognised since the age of 21 years. On this occasion Freeman reported that he had recently removed a fibroid weighing 51 pounds—the patient died of shock.
these latter assume the form of polypi not to call them by that name, which is reserved for fibroids pendant in the uterine cavity. An important variety of sessile sub-peritoneal fibroids is that which is developed between the layers of the broad ligament— intra-ligamentous fibromata. But they generally arise from the cervix, and will be described along with the tumours of that portion of the womb. Whatever be the seat of fibroids, they bring about in the uterus a regular concomitant hypertrophy, which is pronounced to varying degrees. Sometimes the muscular wall hypertrophies in such a way as to surround by a kind of thickened capsule many tumours which are thus united into one mass; the muscular coats of the uterus then

![Image of pedunculated sub-peritoneal fibroid](image.png)

Fig. 135.—Pedunculated sub-peritoneal fibroid.

resemble the muscular layers of the gravid uterus and are continued far into the broad ligaments, thickened and fleshy.* A great development of vessels usually accompanies this globular or concentric hypertrophy (fig. 131). The increase in size of the uterus brought about by the constant stimulation of which the neoplasm is the starting-point may be compared to that occurring in the first months following conception, and hence this condition has been spoken of by Professor Guyon,† who suggested the

name, by the graphic and happy name of "fibroid pregnancy." Very small fibromata are sufficient for its production* (fig. 129). The uterine cavity is increased in size by this excentric dilatation,

Fig. 136.—Interstitial fibroid of the posterior lip of the cervix (Gusserow).

Fig. 137.—Small polypus of the infra-vaginal cervix, of mulberry appearance (papillary fibroma with glandular hypertrophy, Ackermann).

and often also by the traction which a heavy, and sometimes adherent, mass exerts upon the fundus of the organ.

* Tillaux (Gaz. des hop., 1867, No. 144) cites a curious example of this fact.
Fibroids of the cervix.—Fibroids of the cervix merit a separate paragraph. They, also, may occupy the different seats that I have described, and they, also, might be divided into the same classes; but the division of the cervix into two very distinct portions—the supra-vaginal and infra-vaginal—necessitates another classification.

(a) Fibroids of the infra-vaginal cervix.—Be they interstitial or sub-mucous, they generally give to the lip in which they develop a more or less cylindrical and elongated form. They may thus come to filling the whole vagina (fig. 136). Sub-mucous fibromata, starting from the canal of the cervix, sometimes affect a special polypoid arrangement, of which I have seen some examples. They descend into the vagina in the shape of a bunch of slender stalactitic masses, or like the gutterings of a wax candle, forming a kind of sheaf, which emerges from the external os and is attached, by a circular or semi-circular base, either to the isthmus or lower down. I have seen one intra-cervical sub-mucous fibroid project into the interior of a dilated cervix, and form a kind of frill around the

Fig. 138.—Intra-ligamentous fibroid.
A, Intra-ligamentous fibroid, abdominal variety.—B, Pelvic variety; the tumour has depressed the floor of the pelvis and forms a prominence in the vagina.
internal os. At other times these small fibrous polypi of the cervix contain a layer of glandular new-growth, and present a papillary or mulberry appearance* (fig. 137).

Exceptionally, fibromata starting from the thickness itself of the body of the uterus may be prolonged into one of the lips of the cervix and shell it out.†

(b) Fibroids of the supra-vaginal cervix.—Those alone call for special mention which take their origin from the external surface of this region, and are thus found at the outset in the very thickness of the pelvic roof, close to numerous interstices, through which they may slip and develop, at the same time remaining incarcerated in the cavity of the true pelvis. They develop most commonly behind the cervix. They raise Douglas's pouch and come into immediate contact with the posterior wall of the vagina and the rectum. They often extend at the sides between the layers of the broad ligaments, which they open out, thus constituting one of the most serious varieties of intra-ligamentous fibroids. They may even pass beyond this area, pass between the bladder and uterus, and send processes even into the iliac meso-colon. Imprisoned at their very starting point in the inextensible area of the true pelvis, they are the cause of the

† Duchemin. Some considerations upon fibroids of the uterus. Strasburg, 1863.
most formidable compression symptoms. I have proposed to call them pelvic fibromata.*

Connections of fibroids with the uterine tissue.—Most frequently fibroids are separated from the uterine parenchyma itself, by a lamella of loose cellular tissue, forming a kind of capsule or bed for them, whence they may be enucleated or shelled out without any great effort. This arrangement is sometimes so well marked that it is sufficient to incise the capsule for the fibroid to start out of its bed, owing to the muscular contraction in the living subject. Most frequently, however, this independence is not complete, and the fibroma, instead of being encased in the uterine parenchyma like a simple foreign body, is held there by fibrous bands of greater or less thickness, by which the vascular connections, too, are established. Lastly, there are cases—rare, it is true—in which there is no appreciable line of demarcation between the fibroma and the uterine wall, over a great extent of its surface. In general, the less hard the fibroid the closer its connection with the neighbouring tissue.

Structure and texture.—To the naked eye fibroids are made up of a dense, brilliantly white or pinkish white, elastic tissue, presenting, on section, a clean cut or an even surface, which is slightly convex, as if the tissue in the centre were compressed by the superficial layers, which, as a rule, are more closely packed together. At the surface may sometimes be distinguished without the aid of a lens, interlaced fibres and eddy-like arrangement, as if the fibres were rolled round fictitious multiple axes (fig. 139).

The vessels are relatively few in number, but, nevertheless, in fibromata of very large size, very considerable vessels may be seen winding over the surface, under the peritoneum or the capsule, and in one case that I saw there was a vessel in the broad ligament as large as the brachial, which gave rise to a very distinct murmur, accompanied by a thrill. The peripheral veins may then be as large as the jugular, and adhere on all sides to the muscular layers, being thus kept open by them. When this arrangement is very marked, and when, in addition, the neoplasm is riddled with vascular spaces, due to dilated capillaries, it comes under the variety described by Virchow† as telangiectatic

myomata, "myoma telangiectodes seu cavernosum." Portions that have undergone this degeneration look like sponge engorged with blood.

The pedicles of the polypoid myomata rarely contain large arterial vessels, and even when they do* the vessels present so much thickening of their walls, and possess so much retractility, that, combined with the contraction of the pedicle itself, spontaneous arrest of haemorrhage is certain when they are divided.

Klebs considers that the spaces between the balls or layers of fibres are lymphatic spaces. Nerves have been found in these tumours by Astruc and Dupuytren. Bidder corroborated the fact more recently, and Hertz† has even described their mode of termination in the nuclei of smooth fibres.

Fibroids examined microscopically show smooth muscular fibres and connective tissue fibres in varying proportion. According to Robin,‡ the muscular fibres never form more than half, and are sometimes present only to the extent of one-tenth. According as one or other kind of tissue predominates, or if they are equal, these tumours have been described as fibromata, myomata, or fibro-myomata. This latter designation is the only one that is really correct, for the elements are almost always mixed. Gusserow§ proposes to separate hard fibromata, in which the connective tissue predominates, from soft fibromata, which are particularly composed of muscular tissue. These latter are less distinctly encapsuled, and are more vascular.

Generally, in a section one sees the muscular and fibrous bundles cut now transversely, now obliquely, or even longitudinally. The first are easily distinguished by the fusiform appearance of the elements, and by their characteristic nuclei, which, on transverse section, form a mosaic. Care must be taken not to confound this horizontal section of the fibres and their nuclei with the appearance of round cells. Between these bundles there are found fibrous layers of unequal thickness, and interlacing in various directions, forming a kind of uniting

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‡ Ch. Robin. Dict. de Nysten, 14th edit., Paris, 1878.
tissue. They are composed in part of bundles of connective tissue, poor in cells, and in part of bundles of fusiform bodies with long processes (fig. 140).

Connections with neighbouring organs.—When a fibroma springs by a large base from some free portion of the uterus, such as the fundus or the anterior or posterior surface, it extends upwards into the abdominal cavity, and floats in the midst of the intestines. The uterus is then raised and sometimes dragged upwards, the cervix is thinned, and its cavity elongated. If the point of origin of the fibroma is small, the uterus no longer serves it as a support, nor, so to speak, as a pedestal; it may fall backwards into the pouch of Douglas, and become incarcerated there, with or without adhesions. If it has largely increased in size, without becoming fixed, it will jolt about in the abdominal

![Fig. 140.—Fibro-myoma of the uterus (microscopic section).](image)

cavity, irritating the peritoneum until it has produced either a liquid exudation (ascites) or a plastic one (adhesions).

The dropsy is, as a rule, of small quantity, of yellowish colour, and but very rarely tinged with blood. This latter condition, as is known, is more likely to occur if the growth be malignant. Occasionally, so-called chylous ascites* has been observed; it is probably due to a fatty change occurring in fibrinous exudations.

Adhesions generally occur between the tumour and the great omentum or the intestine; a piece of intestine is sometimes

almost fused to the surface of a fibroma, so as to defy all attempts at dissection. These adhesions then become the principal source whence the new growth draws its nutrition, and the pedicle may become extremely thin without any cessation in the growth of the fibroma. It may even break under the influence of distension produced by pregnancy, and leave the fibroid free from the uterus, and engrafted upon some point or other of the pelvic contents. Huguir* and Nélaton † have seen cases of this kind. Depaul‡ has even found a fibroid free in Douglas's pouch. This fact can only be explained by rupture of the pedicle, and the absence of adhesions.

Elongation, and doubtless also torsion, of the pedicle, may finally bring about various changes in the nutrition of fibroids, and enter largely into the subsequent degeneration.

Alterations and degenerations of the new growth.—The greater number of fibromata undergo a progressive induration after the menopause; at the same time they diminish in size and bring about senile involution and atrophy of the uterus; the tumour still exists, but without awakening any morbid reaction. Such is the ending of many fibromata, unrecognised during life, which are found at the autopsies of old women.

Calcification (not ossification, as old writers believed) is a somewhat rare change. The deposits of phosphate and carbonate of lime are seen especially towards the centre of the tumours, and form either an incomplete meshwork, or occasionally veritable uterine stones.§ They are scarcely ever seen but in pediculated sub-peritoneal fibroids, or in polypi; they may become free, and be spontaneously expelled. Facts of this kind have been known since the time of Hippocrates, and the Academy of Surgery formerly collected numerous examples of it.||

Softening may be due to various causes. During pregnancy fibroids acquire a considerable size, since they participate in the

† Nélaton. Ibid., 1862, p. 77.
§ J. T. Everett (Amer. Journ. of Obst., 1879, vol. 12, p. 700) has collected 33 cases of calcification of fibroids. One of them was his own, and was removed by laparotomy. Cf. also a work by J. N. Upshur, ibid., vol. 14, p. 108, and an observation by Briggs, ibid., vol. 20, p. 103.
|| Louis. Mém. de l’Acad. de chir., 1753, vol. 2, p. 120.
increased nutrition of the uterus. Being consequently swollen with lymph they become softer.* After delivery they may, by a process that has somewhat hypothetically been attributed to fatty degeneration, gradually disappear, participating also in the involution of the uterus. Several writers have cited numerous observations of this retrogression, and I myself have seen one most remarkable case, that of a large fibroma which, after necessitating thermal treatment, had nearly trebled its size owing to a pregnancy which supervened during the course of this treatment. The delivery proceeded without untoward symptoms, and the new-growth disappeared afterwards without leaving the slightest trace.

Fatty degeneration, as Gusserow has very justly remarked, which has been called in by many writers to explain this, has never been observed microscopically except in two cases, and in them diminution of the size of the tumour did not ensue.†

Lardaceous degeneration of a polypus has been seen by Stratz.‡ So far this case is unique.

Œdema, which is sometimes the first stage of gangrene, may bring about softening of fibroids.

Colloid or myxomatous degeneration, according to Virchow,§ is characterised by the effusion of a mucoid material between the muscular bundles; the presence of mucin and the proliferation of nuclei, and round cells in the interstitial tissue would distinguish it from simple œdema.

The formation of fibro-cystic tumours may succeed on either of these infiltrations || when the bands separating the small cells from the œdema have become destroyed. There are, therefore, no distinct walls to these cysts, which are simply lacunæ in the midst of the tissue forming the tumour.

Other fibro-cystic tumours have a very different origin, and belong to a special anatomico-pathological variety. The cysts

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* Dolérias (Arch. de tocol., Jan. and Feb., 1883, pp. 1 and 363) admits also a proliferation of the connective tissue becoming colloid.
originate in pre-formed cavities, dilatations of lymphatic vessels, analogous to those which sometimes occur in blood-vessels. The liquid within them is limpid, and coagulates on exposure to the air. Leopold has called them lymphangiectatic myomata.* It must, however, be noted that the lymphatic origin of certain cystic tumours of the uterus had already been distinctly formulated by Kœberlé.† Their formation seems to result from the development of a portion of the tumour in the track of the lymphatic vessels, which are compressed in the broad ligament. On the internal surfaces of these lymphangiectatic cysts an endothelial covering has been demonstrated, which distinguishes them from simple cavities or cysts formed in the substance of the tumour by softening, or by extravasation of blood. Mixed forms, at once telangiectatic and lymphangiectatic, have been observed.‡

Fibro-cystic tumours of the uterus must carefully be distinguished from intra-ligamentous ovarian cysts, which are closely bound down to this organ, and from accumulations of serous fluid, which are sometimes found around the womb in certain cases of pelvic peritonitis. The error seems to have been made more than once.

Lastly, some pseudo-cysts are formed by foci of molecular fatty disintegration, which may occur in the centre of large tumours where nutrition is obstructed. Necrosis cannot here be followed by gangrene, because germs are absent. It is, therefore, necrobiosis which takes place, with formation of soft oedematous masses, and these, later on, undergo liquefaction, and these form cavities or cysts filled with more or less liquid pulp. Extravasations of blood often increase the dimensions of these false cysts and modify their contents.§ Rupture of these foci into the uterus has been observed.

In some rare cases the internal os becomes occluded owing to the elongation of the cervix, or the partial rotation, or a certain amount of inflammation, and a special variety of hæmatometra

† Kœberlé. Gaz. hebdom., Feb., 1869, pp. 120, 135, and 163.
§ L. Championnière (Bull. et Mém. de la Soc. de Chir., 1889, p. 196) has seen a fibroid in the centre of which was a collection of material which he likens to a hæmatocele.
is formed. Meredith* has reported a remarkable example of this condition which was cured by supra-vaginal hysterectomy; the morbid mass weighed 15 lbs., and contained 5 lbs. of blood. Dubreuil † punctured and drained in a woman, aged 65 years, a hæmatometra simulating a fibro-cystic body, due to the obliteration of the cervix in a uterus which contained fibroids. This incomplete operation was followed by death. Tillaux ‡ has published a very similar condition, under the name of “cystic uterus,” that was cured by abdominal hysterectomy. These

cases generally occur in elderly women, the cervix, under the
influence of senile atrophy, having a tendency to become
narrowed, and even obliterated.

To sum up, we see that, from an anatomical point of view, myo-
or fibro-cystic tumours do not constitute a natural group. They may arise from: 1. closed spaces resulting from the dilata-
tion of lymphatics, i.e., lymphangiectatic (Koeberlé, Leopold); 2, oedematous infiltrations (Oskar Schröder) or myxomatous (Virchow) come to their last stage; 3, lacunae or cavities formed in the centre of tumours by the disintegration of tissues—myo-
matous or sarcomatous—while all these various forms may be
complicated by extravasation of blood into them.

**Inflammation, suppuration, gangrene.**—It is probable that the
starting-point of inflammation in fibromata is always a more or
less extensive necrosis, which infects the capsule and brings
about suppuration in this zone, which is at once more vascular
and looser in texture. This initial necrosis is due sometimes to
surgical interference, in having opened the seat of a fibroma
with a therapeutic object in view, sometimes to infection come
from without, consequent upon some septic manipulation (dilata-
tion, passage of the sound), and, lastly, it arises both from
compression or obliteration of the nutrient blood-vessels of the
tumour and from the injury done to the mucous coat which
covers it and protects it against the entry of micro-organisms.
This last is the one most commonly occurring in gangrene
of polypi. If it be true that necrosis of a small portion of
an interstitial fibroid or sub-mucous fibroid precedes inflamma-
tion and suppuration, on the other hand this latter becomes in
its turn the means of causing gangrene of the whole mass, which
it separates from the neighbouring tissues by a veritable
dissection.

The gangrenous portions are eliminated spontaneously or call
for surgical interference,* otherwise they cause septic infection.
Under these circumstances the pus has been seen to spread in
the pelvic cellular tissue. G. Braun† has reported a case in
which the pus, after having distended the uterine cavity, effected

* Demarquay and St.-Vel. Diseases of the uterus, Paris, 1876, p. 158.—F. Lange,
† G. Braun. Zur Behandl. der Uterusfibrome (Wien. med. Zeitschr., 1867, Nos. 100
and 101).
an exit through the external os and the vaginal region at the same time. Orthmann* performed laparotomy unsuccessfu-
ly upon a woman in whom a suppurating fibroid had burst through
the posterior wall of the uterus and caused peritonitis.

Can a fibroid become the starting point of cancer? Simpson
maintained that the irritation caused by the presence of a fibroid
was a kind of invitation for the appearance of a malignant new-
growth: we should express the same idea now-a-days by saying
that its presence forms a locus minoris resistantiae, occasioning
the local determination of the diathesis. Recent researches have
allowed us to understand the process better. It is probable†
that in certain cases the coincident chronic inflammation of the
mucous membrane first of all causes a proliferation of the glands;
this passes from the typical form (adenoma) into the atypical
form (epithelioma). Wahrendorff‡ collected, in Schröder's
wards, four cases of this kind, which seem conclusive. A second
mode of transformation of the fibroid into a cancer is the
sarcomatous degeneration of the very meshwork of the fibroid,
which becomes infiltrated gradually with rounded cells, that
take the place of the muscular fibres.§ It is possible that these
myo-sarcomata themselves undergo cystic change, either by dis-
tension of lymphatic spaces or by softening and by apoplectic
effusion of blood. We have, then, a sarcomatous variety of fibro-
cystic tumours.

With regard to the transformation of a fibroid into carcinoma,
it is clear from the inquiry instituted by Gusserow on this
subject that it is far from being proved. The observations which
have been cited as being cases of this transformation generally
resolve themselves into being cases where carcinoma has invaded
the uterus side by side with the fibroma; but that is a very
different matter from an anatomico-pathological and pathogenic
point of view, though clinically it is very closely allied. Liebmann||
has recently published a case which seems to him conclusive;
the two ovaries were at the same time affected with cancer.

‡ E. Wahrendorff. Fibromyome und Carcinome des Uterus. Inaug. Dissert.,
Berlin, 1887.
Lond., May, 1890.
|| C. Liebmann. Ein Fall von Myocarcinom des Uterus (Centr. f. Gyn., 1889, No. 17,
p. 291).
The association of epithelioma of the cervix with fibroids is fairly common.

**Neighbouring and distant lesions.**—Wyder and von Campe* have shown that in almost all cases where a fibroid exists endometritic lesions are to be found, the mucous coat of the uterus undergoing interstitial or glandular hyperplasia. Wyder† has found that the latter occurs almost exclusively when the fibromata are at some distance from the uterine cavity, while the interstitial form accompanies fibromata in close proximity to the uterine mucous membrane. When this is the case a mixed variety is sometimes seen (endometritis fungosa, Olshausen). These lesions fully explain the symptomatic haemorrhages of fibroids. It is certain that in such cases endo-salpingitis is often found, dependent upon propagation to the tubes; and in hysterectomy and ovariectomy for fibromata the tubes have often been found inflamed and full of blood. Röse,‡ during an operation of myomotomy, found one of these hæmatomata of the tube with walls so thin that they were on the point of giving way, and he therefore considered it reasonable to take this fact into consideration amongst the indications for operation.

Bantock§ often has met fatty liver in patients suffering from large fibroids, and he attributes this lesion to the presence of the tumour; according to him we have here a frequent cause of unsucces after laparotomy.

Fibroids, by compressing the ureters, often produce grave disorders of the kidneys—pyelitis, pyelo-nephritis, hydrenephrosis.|| I shall have more to say upon these accidents later on; they are closely analogous to those obtaining in cases of cancer. They are especially observed when the fibroma develops within the pelvis.

Cardiac lesions, which supervene upon all large abdominal tumours,¶ are very frequently met with as a complication of

uterine fibroids. They sometimes seem to be connected with the renal complication (through the mechanism described by Traube), but often they cannot be thus explained. Hypertrophy, with or without dilatation of the cavities or consecutive alteration of the muscular fibres, then doubtless is brought about by a process analogous to that which leads to the hypertrophy during pregnancy. As to the subsequent degeneration of the heart, it is very largely favoured by the anaemic and cachectic condition of some subjects. Two kinds of degeneration of the cardiac muscular fibres have been described, fatty degeneration and brown induration of the myocardium (Hoffmeier). Sébileau* has quite recently further insisted upon the dilatation or hypertrophy of the left heart and more rarely of the right heart in large abdominal tumours. We shall return to the subject a little later on.


* Sébileau. The heart and large abdominal tumours (Rev. de chir., 1888, pp. 284, 389).
CHAPTER II.

SYMPTOMS, DIAGNOSIS, AND ETIOLOGY OF UTERINE FIBROIDS.


The signs of fibromata are of two kinds: 1. The rational symptoms, which are identical with the general symptoms of uterine disease, as I have described them above (Bk. iii., chap. 3), with some special peculiarities, and with the predominance of the symptoms of hæmorrhage; 2. The physical signs caused by the tumour.

1. Rational symptoms.—The fulness with which I discussed above the general symptoms accompanying uterine disease allows of my shortening this part of the description. Hæmorrhages here assert themselves in quite a special manner, and in the majority of cases become the predominant symptom. They take on a menorrhagic or a metrorrhagic form, that is to say, they supervene while menstruation is proceeding, or in the intervals. As Wyder has shown, they are intimately connected with the
interstitial endometritis which always accompanies fibroids but little distant from the mucous membrane. Glandular endometritis, which co-exists with fibroids that are more distant from it, only give rise to leucorrhœa. Speaking generally, the hæmorrhage is complained of in proportion to the nearness of the new-growth to the cavity of the uterus; it is seen at its maximum with polypi. These losses of blood greatly weaken the patients, but fatal cases are quite exceptional. Matthews Duncan* has reported one; at the autopsy there was found rupture of a large venous sinus.

Leucorrhœa is very common. Sometimes very abundant losses of true serous fluid—hydrorrhœa—occurs. These are distinguishable from the serous discharges of cancer by absence of smell, and by their intermittence.

The pains are of various kinds. Most frequently there is a painful sensation of weight, of dragging in the loins, and lumbo-abdominal reflex neuralgias, so frequently met with in all uterine affections. The tumours that project into the uterine cavity are, moreover, accompanied by colicky or expulsive pains, sometimes very sharp when the losses of blood occur. Lastly, some tumours of very large size cause frightful sciatic pains from pressure on the sacral plexus. These pains, as Kidd† has remarked, are intermittent, and especially prominent during menstruation. Jude Hüe‡ saw two similar cases where the support afforded by an aluminium pessary of particular shape caused their cessation.

Compression phenomena are very frequently seen in the case of the bladder. West noticed dysuria 35 times in 96 cases. Gallard§ cannot see in these facts a simple mechanical phenomena, to the exclusion of another hypothesis. It is probable that they are related to some very small fibroids situated on the anterior wall of the uterus, in front of the pelvis, in immediate relation with the neck of the bladder.|| These vesical troubles are especially pronounced when the periodic congestion dependent upon menstruation is present, and sometimes acquire the importance of true cystitis, as much by the

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permanent stagnation of the urine as by the repeated catheterisation which is necessary, and occasionally becomes, if rigorous antiseptic precautions be not taken, the real cause of infection. Compression of the neck of the bladder has caused a chronic distension of the organ, such as to cause it to be mistaken for an ovarian cyst.*

Compression of the rectum, rarer than the preceding, sometimes causes hæmorrhoids, and combines with habitual dyspepsia to produce constipation. Barnes† attributes much importance to the re-absorption of excrementitious matters which follows obstinate constipation, and he believes that a veritable toxaemic condition, which he proposes to call "copræmia," may result from this state. Recent researches upon the ptomaines and leucomaines give a certain amount of weight to this view, which, when it was formulated for the first time, seemed extremely bold.

In cases of fibroids incarcerated in the true pelvis—pelvic fibroids—compression of the rectum may give rise to internal strangulation, causing death.‡

Compression of the ureters, and the grave renal troubles which it produces, was long ago noticed by Murphy.§ Since that time numerous examples were scattered throughout the literature of the subject. I have collected some,ǁ and have shown that the fear of this formidable complication, wrongly considered by Gallard¶ and the majority of writers as very rare, ought, on the contrary, to be a powerful indication of the necessity of operative interference.

A very large number of the deaths attributed to hysterectomy

† R. Barnes. Clinical treatise on the Dis. of women, French trans. by Cordes, Paris, 1876, p. 646.
and ovariotomy have, as their real cause, renal disease, often unrecognised, to which the surgical interference and the long inhalation of anaesthetics have given a sudden extreme importance (observations of Lee, Skene, Salin and Wallis *). On the other hand, symptoms of suppurative pyelitis (Cabot) of albuminaria, with threatened uræmia (Porak), have been seen to disappear after the removal of a fibroid which pressed on the ureters.† Consequently, chemical and microscopical examination of the urine must never be omitted, for the determination of the amount of urea, the presence or absence of albumen, pus, or of the characteristic hyaline or granular casts.

Every abdominal tumour causes an increase of blood-pressure, and, in consequence, reacts upon the cardiac muscle. It is, therefore, not astonishing that every cardiac lesion, however slight, should be greatly intensified by the existence of a large fibroid. The same occurs in cardiac cases, under the influence of pregnancy.‡ A portion of the disease of the heart, so frequently seen in the subjects of large fibroids, has often no other cause than this. Some few isolated observations had alone been published§ when Hofmeier, || in 1884, in a remarkable paper

* Lee reports a case of $4\frac{1}{2}$ months pregnancy complicated by three fibroids of the size of an apple, which compressed the bladder, whose fundus was incarcerated, and the neck above the symphysis: ineffectual attempts at reduction; death. At the autopsy, pyelo-nephritis.—Skene, referring to this case, says that it was the third time he had seen fatal pyelc-nephritis as the result of pressure of a fibroid on the neck of the bladder. He believes that such cases are commoner than is thought (Obst. Soc., New York, April 20, 1886, in Amer. Journ. of Obst., June, 1886, p. 607).—Salin and Wallis (Stockholm). Case of ovariotomy followed by death from double hydro-nephrosis, due to a large uterine fibroma. The case was that of a woman, aged 40, in whom dorsal decubitus provoked very sharp pain. The operation was followed by oliguria, uræmic symptoms, and slight albuminuria; death supervened at the end of a week. At the autopsy the ureters were found compressed and thickened, the pelves of the kidney dilated. (Hygieia, 1887, vol. 49, No. 2. Analysed in Centr. f. Gyn., 1887, No. 25, p. 407.)

† A. T. Cabot has cited a remarkable case of suppurative pyelitis, caused by a fibroid, which was cured by abdominal hysterectomy. (Boston med. and surg. Journ., June 2, 1887.)—Porak has published an observation in which existed albuminuria and dyspsæa, doubtless uræmic, which disappeared after the removal of a uterine polypus, which probably compressed the ureters. (Gyn. Soc. of Paris, Jan. 15, 1887, in Ann. de gyn., Feb., 1887, vol. 27, p. 140.)


upon the pathology and physiology of shock, insisted upon the frequency of cardiac lesions in cases of abdominal tumours, and particularly in cases of large fibromata. He related a series of eighteen cases, occurring in Schröder's wards, where sudden death by syncope had been brought about by a physiological or pathological abdominal tumour. In three cases (two myomata and one ovarian cyst) there was advanced fatty degeneration of the muscle of the heart; in fifteen cases (five ovarian tumours, five myomata, five pregnancies) brown atrophy of the myocardium. Five deaths supervened before any operation, nine after an operation, and five after parturition.*

This interesting question has been since taken up by other writers. Fehling,† in a series of fourteen hysterectomies, carefully examined all his patients on this point, and found in four cases clear signs of cardiac alteration. At the same time, moreover, he had under observation three cases of moderate-sized fibroids, accompanied by signs of cardiac disease; two of these patients died, one of them suddenly. Dower,‡ in America, has published a case of this kind. In England, Bedford Fenwick read a paper on the subject before the Gynaecological Society of London.§ In France, Sebileau|| has reported confirmatory facts. Amongst eighteen cases of abdominal tumour which he examined from this point of view, he found cardiac mischief indicated by murmurs, seventeen times; but of the three cases of myoma of the uterus that he cites, there was not a single autopsy.

Every patient therefore suffering from a fibroid which has reached a certain size ought to be carefully auscultated. Weakness of cardiac impulse, the soft character of the murmur, breathlessness, and general weakness will give rise to a suspicion of fatty degeneration of the myocardium. Brown atrophy has not given rise to any special symptom; it is particularly met with in patients who are much debilitated by haemorrhage.

I share the view held by those surgeons who regard this lesion

* The author makes here an evident error of calculation.
|| Sebileau. Loc. cit.
as being an additional indication for operation, and, at the same time, as one rendering the prognosis more grave.

2. Physical signs.—Amongst the signs yielded by local examination, that which it is best to place in the front rank as the most fixed, being common to large and small tumours alike, is elongation of the uterine cavity. It is constant in all cases of tumours undergoing evolution, that is to say, giving rise to morbid phenomena. The uterus is even dilated when the fibroids are interstitial or small-sized polypi, because it is hypertrophied under the influence of what Guyon has called "fibroid pregnancy." When the fibroid is large, the uterus is further elongated by the excentric development of the tumour, and the traction it exerts upon the cervix. The sound may then penetrate as much as 20 cm.

The sound should always be passed with extreme care; it is generally possible to use a sound made of malleable silver, which can be bent as is necessary. But if any difficulty be found with that, an ordinary moderately flexible catheter may be used, which, before removal, is to be grasped at the level of the cervix, so as to estimate the length of it that has penetrated into the uterus. This simple method is, I think, preferable to the use of Caulet's sound, or to Terrillon's dial-plate hystero-curvimeter, which has been recommended before the Surgical Society.

The uterine cavity may be so completely blocked up by the prominence of the fibroid that it becomes impossible to insert the instrument.

The swelling must be sought for by bi-manual examination, aided by rectal examination. In difficult cases it may be useful to procure relaxation of the abdominal walls by means of anaesthesia. To all examinations, one general remark applies: they always give very different information according as examination is made during or after a congestive and haemorrhagic period. If they are examined after, great diminution in the size of the tumour is often found, attributed, wrongly, to some internal treatment the patient has undergone. One must also be warned against the so-called contractions, which have been supposed to be felt in certain tumours. A fibrillar movement of the abdominal walls, or the displacement of a coil of intestine, may give rise to this illusion.
When the tumour has effaced or passed beyond the cervix, it becomes accessible on vaginal examination.

From a clinical standpoint, fibroids must be divided into three chief classes, and these lend themselves to some further subdivisions according as 1, the tumour, but little developed, constitutes a moderate symptom, or 2 and 3, it is well marked, and pursues its evolution towards the vagina or the peritoneal cavity.*

In the first case the symptoms of metritis predominate—it is the metritic type.

In the second case, the type with vaginal evolution, secondary varieties must be distinguished, formed by: A, fibromata of the body, sub-mucous; B, pediculated fibroids or polypi; C, fibroids of the infra-vaginal cervix. In the third case, the type with abdominal evolution, there must be separated: A, pediculated fibromata; B, those which have developed in the fundus of the uterus above the attachments of the broad ligaments; C, those which have developed in the body of the organ below the attachments of the broad ligaments; and amongst these latter C¹, those which starting below the peritoneum in the supra-vaginal cervix, have taken on pelvic development in the cellular tissue of the true pelvis.

The following table will make this division clearer:

<table>
<thead>
<tr>
<th>I. Metritic type (small interstitial fibroid).</th>
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<tbody>
<tr>
<td>(A, fibroids of the infra-vaginal) a, sessile.</td>
</tr>
</tbody>
</table>
| cervix,  
| b, pediculated. |
| B, sub-mucous fibromata of the body. |

<table>
<thead>
<tr>
<th>II. Type with vaginal evolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>C, pediculated (a, intra-uterine.</td>
</tr>
<tr>
<td>fibromata (of b, appearing intermittently.</td>
</tr>
<tr>
<td>the body) or c, intra-vaginal.</td>
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<tr>
<td>polypi.</td>
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<td>— ear.) enormous polypi.</td>
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<table>
<thead>
<tr>
<th>III. Type with abdominal evolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>(sub-peritoneal or interstitial fibroids) . . . . .</td>
</tr>
<tr>
<td>A, pediculated fibromata.</td>
</tr>
<tr>
<td>B, sessile fibroids not enclosed in the broad ligaments.</td>
</tr>
<tr>
<td>C, sessile fibroids enclosed in the (a, abdominal broad ligaments.</td>
</tr>
<tr>
<td>b, pelvic.</td>
</tr>
</tbody>
</table>

The above is the order I shall follow in the description of the diagnosis.

Diagnosis of fibroids of the metritic type (small interstitial fibroids). When the tumour is very small, and has, as yet, no tendency to separate itself from the uterine walls (fig. 129), it

* This is the division I have adopted for seven years in my lectures at the Hospital Lourcine-Pascal. It has been followed by Vautrin, in his excellent Fellowship Thesis (The surgical treatment of uterine myomata. Paris, 1886, p. 18) according to my indications.
is sometimes extremely difficult to recognise the real origin of the morbid phenomena that are observed. The guiding symptoms will then be the persistent hæmorrhages, coinciding with an increase in the size of the uterus, and of its cavity; but the small tumour itself is sometimes impossible to find.

Hæmorrhagic metritis will be eliminated in the same way. Early pregnancy is accompanied by cessation of the periods; nevertheless, one ought to remember that hæmorrhage may exceptionally take place in pregnancy. Abortion with retardation in uterine involution, caused by partial retention of the placenta, will be distinguished by its special course, and also by the examination of the expelled matters or portions removed by the curette.

Cancer of the body of the uterus also causes hæmorrhages, and increase in the size of the organ; but the losses are accompanied by fœtid leucorrhœa, and in case of doubt the curette would remove a fragment, and the nature of the growth could be recognised by the microscope.

Inflammations of the tubes and ovaries are a much more frequent source of error. Many deceptive signs may put one on the wrong scent; frequent hæmorrhages, tumour (hydro-, hæmato-, or pyo-salpinx) which often seems to form a portion of the uterus to which it is bound down, either at the sides or behind in Douglas's pouch.

We must not count upon a search for fluctuation to throw light on the diagnosis; it is generally absent in small tense tumours, and moreover it is dangerous to make too persistent a search for it. The rapid formation of the tumour, previous experience, the rational signs, local minute examination made under an anaesthetic, absence of any increase in the size of the uterus, are valuable signs in the recognition of any affection of the appendages.

Anteflexion and retroflexion of the uterus, even when they are accompanied with loss of blood, will not cause doubt for long; the nature of the tumour felt in one of the vaginal fornices will be quickly recognised by bi-manual palpation and passage of the sound.

I only mention small fecal masses that have collected in the rectum, and are felt through the vagina; nevertheless, they have sometimes deceived young practitioners. It is sufficient to
say that they can be depressed by the finger, and are removed by a purgative.

II. Diagnosis of fibroids with vaginal evolution. A. Fibroids of the infra-vaginal cervix.—The existence of a tumour hanging from one of the lips of the cervix is here the chief sign. This tumour is smooth, elastic, and, as a rule, not ulcerated. By passing the finger around its base the os may be felt in front or behind, according as it is situated upon the posterior or the anterior lip; the healthy lip is generally thinned, and a little diminished in size. This circumstance has caused mistakes, and has led to the fibroid being taken for the mass of an inverted uterus, or, again, of a polypus coming from the interior of its cavity. Careful examination of the two lips, by the finger, of the uterine cavity by the sound, and of its position by bi-manual palpation, will guarantee a correct diagnosis. But it must not be forgotten that fibroids of the infra-vaginal cervix may themselves be pediculated. Lastly, they may, when they spring from the cervix at the level of the vaginal insertion, increase in size by separating the recto-vaginal partition, and then simulate a vaginal tumour,* or again may develop in part towards the uterine cavity.†

B. Submucous fibroids of the body.—The hemorrhages and the increase of the uterine cavity in size are here particularly marked; the presence of the tumour which causes them is also easily recognisable. The tumour should be sought for by digital examination during haemorrhage, when the uterine contractions soften and half open the cervix. To confirm the diagnosis by intra-uterine examination dilatation can be precipitated by the methods I have described above. The finger then feels on one of the faces of the uterus a tumour which projects into the cavity and reduces it to a narrow slit with a lateral deviation. The surface of the fibroid covered by the hypertrophied mucous membrane is smooth and pulpy. There is no pedicle, but a large basis of origin which excludes the idea of polypus.

Externally the uterus has in these cases a globular form which might suggest the early months of pregnancy were it not for the rarity of hemorrhage under those circumstances.

* P. Müller. Scanzoni's Beiträge, vol. 4, p. 65
It is when the surface of these myomata has become gangrenous in parts that errors in diagnosis are possible; a sanious discharge, an irregular and putrid surface, the cachexia of the patient would lead to the diagnosis of a malignant growth, a cancer of the body, if one did not bear in mind the possibility of such an error.

_Pediculated fibroids or polypi of the body._—Three periods in the evolution of polypi may be described, and each of these periods corresponds to a variety of these productions. In the first, the pediculated fibroid is still enclosed within the cavity of the uterus, which is often greatly dilated—it is intra-uterine. In the second, it has the tendency of half opening the cervix; during menstruation it almost passes beyond the external os, but during the intervals it disappears; it is the variety of polypus which appears intermittently. Lastly, in the third period, the last of their evolution, the polypi, having completely passed beyond the uterus, become intra-vaginal, and may take on very rapid development, becoming of an enormous size,* and this constitutes yet another variety from a clinical and operative point of view.

Intra-uterine polypi cannot be distinguished from sessile sub-mucous fibroids but by direct exploration after dilatation of the cervix. The presence of the pedicle is characteristic.

Polypi appearing intermittently, the appearances coinciding regularly with menstruation, may be missed, unless the patient be examined at an opportune time; here also artificial dilatation of the cervix is necessary, not only for the completion of the diagnosis but also to allow of their removal.

An intra-vaginal fibroid of the body could scarcely be confounded with a sessile or pediculated fibroid of the cervix. Digital examination would fully make out its connections. It might be mistaken for an inverted uterus, and the mistake is easy, especially if the inverted uterus itself contains a sub-mucous fibroid; it has been made more than once even by distinguished surgeons. Moreover, this inversion may be mistaken under two conditions; it may be a complication of a polypus or a sub-mucous fibroid which alone attracts attention,†

* S. Pozzi. _A clinical variety of fibroids of the uterus (enormous polypi)._ Rev. de chir., Feb., 1885, p. 113.
† Tillaux. _Bull. et Mém. de la Soc. de chir.,_ 1874, p. 653.
or it may exist of itself and strangulation of the inverted organ at the level of the cervix may simulate a pedicle.* Attention has particularly been directed to the extreme sensibility of the tumour formed by the uterus as sufficient to put the operator on his guard, but this symptom is not constant. But passage of the sound, rectal examination combined with vesical catheterisation, and bi-manual examination under anaesthetics will allow of the recognition of an inverted uterus if it exists.

This investigation will be, nevertheless, difficult in cases of enormous polypi filling the whole vagina, and even passing through the vulva, which have brought about a kind of dislocation of the uterus. These polypi sometimes contract adhesions with the vaginal walls, and cause ulceration therein, or themselves necrose in parts: moreover, by the retention of the decomposed liquids which takes place above them in the obstructed vagina, they bring about a putrid absorption, which, by its continuance, alters the general condition of health. At the commencement, also, the rational signs and interrogation of the patient might make these cases confounded with cancer, but the mistake would be quickly corrected by local examination.

III. Diagnosis of fibroids with abdominal evolution. A. Pediculated sub-peritoneal fibroids.—The uterus is here quite distinct from the tumour, movements of which cannot be transmitted to the finger placed on the cervix (fig. 135). The cervix is generally raised. Ordinarily there is no metrorrhagia, and the uterine cavity may remain normal. Ovarian cysts are the chief conditions that may be most easily confounded with fibroids. Fluctuation in a cyst would be pathognomonic, but fluctuation must not be mixed up with the softness of some oedematous fibroids. Moreover, in small, or very tense, or multilocular cysts with small alveolar cavities it may be very difficult to appreciate; to remove all doubt it is often necessary to make an examination with the patient under chloroform. In the case of fibro-cystic tumours, as a rule, hard and bossy portions are found side by side with fluctuating parts.

Another important consideration is the slow growth of a fibroid compared with the rapidity that obtains with cystic tumours. Nevertheless, there are, as Knowsley Thornton † has remarked,

fibroids which develop so rapidly, and yet cause so little reaction on the part of the uterus, that confusion is easy, and he adds: "In every ovariotomy we ought to be prepared to perform hysterectomy."

Exploratory puncture, which was used to excess some years back, ought to be absolutely interdicted. It exposes the patient to serious dangers: evacuation of the contents into the abdominal cavity in cases of cyst, hæmorrhage, thrombosis, or embolism in cases of fibroid, and sometimes more or less widely spread peritonitis. Harsha,* judging from a case of fibro-cystic tumour of the uterus in which he plainly found contractions of the muscular wall of the cyst, has proposed, for diagnostic purposes, to anaesthetise the patient when menstruation is on—the period most propitious for this examination—and then to examine for the contractions of the tumour by means of percussion.

Jones† has reported an exceptional condition in which the gravid uterus can simulate a pediculated fibroid. In four cases, which form the basis of his paper, the uterus formed a tumour of the size of the closed fist, round, hard, and mobile, situated between the symphysis pubis and the umbilicus, and giving the sensation of a mass bound down by a long pedicle to some pelvic organ. Pressure exerted upon the tumour only feebly reacted upon the cervix; there was no fluctuation; passage of the uterine sound, which was done before pregnancy was recognised, gave the length of the uterus as about 12 cm. The writer attributes this particular condition of the gravid uterus to the absence of any amniotic secretion; the fundus uteri, which is the usual seat for the localisation of the ovum, would then become globular, while the lower segment would remain flaccid; hence the false sensation of a pediculated condition. It is far more probable that the cases were those of early pregnancy in women who had hypertrophy of the supra-vaginal cervix. A short delay, however, would soon put doubts on this point at rest.

Floating kidneys would be recognised by their form and by their absolute independence of the uterus.

Cancerous masses in cakes formed by degeneration of the great

omentum in cases of cancer of the peritoneum may complicate the diagnosis if they seem to be bound by adhesions to the uterus. But blood-stained ascitic fluid, the shape, and the scattered nature of the tumours, the concomitant signs and the integrity of the uterus, as shown, by the sound and bi-manual palpation, will prevent hesitation for any considerable time.

B. Free and sessile sub-peritoneal fibroids (not enclosed in the layers of the broad ligament).—The differential diagnosis is the same as for the preceding cases from the other abdominal tumours. One diagnosis is often very difficult, viz., pregnancy associated with a sessile sub-peritoneal fibroid. Careful analysis of the symptoms and particular search for those characterising the presence of a fetus can only prove fruitless during the earliest months.

Fibroids of this kind may be distinguished from pediculated fibroids by their forming a far more solid mass with the uterus. By bi-manual palpation it will be felt that the womb and the tumour only form one single mass. At the same time it will be easy to calculate to what extent the lower portion of the uterus is affected; intact, when the development of the tumour takes place above the insertion of the appendages, in the opposite case it is involved. The mass is then perfectly immovable in the midst of the true pelvis; and no lateral movement can be given to it, but by bi-manual palpation the iliac fossae are felt to be free, and that fact distinguishes this variety from the following:

Fibroids enclosed in the broad ligament or intra-ligamentous fibroids. Abdominal variety.—Here the development of the tumour has been especially in a lateral direction, and it has separated the layers of the broad ligament; generally the tumour projects into one of the iliac fossae, which it fills and in which it is immovable. By digital examination and palpation combined its connection with the uterus may, with more or less difficulty, be made out; moreover, generally only one lobe of the fibroid is intra-ligamentous, one portion lying between the layers of the ligament and another resting above them. But what permits of this kind of tumour being denominated by a special name is the seriousness of its nature and the special therapeutic indications arising therefrom.

It is exceptional for these tumours to give rise to any
uncertainty of diagnosis from the point of view of their existence. At most, before a complete examination, it might sometimes be taken for a tumour of the ilium; but doubt could not be of long duration. Parovarian cysts enclosed in the broad ligament would be recognised by their fluctuation.

Encysted tumours of the tubes, particularly hydro- and hæmato-salpinx, are often extremely difficult to diagnose from the tumours we are considering, on account of adhesions binding the tumours to the posterior surface or to the sides of the uterus and of the difficulty of obtaining fluctuation. Careful study of the history and the passage of the sound showing that there is no "fibroid pregnancy" are the chief elements necessary for the formation of a diagnosis.

C. Pelvic variety.—The characteristic feature of this variety is the development of the neoplasm, so to speak, in the thickness of the pelvic roof between the organs which are attached to it, with a tendency to insinuate itself between the spaces which separate them rather than to detach itself from the body of the uterus and rise into the abdominal cavity (fig. 138 B). Clinically, there arrive therefrom grave symptoms of compression, and, from the point of view of operation, many extreme difficulties. The starting-point of these tumours is always in the sub-serous portion of the surface of the uterus—that is to say, in the supra-vaginal portion of the cervix. When they take their origin anteriorly, from the very commencement, and when they have only a very small size, and, in fact, when they are scarcely appreciable on examination, they may produce grave bladder troubles, such as dysuria, retention of urine, &c. It is in this variety also that one is especially likely to find the intense pain, due to compression of the nerves, and the symptoms of intestinal obstruction.

Vaginal and rectal examination, combined with palpation, demonstrate their close connection with the viscera contained in the true pelvis. The vaginal reflexions have almost disappeared, having been absorbed, so to speak, by the new-growth. All around the orifice, which in extreme cases henceforth alone represents the cervix, are to be felt hard nodulated masses dependent from the uterus and immovable on pressure. This last sign allows of our differentiating the fibroid initially pelvic from the fibroid which has become pelvic owing to retro-
flexion of the uterus. The latter variety, which may bring about the same symptoms of compression and give similar signs on digital examination, is not immovably fixed in the hollow of the pelvis (unless it be by subsequent adhesions). By placing the patient in the genu-pectoral position, and by exerting pressure on the mass through the vagina and the rectum, it may be felt to become displaced, and, as a rule, it may be thrust back above the brim of the pelvis.

Hæmatocele, foci of peri-uterine inflammation, encysted collections in the tubes, will be recognised by the history of their commencement and by the progress of the case. Here diagnosis, which is sometimes extremely difficult, has given rise to a great number of mistakes. The so-called medical treatment of fibroids owes thereto a considerable proportion of its successes. Before ending this clinical description I shall mention some symptoms more rarely observed.

There is one phenomenon common to all solid tumours that compress the large abdominal vessels—the intermittent murmur called the "uterine souffle" in pregnancy. It has no diagnostic value whatsoever. If it fail to be found in ovarian tumours, it is when their fluctuation allows of no doubt. On the other hand, it is met with in solid ovarian tumours. In telangiectatic fibroids there may be close to the broad ligaments a spot where is heard a distinct continuous soft double murmur, like that of an arterio-venous aneurysm, and like it accompanied by a thrill. I have met with one example of this condition.

Ascites is rarely associated with fibroids. Nevertheless it may present itself in cases in which the tumour is very mobile, and also in those in which they undergo degeneration owing to torsion of their pedicle. Then, too, it may occur in cachectic subjects presenting tumours which, in other patients, would certainly not have produced it. I have seen it in these conditions in an insane woman who was cured by hysterectomy; the operation at the same time improved her mental condition.

Hæmorrhagic ascites is almost always a sign of a malignant tumour, and its presence ought to cause some reservation in the diagnosis of the nature of the tumour. I mentioned above chylous ascites, which is a very rare condition.

I have remarked upon the very frequent co-existence of serous cysts of the broad ligament with large fibromata of abdominal
evolution. We have here more, I think, than a mere coincidence. The nutritive activity resulting from the "fibroid pregnancy" must favour the development of these cysts at the expense of the vestiges of the Wolffian bodies which lie dormant in the parametrium.

The lowering of the organ, which some large uterine tumours produce, may give rise to a prolapse of the genitals. The same thing also may be observed with some ovarian tumours.

Inversion of the uterus may be, exceptionally, produced by polypi or sub-serous fibromata.

An accident which is very rare, but of which I have seen one example, and which formed the subject of an unpublished thesis by Düll, analysed by Schröder, is the separation of the linea alba and even a kind of hernial sac like a bag, in which the large fibroid, generally pediculated, is lodged. In the case that I saw the patient was an elderly woman, who had carried about this extraordinary hernia, which was larger than the head, for several years. The sac had a true neck, so much so that all reduction was impossible. The sac was thinned, and rested upon the thighs. In one of Düll's cases, a fatal termination was brought about by mortification of the sac.

Progress and prognosis.—By far the larger majority of fibromata only give rise to vague symptoms, and are often overlooked. Even when they have caused serious troubles during the generative life of the woman, the greater number have a natural tendency to atrophy, or at all events to diminish in size by a kind of involution and induration process after the menopause. The same effect may be brought about by a pregnancy. But this rule, however, is not absolute. On the one hand, there is a certain number of tumours whose progress is really "galloping," as I have called it, and these bring about the death of the patient, not so much by the hæmorrhage as by the enormous development of the morbid mass, and by the symptoms of compression and of mal-nutrition which result therefrom. The same holds good for the generality of fibro-cystic tumours, and also of some simple fibro-myomata. On the other hand, some

† S. Pozzi. The value of hysterectomy, &c., 1875, p. 20.
tumours, whose development is less rapid, do not any the less continue to grow indefinitely in size. After the climacteric* this growth, however, as a rule, becomes notably retarded.†

It might be said that the natural termination of fibromata is a tendency towards their expulsion beyond the limits of the uterine walls, either towards the exterior or towards the peritoneal cavity. This effort is led up to by the formation of pedicles which occur in these two directions, and, as a matter of fact, this termination is occasionally brought about, though examples of it are extremely rare. Nevertheless one fairly often sees the "accouchement" of a polypus after its pedicle has been torn through, under the influence of strong uterine contractions,‡ or even by the effect of its weight and the thinning of its attachments. Defaecation or vomiting may then suffice to bring about the expulsion of the polypus.§ Rupture of the capsule of a sub-mucous fibroid may occur under the same conditions, and give rise to a true spontaneous enucleation. It is sometimes preceded by a period of pain and haemorrhage;¶ at other times it occurs quite suddenly during an effort, or even during examination.‖ It has been observed to follow on delivery, and the consecutive retraction of the uterus.**

An analogous process to that which brings about the rupture of the pedicle of sub-mucous polypi may also set free pediculated sub-serous fibroids.+++ The tumour then remains engrafted upon that spot at which it had previously contracted adhesions, or possibly remains free in the peritoneal cavity, and undergoes there a kind of mummification.

Another mode of spontaneous expulsion, which is far more

‖ Mundé (Obst. Soc., New York, June 6, 1886) showed a specimen coming from the spontaneous enucleation of a fibroma that weighed not less than 2 lbs.
** Anderson has seen a case of spontaneous elimination of a fibroid of the size of an egg, unaccompanied by haemorrhage, three days after delivery (Hygieia, Stockholm, Aug., 1887).
serious, is brought about by the mortification of the tumour. The necrosed tumour tends to become expelled externally. Sometimes it is extruded into the uterine cavity, and all may go well in spite of the dangers of septic infection. Sometimes it perforates into a neighbouring organ, such as the bladder,* or makes its way through the pouch of Douglas,† or even the abdominal wall. Under the two former conditions a fatal event is almost inevitable. The last may terminate in recovery, as in a case seen by Dumesnil.‡

Lastly, absorption or retrogression of the tumour may take place, as I said above, after a pregnancy,§ or even at the menopause.‖ But, under the latter condition, induration and considerable diminution, rather than a true disappearance, takes place.

Fibromata are certainly a cause of sterility; nevertheless impregnation may occur, and even pregnancy follow a normal course. The fatal event may be brought about slowly by the profound anæmia which the repeated hæmorrhages produce, by successive attacks of chronic peritonitis, by renal lesions and the consequent uræmia, by some cardiac complication and asystole. It may also supervene rapidly by an acute peritonitis due to the rupture of a cyst, or caused by gangrene and inflammation of the tumour, propagated to the neighbouring serous membrane, with or without perforation. Fatal septicæmia may have, as its cause, the gangrene of a sub-mucous fibroid. Lastly, sudden death has been seen consequent upon embolism,¶ and this termination is to be feared, particularly in cases of fibro-cystic tumours with telangiectasis. It is worthy of note that exploratory puncture seems to favour embolism by leading to thrombosis in the large venous sinuses. Death, almost instantaneous, from shock has also been observed after rupture of fibro-cystic tumours within the abdominal cavity.**

* F. Guyon. Fibrous tumours of the uterus, 1860, p. 65.
|| Boinet. Gaz. hebdom., 1873, No. 18, p. 287.
Etiology.—In spite of the patient researches that have been carried out with a view of elucidating this question,* nothing positive is known about the efficient causes of fibromata. At most, a few indications on the predisposing causes can be given. The negro races are more subject to fibroids than whites, and that at an earlier age. Amongst ourselves they are met with especially between the ages of 30 and 40. Sterility is not a cause, but a consequence. All kinds of local exciting causes have been invoked, but without any proofs. On the other hand, celibacy has been supposed to favour the formation of fibroids.† This view has been overthrown by Gusserow’s statistics. Fehling‡ attributes great importance to incomplete involution of the uterus after parturition or abortion, when sufficient rest has not been imposed upon the patient after delivery.

† Fehling. Einige Bemerkungen zur Aetiologie der Myome und Methode der Myomotomie (Centr. f. Gyn., 1890, No. 29, p. 513).
CHAPTER III.

MEDICAL TREATMENT OF FIBROMATA.—SURGICAL TREATMENT OF FIBROMATA WITH VAGINAL EVOLUTION.


The treatment of fibroids may be medical or surgical.

The medical treatment, as a rule, is symptomatic only. The various substances which have been recommended as acting upon the tumour directly, either by constricting its nutrient blood-vessels (ergot), or by bringing about fatty degeneration (arsenic, phosphorus) seem, as a matter of fact, to act especially through a different mechanism; the former by causing contraction of the uterine muscular walls, and so controlling haemorrhage, and the latter (at any rate arsenic) by improving the general nutrition of the patients. There remain as specific agents, electricity, to which some authors attribute a considerable influence in the production or absorption of fibroids, and the sodium chloride mineral waters, whose action in this direction seems incontrovertible.

Ergot of rye has been methodically used in the shape of hypodermic injections since the appearance of Hildebrandt’s* work, by whose name this method is still called. It must be

carried out persistently for some months. A solution after the following formula may be used:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
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<tbody>
<tr>
<td>Ergotine (Yvon’s)</td>
<td>5 gr.</td>
</tr>
<tr>
<td>Chloral hydrate</td>
<td>1 ”</td>
</tr>
<tr>
<td>Distilled water</td>
<td>100 ”</td>
</tr>
</tbody>
</table>

and twelve drops (about 25 cm.) may be injected daily. If the solution has to be kept for some time, in addition to the chloral which is already used as a preservative, a few drops of van Swieten’s liquid should be added. Care must be taken to always keep in the needle a piece of silver wire, so as to ensure its permeability, to pass it through the flame of a spirit lamp after every injection to dry it, and before every fresh injection, so as to purify it. In that way the formation of abscesses will be avoided. Lastly, the fluid should always be injected into some fleshy mass, such as the gluteal muscles or the deltoid, and for that the needle should be plunged perpendicularly to a depth of two to three centimetres, all air having previously been expelled. That the injection may not cause pain, Bumm* advises that the solution should be neutralised with soda, and filtered. Patients may be taught how to give themselves the injections. Winckel speaks of a woman who had thus given herself 1,500.

In spite of the very large number of would-be demonstrative observations that have been published, the effect of this method on the development of fibroids is still disputed. Schröder‡ has seen cases not present any diminution until four hundred injections had been given, and that although the dose employed was stronger than that which has just been indicated. Nevertheless he has often found that the tumours remained stationary, although when treatment was instituted they were in full development. Leopold also approves of the treatment, and Byford,‡ in America, is one of its warmest supporters. On the other hand, many writers declare that they have never seen any good results from its use.

If ergot be used in the manner that has been pointed out, no

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untoward accidents will arise. If the dose be exceeded to any extent, cramps of the extremities, vomiting, or fever may supervene. To it have even been attributed suppuration of the tumour and an attack of aphasia.* One of the advantageous results that have been attributed to this treatment is that it favours the spontaneous expulsion of the tumours. But it is open to doubt whether it is sufficient to bring about the formation of a pedicle in cases of sub-mucous growths, and as to polypi themselves, they do not derive the least benefit from medical treatment. Churchill and MacClintock highly recommend the tincture of cannabis indica, in ten minim doses given three times a day, for arresting haemorrhage. Antipyrin † has been used with the same object in view. A new drug, come from America, has lately been introduced into European practice; it is the fluid extract of hydrastis canadensis.‡ It seems to act as a haemostatic by causing constriction of the blood-vessels, while its bitter taste also makes it a stomachic. The dose is twenty-five minims two or three times a day. Schatz§ has spoken of this drug in high terms; he asserts that he has seen a fibroid which reached up to the umbilicus return into the cavity of the pelvis after two years' use of hydrastis canadensis. Lack of success, to his mind, depends upon the difficulty of procuring the drug in a state of purity in Europe. I myself have found some good effects from its use.

Bromide of potassium has been recommended by S. J. Simpson in small doses long continued. It only seems to act as a sedative for the pain, and its prolonged use might cause alterations in the digestive processes, and these it is most important to preserve intact.

On the other hand, arsenic, recommended by Guéniot, if it has not the especial property that was hoped for, has at any rate a tonic action which may be of use; the same cannot be said of phosphorus. The sodium chloride mineral waters, such

* Schorler. Loc. cit., p. 175.
† Chouppe had a successful case with antipyrin, administered in an enema, in two gramine doses, in a case of metrorrhagia (Soc. de Biol., Nov. 19, 1887, p. 676).
‡ E. Falk (loc. cit.), has recently recommended hydrastinine in the haemorrhage due to fibroids. He uses hypodermic injections every day (dose, 05 to 1 centigr.).
as those of Salies-de-Béarn* (Basses-Pyrénées), Salins (Jura), Kreuznach† (Germany), &c., have an incontestable action upon fibromata. They act moreover by improving the general nutrition. The cases in which I have obtained notable improvement are very numerous.

Of late, electricity has quite come into fashion, especially in England and America; this is largely due to the work of Apostoli, who has followed out with rare persistency the way opened up by his master, Tripier:‡

The application of electrolysis to fibromata was first made in America, in 1871, by Cutter;§ in Italy, in the year 1876, by Ciniselli and his pupil Omboni. It is known that moderately strong currents have the effect of producing chemical decomposition of the tissues; the acid elements being formed at the positive electrode and the basic elements at the negative electrode. If, then, the tissues be put into contact with the positive (acid) electrode, either on the surface of the mucous membrane or in the thickness of the tumour itself, an eschar will be produced there, which, like those following on the use of acids, will produce a fibrous contractile cicatrix. If contact take place with the negative (basic) pole, the eschar produced will be, as in the cases when potassa fusa has been used, soft and non-contractile. Chemical action may always be prevented from occurring at one or other of the poles by making it terminate in some conducting substance (clay, gelosine, gelatine,

* It must be remembered that "mother-liquors," the residue of the crystallisation of sodium chloride, are especially rich in alkaline bromides and iodides (the mother-liquor of Salies-de-Béarn contains 10 grammes of NaBr per litre) and this gives them a particularly sedative action. According as an exciting or calming action is desired, the mother liquors will be abstained from or will be used, in addition to salt water or simple baths. A portion of its effects may be obtained if distant from the waters, by mixing the mother liquors with baths artificially prepared with table-salt.


&c.) or in large perforated metallic plates covered with cotton wool or chamois leather, which disseminate the action over a large surface where it becomes lost, so to speak.

Fig. 142.—Apostoli's chemical galvano-caustic uterine sound.

1.—Natural size. A, the simple sound; B, trocar for puncture; F, notch showing the normal depth of the uterus.

2 and 3.—The whole instrument reduced to one-third. C, celluloid sheath for protection of the vagina; E, electrode; D, screw for fixing the sound or trocar at the required length.

N.B.—For several years Apostoli has replaced the platinum trocar by a steel or gold filiform trocar, which can be brought to a finer edge than the platinum.

4.—Retort carbon electrode for galvano-chemical cauterisation (Apostoli).

The early promoters of electrolysis used weak currents and dreamed of a catalytic action unaccompanied by real destruction of
the tissues. Many electro-therapeutists still keep to this plan,*
which exposes the patient to fewer dangers. But by far the
greater number, following Apostoli's and Engelmann's (of St.
Louis)† example, use currents of high intensity from a Gaiffé's
battery, which is composed of Leclanché cells. Apostoli, in
1884, did not exceed 100 milliamperes; now he often uses up
to 250.‡ The intensity is measured by a galvanometer; this
improvement added to the old methods is of capital importance.

The following is Apostoli's method:—

One of the poles being applied to the abdominal walls through
the medium of a cake of clay or any other appropriate substance,
the other electrode formed by a platinum sound, covered by an
insulating sheath of celluloid or gutta-percha over its whole
extent, except that which is to be within the uterus, is inserted
into the uterine cavity, or even thrust into the thickness of the
parenchyma "by means of a previous puncture, which will be
compulsory when the cervix is inaccessible or impermeable, or
which will be resorted to from choice when the operator wishes
to bring about more rapidly the denutrition of the neo-plasm.''
By this method an intra-uterine eschar is produced, the positive
pole being used if the case be one of hæmorrhagic fibroma, the
negative pole in other cases.

Apostoli asserts that "well applied and kept up for a sufficient
length of time (from 3 to 9 months on an average) this method
is generally a sovereign remedy, and in 95 per cent. of the cases
leads to the following results: anatomical retrogression of the
fibroma varying from one-fifth to one-third, and sometimes even
to half of its bulk, but never total disappearance; very rapid
and very durable arrest of the hæmorrhage; and disappearance
of the compression symptoms."

Engelmann (St. Louis) describes a similar method. Ex-

Amory (America) cited by Egbert Grandin. Electricity in Gynecology, &c. (Cyco-
† Apostoli. Trans. French Congress in Surgery, 1889.—Engelmann. The use of
‡ The "ampère" is the current developed by an electro-motive force of 1 "volt," in
a circuit whose total resistance is 1 "ohm."—The "volt" is an electro-motive force very
nearly equal to that of a Daniell's cell.—The "ohm" is the resistance equal to that of
a column of mercury 1 sq. millimetre in section and 105 mm. high.
ceptionally he has also resorted to double puncture of the tumour through the vagina. He uses an intensity of from 50 to 250 milliampères for from 3 to 8 minutes.

How does this method act? It seems that its partisans recognise two modes of action.

First, caustic action upon the mucous membrane, producing, to use Apostoli’s expression, a true electric curettage; now, it is well known that curettage is often extremely efficacious as a treatment for the haemorrhage that accompanies fibromata, by removing the diseased mucous membrane. Curettage, and as a consequence electricity, may doubtless also lead to superficial necrosis of sub-mucous fibroids. Bröse* has laid great stress upon this mode of electrical action. Nicaise† also sees in this destruction of the mucous membrane the chief advantage of electricity. Nevertheless this destruction can never be other than very incomplete, linear, and in fact corresponding to the rectilinear path of the sound within the uterus. It cannot in the least be comparable with that which is obtained by a curette that is passed over the whole uterine surface with some degree of force and penetrates into all the corners. Danion,‡ by some experiments upon animals, has even shown that with a sound introduced into the corner of a rabbit’s uterus the intensities used by Apostoli do not produce any caustic effects beyond at points that are almost invisible.

Yet another mode of action is invoked by all the partisans of electro-therapeutics, whether they use weak or strong currents. It is that which has been denominated interpoler action. Unfortunately this phrase has an ill-defined and still hypothetical meaning. Does it consist in a chemical modification of the medium in which the constituent elements of the tumour live, or in an action, at the same time vaso-motor and electro-tonic, on the muscular fibres? § Danion has even gone so far as to speak of a galvanic massage of the tumour, and he supports himself on this view to insist upon the reversal of the currents. It must be confessed that all these ex-

planations are extremely hypothetical and only rest upon personal opinions.

This method is not without presenting some dangers. Two deaths have already been reported in France.*

Still more dangerous is Cutter's method; he uses cells of considerable size, and punctures the tumour at two spots, either by the vagina, or the rectum, or the abdominal walls. Also in fifty cases he has had no fewer than four deaths. The results he

obtained were as follows:—Fibroids not arrested in their progress, 7 cases; arrested in their progress, 25; relieved, 3; cured 11.

Cutter is guided by a different theoretical view to Apostoli. He seeks the electrolytic destruction of the tumour by producing eschars by the action of the electric current. As a matter of fact Apostoli himself seems to advance somewhat upon this road when he thrusts the electrode into the centre of the tumour in exceptional but nevertheless too frequent cases. One of the least disadvantages of this course is that it gives rise to interminable suppuration.* Reacting against these violent procedures, Danion and L. Championnière† recommend currents of low intensity, as a rule from 45 to 65 milliampères at the most. Very rarely they have gone as far as 90 milliampères. These moderate intensities should give quite as satisfactory results as the intense currents. Danion especially attaches great importance to frequent reversal of the current. He introduces the electrode only into the cervix, and even asserts that the same phenomena can be obtained with an intra-vaginal electrode if the necessary precautions be taken. That is a question of the extremest importance, for it is sometimes impossible to reach the cervix, and especially to pass beyond its limits.‡

Even at the present time it is extremely difficult to formulate any judgment upon the value of electrolysis applied to fibromata. Even an opinion can scarcely be formed, so contradictory is the evidence.

Gynaecologists might have been seen divided into two camps on this subject, not only at the Gynaecological Society of New York,§ but also at the corresponding Societies of London|| and Berlin.¶ In France opinions are very divided. Doléris,** who has resorted to this treatment in twenty cases, believes that the

‡ Championnière. Ibid., p. 542.
surgeon is often the victim of an illusion, and takes for a diminution that which, as a matter of fact, is nothing more than a general sinking of the whole tumour into the pelvic cavity. Care must also be taken not to regard as a portion of the fibroid those perimetritic exudations which are extremely likely to be re-absorbed under the influence of rest and accompanying suitable treatment. From an important discussion at the Surgical Society (of Paris) it seems that the value of this therapeutic agent has been overstated, from the point of view of the diminution of tumours in size. When that occurs it is only temporary, and ceases as soon as the use of electricity is interrupted.* But the majority of observers recognise that electricity diminishes the haemorrhages and the pains in a perfectly clear manner, and thus brings about an improvement in the general condition.

Without going to such an extreme as Thomas Keith, who declares that whoever practises hysterectomy without a previous trial of electricity is morally a criminal, we must remember that we have here a therapeutic resource which it is no longer permissible to neglect in cases where operative interference would not appear to offer a sufficiently reasonable chance of radical cure.†

I simply mention the action of interrupted constant currents, which Aimé Martin and Chéron praise so much. Their use is not common, and the same may be said of the interrupted (faradaic) current.

obstruction, uræmia, or paraplegia. Occasionally these symptoms have been caused to cease, by pushing the tumour above the promontory of the sacrum. To accomplish this the woman must be put in Sims' position, or better, in the genu-pectoral position, and the tumour is manipulated either through the vagina or the rectum. If there be much muscular contraction and hyperæsthesia, chloroform should be administered. This manipulation has also yielded good service during labour, in cases where fibromata complicate the pregnancy.

Minor haëmostatic operations.—Before commencing the description of the major operations the surgeon may be called upon to perform for fibroids of the uterus, I must speak of the minor operations which have been performed for the haemorrhages, which are often very serious. These minor operations by their relative simplicity find their category between the medical and the surgical treatment, properly so-called.

Curettage and intra-uterine injections.—This treatment has often been resorted to, doubtless from a mistaken diagnosis, the case being regarded as one of haemorrhagic metritis. Recent researches, however, on the condition of the mucous membrane show that this treatment is in some degree rational. It may be successful when the uterine cavity is not too greatly altered in shape, and when, consequently, the curette can be used effectually.* Intra-uterine injection of perchloride of iron should afterwards be practised with a Braun's syringe, and followed by a full douche, with a double-channel canula, as was pointed out while describing the treatment of metritis. These injections and douches must, however, be given with extreme caution, and remembering that in such cases the tubes may be considerably dilated, and thus allow the passage of fluid into the abdominal cavity.

Dilatation of the cervix.—Recommended first of all by Baker Brown, by MacClintock and Nélaton, haemostatic dilatation of the cervix has again been returned to by Kaltenbach.† He uses Hegar's bougies, going up to 16 or 18 millimetres. In three cases the success was remarkable. Kaltenbach is, moreover, led to attribute very great influence to narrowness of the

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cervical canal in the causation of the pain and haemorrhages that accompany fibromyomata. He especially recommends this palliative treatment in the case of a woman approaching the menopause and suffering from a tumour of moderate size, when the chief thing is to gain time. I myself treated one case most successfully in this way.

Bilateral section of the cervix.—This operation, first performed by Nélaton, then by Baker Brown, who some years ago favourably adverted to it,* can only be of use if the incision be carried sufficiently far for the section and ligature of the chief branches of the uterine artery. It consequently reduces itself to the ligature of these vessels. This interference can only be of use in those very rare cases in which the new growth occupies the inferior segment of the uterus.

Intra-uterine scarification.—In cases of obstinate haemorrhage dependent upon an intra-uterine fibroma, Martin† says that he has derived much benefit from a method formerly employed by Simpson, viz., notching of the capsule by scarification of the projecting portion of the sub-mucous tumour. The divided vessels retract.

Surgical treatment of fibroids.—The operations applicable to fibroids of the uterus differ according as they are approachable per vias naturales, or only by laparotomy. The progress of operative gynaecology to-day allows of much less recourse to abdominal section than was formerly the case.

In this chapter I shall treat alone of those fibroids whose evolution forces them towards the vagina, and which can be approached through this canal.

A. Fibroids of the infra-vaginal cervix.—In the cervix it is not possible, from the thickness of the tissues, to distinguish fibromata into sub-mucous and interstitial. They are ordinarily detached with ease from the neighbouring tissue. Consequently, as Lisfranc did long ago,‡ and as all surgeons do following his example, we may endeavour to enucleate them by means of the finger and a spatula, after having removed the lower portion, and sufficiently diminished its size by ablation of a slice of the tissue, or of a conoid portion, so as to facilitate the manœuvre.

† A. Martin. Path. u. Ther. der Frauenkr., p. 273.
It is quite useless to complicate the operation by using the écraseur or the galvano-caustic snare for its piecemeal removal. The latter is dangerous for the neighbouring parts, and itself difficult to manage. It should not be used except in very exceptional cases. The écraseur, which many surgeons still recommend for the removal of fibroids through the vagina, has several defects, and some of them very serious ones. It easily breaks if the tissues are very resistant; it cuts them slowly and causes much loss of time, during which the uterus may be bleeding above the tumour; and lastly, it has a tendency to rise, to climb, so to speak, over the resistant tissues by a gradual movement which has occasionally caused opening of the peritoneum.* The least amount of blood is lost, I believe, by rapid cutting with the bistoury; but fibroids are not very vascular, and if some vessels bleed it would be easy to arrest the haemorrhage by placing some artery forceps upon them, or by using the thermo-cautery. If the tumour of the cervix, as in one of Schauta's cases, is prolonged above towards the uterus, one would abstain from going too high, but would remove all that portion which was easily accessible, and leave the base of the tumour in situ. It would doubtless, later, be forced forward by the uterine contractions, and could then be extirpated. If the case be one of a fibroid unprovided with a capsule, the tumour should be amputated as high up as possible, leaving two flaps that would afterwards be united.

When after enucleation a clean wound presents itself, the edges may be trimmed and sutured together. But if one have the least doubt whether primary union is possible, the remnants of the capsule should be simply resected, and the cavity stuffed with iodoform gauze.

B. Pediculated fibroids (of the body) or polypi.—When the polypus is within the uterus, a preliminary operation will be necessary to render it accessible. The procedure one would adopt by preference is bilateral incision of the cervix, which would be performed by means of cutting the tissue up to the vaginal reflexions with strong scissors. The supra-vaginal portion of the cervix is generally dilated from the pressure exerted by the polypus itself; otherwise laminaria tents would be used to soften it, followed by Hegar's bougies to procure

dilatation. Lastly, if necessary, the infra-vaginal cervix might be notched on both sides.

The removal of a polypus is, as a rule, extremely simple. The patient is placed in the dorso-sacral position; the vagina is dilated and kept on the stretch by retractors, the polypus being held by toothed forceps (figs. 144 and 145) is lowered as much as possible, while the hand applied above the pubis ascertains that the uterus is not inverted. The polypus is rotated on its own axis so as to twist the pedicle. After two or three turns have been given, a pair of strong scissors, curved on the flat, are inserted up to the insertion of the pedicle into the polypus, and the pedicle is gradually snipped through, torsion being continued
all the time. This latter has a double effect; it aids the detachment of the pedicle, and favours the arrest of hæmorrhage. The advice is generally given to divide the pedicle as high as possible. By taking the opposite course I think we are much more likely to place ourselves beyond the risk of secondary hæmorrhage, though I confess that that risk is a very problematical one. The divided pedicle retracts within the uterine cavity, and that portion which is not shed by reason of the torsion it has undergone, spreads out and is rapidly effaced.

All those methods of removal which are employed through fear of hæmorrhage ought to be resolutely abandoned. They have caused more deaths than they have saved patients; the galvano-caustic snare, the serre-nœud, the écraseur, the ligature, prolong and infinitely complicate an operation which ought to be rapidly

Fig. 145.—Collin's tumour forceps.
performed if it is to be without evil consequences. Long ago Dupuytren opposed the chimerical fear of haemorrhage, and recommended cutting instruments, and we must return to his mode of procedure. In those cases, which are undoubtedly very rare, where the pedicle contains large vessels,* they would be recognised by the finger, and before dividing the pedicle, long pressure forceps would be placed upon it, and left in position for several hours. If, however, bleeding occurred, hot water injec-

Fig. 146.—Forceps for the extraction of large polypi.
A, tumour-forceps with movable joint (Jeannel); B, serrated forceps.

tions, ergot, and, if necessary, antiseptic plugging of the uterine cavity would easily bring it to an end.

I have proposed* to qualify by the term “enormous” those polypi which, filling the whole cavity of the vagina, do not allow of the fingers reaching the pedicle, and which cannot ordinarily be brought through the vulva without special manoeuvres. Enormous polypi give rise to special operative indications. We cannot attempt to divide the pedicle without previously diminishing the size of the tumour. This result may be very simply arrived at by combining various methods that have in turn been recommended. What has been termed “operative elongation” (allongement opératoire) is obtained by making deep incisions in ladder fashion (en escalier) in the tumour, while at the same time it is drawn outwards (Simon).† The same object is attained by making spiral incisions (Hegar)‡ upon the shell of the tumour, which is its most resistant portion. Lastly, piecemeal removal by the ablation of slices or conoid fragments which progressively § excavates the tumour seems to be one of the best methods. It is much better to attack the tumour than to notch the fourchette, as Dupuytren recommended at first, and as has often been done even recently.‖ As soon as the tumour is sufficiently diminished in size it is seized by widely opening forceps (fig. 146). Compression yet further diminishes its size, and division of the pedicle is proceeded with by snipping with the scissors and simultaneous twisting. It is especially in the cases where the patient is enfeebled and cachectic to a considerable extent that it is of importance to resort to expeditious procedures, and not to prolong the anaesthesia and the operation.

After the removal of polypi, it is well to perform some days later at a separate operation a thorough curettage, followed by the use of caustics, so as to cure the metritis that is invariably present, and in addition to hasten the involution of the uterus, which, owing to the presence of the tumour, has increased in size.

* S. Pozzi. Rev. de chir., Feb., 1885, p. 113.
‡ Hegar and Kaltenbach (loc. cit.), French trans., p. 414.
**Sub-mucous fibroids.**—Clinically under this name must be included those fibromata which, although they are separated from the mucous membrane by a layer of muscle, are nevertheless much nearer to it than to the peritoneal surface, and make a definite prominence in the uterine cavity.

At certain times, as during menstruation and metrorrhagia accompanied by expulsive pains, the cervix may become more or less obliterated, and sufficiently patulous to allow of the finger's penetration up to the prominence formed by the tumour. Artificial dilatation, in the absence of this natural dilatation, allows of our determining these anatomical conditions. A pressing indication for active interference is the commencement of gangrene.

Looseness of connection between the walls of the uterus and the tumour contained within them, and the oft-repeated manifestation of attempts at spontaneous expulsion by the unaided efforts of nature, should induce the surgeon to attempt enucleation.

The idea of enucleation emanated from Velpeau,* but Amussat † was the first to perform this operation, and the enthusiasm which he threw into its defence has, in France, caused it to be called by his name. This bold but attractive operation was, after that time, several times repeated by L. Boyer, A. Bérard, Maisonneuve, Lisfranc, &c., and it had then in France a temporary period of popularity, but soon numerous fatal cases came to undeceive its supporters and cool their ardour. It ended by falling into discredit, and was no longer performed, but from time to time and in isolated cases. The criticisms offered by Jarjavay and Guyon‡ in their theses, had a large share in contributing to this result. But while the fortunes of enucleation fell in France, they rose abroad. In America Atlee§ introduced a method "of treating tumours heretofore considered beyond the resources of art." In England and

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† Amussat. Rev. méd., Aug., 1840, and Monograph on the pathological anatomy of interstitial fibroid tumours of the womb, and on the possibility of extirpating them when they are still contained within the walls of this organ. Paris, 1842.
§ W. L. Atlee. The surgical treatment of certain fibroid tumours of the uterus heretofore considered beyond the resources of art. Philadelphia, 1855.
Germany the operation was also customary, * though for a long time it found its principal supporters in America. † It had almost fallen into complete disuse in France, when my fellowship thesis seemed to attract to it some new attention, and brought about some further observations upon it. ‡ But the progress of laparotomy had, it must be confessed, almost exclusively directed the attention of most surgeons towards intraperitoneal operations (hysterectomy, ovariotomy), until the reaction in favour of operations per vaginam set in, and this was of late largely aided by the exertions of Péan § and his followers.

In Schröder's opinion the size of a tumour which would justify the operation of enucleation, reaches up to that of the head of a full-term foetus, and he says this operation should not be attempted unless the new growth has already, in its greater extent, descended into the vagina. Nevertheless, we shall see that piecemeal operations upon fibroids greatly extend the powers of the surgeon for extraction per vaginam; and, as a matter of fact, it is only in the case of very small fibroids that the typical operation of enucleation, unaccompanied by piecemeal extraction, can be performed.

Narrowness and rigidity of the vagina are a sufficient contra-indication in some cases; attempts should be made to overcome these conditions by preliminary plugging.

If spontaneous dilatation of the cervix be absent, a passage will be made by the use of laminaria tents and Hegar's bougies, and then the cervix is to be incised on both sides. Chrobak prefers many radiating incisions, and these he carefully stitches together after the operation. Further, if the tumour exceeds in size that of the closed fist, no attempt should be made to enucleate

it in its entirety, but preferably one would proceed to extract it piecemeal.

The operation varies considerably according to the volume, the consistency, and the connections of the fibroid. Before giving rules for the operation I again remark that it is very rarely now that enucleation is performed in the same manner as formerly, on account of the fact that greater fearlessness has familiarised most surgeons with piecemeal extraction.

The most convenient position seems to be the dorso-sacral, but some surgeons prefer Sims' position or the lateral decubitus. Anaesthesia is necessary. Two assistants support the legs of the patient, one lowers the uterus by pressing the abdomen above the pubes, the other takes charge of the continuous irrigation apparatus; both hold retractors of the vagina. It is advisable to have a third assistant to relieve the others, as this part of the work is particularly fatiguing.

When the cervix is not sufficiently dilated there should be no hesitation in incising it up to the vaginal reflexion, after having previously ligatured the inferior branches of the uterine artery. This forms a preliminary step.

If the tumour be small, and the cervix be not so thinned that it cannot be seized and held, a pair of fixation forceps on each lip will be of use by facilitating the lowering, and by giving a point d'appui for the manoeuvres necessary.

The first step consists in opening the capsule. The most prominent portion of the tumour is seized firmly with a pair of Museux's forceps, and if the nails are not able to effect it, an incision of as great an extent as possible is made at the point where the mucous coat is reflected back on to the uterus, by the knife or the scissors.

The second step consists in separating the connections of the tumour with the capsule by means of the fingers. In the majority of cases a spatula, mounted on a handle, is necessary. It should be blunt and slightly concave. I have
had one made for me which has been of great use; it has the shape and the bend of the handle of a large soup spoon (fig. 147). I prefer it to Sims' enucleator and G. Thomas's toothed spoon.

As the adhesions of the fibroid are broken down, it is drawn downwards by means of one or more of Museux's forceps; double toothed forceps may also be of use. In this way the fibroid is made to rotate on its axis; if necessary, the fibrous bands which will not yield to the enucleator may be cut with curved scissors.

The third step, or the accouchement of the tumour, is only troublesome when the tumour is of large size. Under those circumstances, piecemeal extraction and removal with small forceps may be necessary, as with enormous polypi. I have succeeded with forceps in delivering in one piece an intra-uterine fibroma larger than the fist, which I had to enucleate, not from its capsule, but from the uterine cavity itself, with which it had contracted adhesions. The case was a very curious one of a polypus appearing intermittently. It had not been removed after frequent migrations into the vagina, and finally receded into the uterus, where it became secondarily fixed.*

Frankenhauser has invented for the extraction of large tumours a special instrument resembling a cephalotribe; Martin, some articulated forceps; P. Segond, an instrument for scooping them out; C. Braun has used the cranioclast for crushing large tumours. But the list of instruments may be simplified by keeping to those I have mentioned.

When fatigue on the part of the surgeon, or exhaustion on the part of the patient, have interrupted the removal of the whole tumour, that part which has been left has often been seen to be eliminated spontaneously after a few days. On other occasions a second operation is more easily carried out on account of the infiltration of the capsule and the relaxation of the adhesions. This latter occurrence suggested to some operators the idea of an operation at several sittings (Matthews Duncan,† Marion Sims). But that is to transform a condition of necessity into a condition of choice, and, as a matter of fact, it is to lay the patient open to the danger of septicaemia, which has followed

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many cases treated in this way. There is another variety of the
operation at two sittings; instead of making two sittings of the
enucleation, at the first, following Atlee's example, a deep in-
cision of the capsule only is made. After waiting a few days,
and when it may be assumed that uterine contractions have
caused gaping of the incision, and a certain loosening of the
connections of the tumour, enucleation is proceeded with.
Vulliet has recently taken up and improved Atlee's method.
First he attempts, somewhat theoretically perhaps, to direct the
fibroid, as soon as it is recognised, towards the uterine cavity
rather than towards the abdominal cavity, by means of electricity
(galvanic current). After the fibroid has become sub-mucous, it
is treated by incision of the capsule; next, ergotine and elec-
tricity greatly facilitate spontaneous enucleation of the tumour,
which is further aided by the stimulus afforded by plugging the
uterine cavity with iodoform gauze, renewed every 48 hours.
The last interference has for its object the completion of the
spontaneous work of expulsion, by which the tumour is removed
sometimes en masse and sometimes in shreds.

The objections to this method are its extreme slowness, the
multiplicity of the manipulations to which it exposes the uterus,
and, lastly, the uselessness of so much delay when the tumour
has once become accessible to the operator.

If it is impossible to remove the whole tumour without using
a force that would be dangerous, the surgeon may resign himself
to leaving a portion in the uterus, provided that by a suitable
antiseptic treatment (iodoform tampons, carbolic intra-uterine
injections, &c.) the septicemia be guarded against, which
gangrene of the unremoved fragment might be quite likely to
produce. There is no cause for surprise if these incomplete
removals of fibroids were followed by disastrous results, when
antiseptic precautions were not taken, or were not sufficient.

* Atlee. Amer. Journ. of Med. Sciences, April, 1845, 2nd series, vol. 9, p. 309, and
† Vulliet. Contrib. to the study of intra-parietal fibromyomata (Arch. de Toc, 1885,
p. 336).
termination by gangrene of intra-uterine fibroids and the dangers of their partial
exirpation (Thesis, Paris, 1883, No. 77, containing an unpublished case of Dumont-
med. Woch., 1883, No. 20, p. 605.—Breisky. Zeitsch. f. Heilkunde, 1884, vol. 5,
p. 109
Although the termination of the case will always be very anxious in such cases one or other of the two following results may be hoped for, and of them several cases have been recorded: either spontaneous expulsion, in a shorter or longer time, of the remnants of the fibroid,* or retraction and atrophy of that smaller portion left within the uterus.†

After the enucleation of a tumour, we find ourselves in the presence of a cavity that is often of considerable size, is bleeding and traversed by loose shreds, and of a uterus that is in a state of more or less complete relaxation. The wound must be trimmed by removing all shreds of the mucous membrane, and of fibrous bands, and a subsequent warm antiseptic injection will be indispensable. It is better for this purpose to use a two per cent. solution of carbolic acid, rather than sublimate, on account of the large absorbent surface, which might permit of toxic symptoms from absorption. If the oozing of blood is of any extent, the injection should be raised to a temperature of 50° C. The uterine cavity may also then be plugged with iodoformed and resined gauze. Lastly, a hypodermic injection of ergotine, combined with kneading of the hypogastrum will bring about contraction of the uterus. An abdominal bandage, lightly fixed over thick layers of cotton-wool, must be applied, and the patient kept strictly to bed.

The principal accidents of enucleation are: haemorrhage, wounding of the uterine walls, inversion of the uterus, and, later, septicemia.

For the haemorrhage the best remedy is to terminate the operation rapidly; retraction of the uterine walls leads naturally to the arrest of bleeding. Under other circumstances the abdominal aorta should be compressed, and the uterus should be plugged.‡

Perforation is not very serious, unless it supervenes upon a septic inflammation of the cavity. If this latter condition be absent a plastic peritonitis soon closes the wound, as happens after vaginal hysterectomy.

Inversion may take place during the operation under the influence of excessive traction, and may even facilitate the surgeon's task, by rendering the tumour more easily accessible; but it is dangerous then to overlook it, as it may mislead the operator. After the operation, thinness of the shell has sometimes led to secondary inversion. Bischoff,* in such a case, obtained gradual reduction by plugging. Septicaemia, with its various local manifestations, metro-peritonitis, thrombosis, &c., is to be feared when a very large cavity exists from failure of retraction of the uterine walls. It is then best to give repeated injections and antiseptic dressings to the cavity of the uterus. In its interior a gutta-percha cross-tube may be left: it easily keeps in position without exerting any pressure (fig. 48). In those cases where the secretion is very abundant and foetid, the feeble current of continuous irrigation should be employed, or even the liquid may be injected drop by drop by using Schücking's ingenious apparatus, adapted to the outflow tube of a reservoir filled with an antiseptic solution (2 p. c. carbolic), and fastened into the intra-uterine cross-tube (fig. 52).

Danger of the operation.—As West† and Gillette‡ wisely remark, it is impossible to form a correct idea of the danger of enucleation by statistics compiled from all the known cases; partly because successful cases are far more likely to be published than failures, and partly because very dissimilar cases are brought into the number, e.g., complete or incomplete enucleations, at one or several sittings, performed for healthy or gangrenous tumours, treated antiseptically or not, &c.

Moreover, the word enucleation has not the same signification for all writers. To properly judge of this operation—as of all others—it should be possible to unite in one total, important series of the operation, each series of which should have been performed by surgeons of undoubted capability, and established

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by categories of homologous facts. But such data are unfortunately wanting, and we are obliged to be contented with dissimilar and more or less incomplete documents, gleaned from the medical journals. Thus in 1875* I collected 64 cases with 16 deaths, or 25 p. c. mortality. Gusserow † collected 154 operations performed from Amussat's time up to 1877, and these included 51 deaths, or 33 p. c. Lomer, ‡ who has restricted his inquiry to the period that may be called antiseptic (1873—1883) found 18 deaths in 112 cases, or 16 p. c. Lastly, by adding some recent cases to Lomer's table, Gusserow arrives at the number of 153 operations, with 23 deaths, or 15 p. c. Ascher.§ has only seen one death in 10 cases, or 10 p. c. Finally, Leopold|| has recently obtained 28 cures in 28 operations, and C. Braun‡‡ 15 cures in 15 cases. It can be seen what an enormous reduction in the fatality of the operation we owe to antiseptics.

A. Martin** gives the statistics of his own operations, and these are of exceptional value from the great dexterity of this surgeon, and the possibility he has had in his large practice of comparing this operation with those performed through the abdomen for the same condition. In 27 operations he had five deaths, of which two were from wounding of the peritoneum and peritonitis, two from septicæmia (before the introduction of antiseptics), one from collapse. Martin declares that he has quite renounced vaginal enucleation for fibroids of the body, even when they are half "accouched." He greatly prefers extraction through the abdominal walls, and he then performs from this side a true enucleation, which preserves the integrity of the uterus, as we shall see later on.††

I hold, with Martin, that the indications for enucleation per

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* S. Pozzi. The value of hysterotomy, &c., 1875, p. 131.
† Gusserow. Die Neubildungen des Uterus, 1885, p. 90.
‡‡ Egon Braun (son). Beiträge zur Lehre der Laparotomien, &c., Vienna, 1890, p. 12.
** Martin. Path. u. Therap. der Frauenkr., 1887, p. 270.
†† Martin (Ueber Myomoperationen in Centr. f. Gyn., 1890, p. 797) has not, however, quite abandoned enucleation, for he has recently published a series of 31 cases with 6 deaths.
vaginam have been wrongly stretched too far. Tumours reaching to the umbilicus ought rather to be removed by laparotomy. Nevertheless enucleation (alone or combined with piecemeal extraction) remains a valuable resource, and a relatively benign one, for fibroids of the cervix, and for those of the lower portion of the body of the uterus, not exceeding the size of a foetus's head, and having already induced some dilatation of the cervix.

Trans-vaginal enucleation.—It may happen that the myoma, springing from the supra-vaginal portion of the cervix, or from the posterior face of the uterus, projects behind the posterior vaginal wall, which then needs to be incised, so as to come straight down on the tumour to enucleate it. Often, also, though less frequently, the fibroma advances into the anterior cul-de-sac of the vagina; under these circumstances the most rational procedure is to freely incise the vagina before extirpating the tumour. It is easily understood that the operation is relatively simple when the operation is posteriorly for tumours exclusively developed in the pelvic connective tissue, and not covered by peritoneum. Czerny,* as well as Ljocis and Olshausen,† report several successful cases by this method. Le Fort‡ has related a curious case where the recto-vaginal wall was separated through its whole extent (simulating a rectocele) by a pediculated fibroid, which he enucleated through the perineum; the patient recovered. Marc Sée, on this occasion, cited a similar case, which, however, was not pediculated.

Eugène Bœckel,§ in a woman in whom the fibroid was most easily accessible through the vagina, incised this canal and the cervix behind, and in the median line, excised and enucleated the tumour, and obtained a recovery.

When the tumour is of very great size it is better to combine piecemeal extraction with the enucleation.

When the fibroid projects both towards the vagina and towards the peritoneal cavity, there is danger of opening the peritoneum, which greatly complicates the operation and makes it more serious. Several cases of death are known, due to the secondary

‡ L. Le Fort. Myoma of the cervix infiltrating the recto-vaginal partition (Bull. et mém. de la Soc. de chir., July, 1888, p. 577.
peritonitis,* but some most successful cases have also been placed on record.†

Piecemeal extraction, or vaginal myomotomy.—The difficulty of performing enucleation when the tumour is of considerable size or has close connections with the uterine tissues on the one hand, the severity of opening the abdomen, compared with an operation through the vagina on the other hand, have led some bold surgeons to undertake the removal of large tumours in successive portions per vaginam, and through a cervix largely effaced, either by natural dilatation or by incision.

Emmet,‡ in America, has designed—under the name of extraction of fibroids by traction—a procedure that he has practised since 1874, and which he unfortunately describes in a somewhat diffuse manner. His object, he says, is to cause the tumour to become pediculated by traction, after which he removes it by a mixed process of enucleation and piecemeal extraction. But he describes his method in so incomplete a fashion that the reader cannot form a very exact idea of how he proceeds. The isolated facts of Czerny and other German surgeons have been put together in no more satisfactory manner. On the contrary, exactness cannot be denied to the method that Péan has made known, even to its smallest details, by a series of publications§ that have been well summarised by Séchéyron, first in his thesis and later in his book. The dominant idea of this method consists in employing piecemeal extraction at the outset, as the initial step, and not as an adjuvant to enucleation. Instead of attacking the tumour at the periphery, this surgeon enters immediately into the centre of the fibroid, and only comes to the fibrous shell when the whole of the tumour has been already removed. This method comprises, in addition, a pre-

‡ Emmet. The principles and practice of Gynaecology, 3rd edit., London, 1885, p. 587 and foll. See in particular case 64 and figs. 110 and 111.
§ Péan. Surgical intervention in small ovarian and uterine tumours (Gaz. des hôp., 1883, p. 686).—Piecemeal extraction applied to complete removal of the uterus in certain cases of fibroid or cancerous tumour (ibid., 1886, p. 66).—Removal of fibroid tumours or myomata of the uterus per vaginam (ibid., 1886, p. 250).—Piecemeal removal, &c. (ibid., March 5 and 28, and April 11, 1889, pp. 246, 341, and 395).—Séchéyron. Vaginal hysterotomy. Consideration of the surgical treatment of fibroids and cysts of the uterus per vaginam (Thesis, Paris, 1888), and Treatise on Vaginal Hysterectomy, Paris, 1889.
liminary operation, special in itself, of liberation, division, and even excision of the cervix, so as to give free access to the fibroid.

The cases to which this surgeon has applied piecemeal extraction per vaginam, comprise not only sub-mucous tumours of the size of a child’s or an adult’s head, but also cases of interstitial and sub-peritoneal tumours, and these infallibly entail opening of the peritoneum. Moreover, in these cases, Péan has often been obliged to terminate the operation by total ablation of the uterus, either through the vagina or through the abdominal wall.* Perhaps that is carrying the method to a dangerous and extreme point. It seems to me that the weak point in this operation lies in the difficulty of determining the limits beyond which it may not pass, and in the possibility of its forcing the surgeon to perform hysterectomy, after he has already had a laborious operation.

The operation is divided into several parts: 1. Liberation of the cervix from the vaginal reflexions; 2. Section of the cervix and of the segment of the uterus, up to the level of the tumour; 3. Division of the tumour into portions, followed or not by its partial enucleation; 4. Excision or suture of the lips of the cervix.

For this operation Péan uses quite a series of straight and curved forceps, with long or broad blades, toothed or plain, with or without points, round or square, designed for the breaking up of the tumour (figs. 149 and 150). Moreover, the surgeon must have at hand a good supply of ordinary, long-handled, forcipressure forceps.

The preliminary arrangements are the same as hold for any gynaecological operation.

The patient is placed in the left lateral position, with the left leg extended and the right flexed and supported by an assistant, who should be seated. Besides the two other assistants placed on the right and the left of the operator, a fourth mounted on a stool, and placed somewhat further away, could be very useful in holding retractors.

First stage. Liberation of the cervix.†—Two or three coulé

* Sécheyron. Loc. cit., pp. 76 and 77.
† The description of the operation is borrowed almost word for word from Sécheyron.
retractors held by two assistants expose the cervix at the bottom of the vagina; the cervix is seized, fixed by a strong pair of Museux’s forceps; a circular incision is made at the level of the vaginal insertions with a knife; artery forceps, as necessary, are placed on the bleeding points of the vaginal surface. This is the time during the operation that artery forceps are most necessary, for before proceeding complete arrest of haemorrhage must be obtained. Separation of the cervix from the surrounding tissues is carried out sufficiently high. The cervix is nearly freed by the knife, and especially in front, so as to avoid injury to either the bladder or the ureters, and thus is made extremely mobile and as free as the clapper of a bell.

At this stage of the operation some care must be taken not to wound the peritoneum. This accident, however, is not of the importance that might be supposed. In some cases even, according to Péan, it is necessary to make this perforation so as to reach a fibroid projecting into the culs-de-sac.

Second stage. Incision of the cervix and of the lower segment of the uterus up to the fibroid.—Long straight scissors with blunt ends are introduced, open, into the cervical canal, and a clean bilateral section is made so as to convert the cervix into two flaps, one anterior and the other posterior. A pair of Museux’s forceps is placed on each of these flaps. The finger introduced into the vagina and the uterine cavity makes out the exact seat of the tumour, and the spot where it will be most easily accessible. It is distinguished from the uterine walls by its whiter and less violet appearance, and especially by its greater firmness. During this exploration it is easy to be assisted by traction upon, and consequent lowering of the uterus.

Third stage. Breaking up (morcellement) of the tumour.—The tumour projects towards the cavity of the uterus, towards the peritoneum, or directly towards the vagina. It is drawn down by firm traction with Museux’s forceps, or with long forceps provided with toothed blades, flat and fenestrated, or furnished with points (figs. 149 and 150). With these forceps the tumour is not torn so readily, as they give a firmer grasp. Bent retractors, large ones introduced into the vagina and small ones into the uterus, expose the field of operation as much as possible. These retractors not only serve to give light, but are at the same time a valuable means of arresting haemorrhage, by the pressure and
traction they exert. If necessary, an electric lamp may be used, and throws a bright light upon the field of operation.

The fibrous tumour is disclosed to view or felt by the finger; it is seized with forceps and strongly drawn downwards. At first it may be grasped, in part, by a pair of strong toothed forceps; a deep incision is made at right angles with the chief axis of the tumour; both of the lips of the section, or at least one of them, is seized as high as possible with strong toothed or pointed forceps, and the portion below the forceps is excised. Before removing the first pair of forceps, a second pair is passed above them, thus a new portion of the fibroid is enclosed, and that piece of the tumour below the highest pair of forceps is removed by the scissors or the knife. Thus, with the assistance of forceps, bistoury, and scissors, a portion of the tumour is removed piece by piece (fig. 148).

The knives that Péan uses are very strong, and of a particular
shape, resembling small finger amputation knives, straight or curved on the flat, and long handled, more than ordinary bistouries.

Very often the operation is simplified—the tumour does not bleed; also the use of forceps may be limited to seizing and lowering portions of the tumour. Scissors or knife are used to cut through the fibroid at the upper end of the fragment thus seized. Removal goes on alternately of one or the other portion of the tumour. In proportion as the operation progresses, the traction exerted by the forceps with large flat blades, each time

Fig 149.—Toothed cyst forceps, capable of being used in the piecemeal extraction of fibroids.

A, tooth forceps with square fenestrated blades; B, toothed forceps with round fenestrated blades (Nelaton's forceps); C, toothed and fenestrated forceps; D, forceps with oval blades.
a fresh piece is laid hold of, allows of the removal of a larger piece, which are sometimes of the size of a walnut or an apple. Removal of some myomata is very simple, each traction allowing of the removal of a large fragment of hard and absolutely bloodless tissue. The operation would be a "white" one, had not the surgeon been obliged to free and divide the cervix uteri. Four or five curved forceps, introduced and drawn out without ceasing, thus allow of the removal of successive fragments, whose sum total may exceed that of the two fists. The operation often lasts for an hour.

When the lower parts of the tumour have been removed, it is sometimes possible, by traction combined with rotatory move-
ments, to obtain the spontaneous shelling out of the upper portion of the tumour. If this occur, the time occupied by the operation is considerably shortened. A few efforts then will remove the last portions forming the cap of the tumour. The volume of this mass enucleated by simple traction may exceed that of the mass previously removed.

According to Péan, piecemeal removal, combined with enucleation, allows of the ablation of tumours whose total size reaches and even surpasses that of a full-time foetus. When the fibroid is as large as that, almost always the inter-muscular space in which it was contained remains widely open, communicates with the interior of the uterus, and with the peritoneal cavity, and bleeds so freely that it is advisable to place forceps upon the chief bleeding points. This stage of the operation, under these circumstances, necessitates dissecting out the whole lower portion of the uterus, so as to make it freely movable, and to draw it down towards the vulva. To facilitate this, Péan, if necessary, excises the two lips of the cervix, and sutures them afterwards to the edges of the wound made in the mucous membrane of the vagina culs-de-sac. For these sutures he uses metal wire. As to the communication that exists with the peritoneal cavity, Péan leaves it untouched if it is not too much bruised, even to drawing it together by means of a few interrupted sutures.*

It is very easy to ascertain if the myoma has been completely removed; the last portions extracted by traction and enucleation present a convex surface, and one that is smooth, redder, and covered with small cellular remnants. This step in the operation is not ended until the surgeon has ascertained with his finger the condition of the neighbouring uterine tissue. If he recognise a second fibroid in the neighbourhood of the first, he should immediately proceed to extract it. If necessary, he will divide the uterine wall until the tumour becomes accessible. It then must be firmly seized, and with forceps and scissors its piecemeal removal brought about. The operator may thus find himself under the necessity of removing a number of small fibromata from the uterine parenchyma.

Recourse to total hysterectomy will be indicated if the injury

thus produced is very considerable, and, in fact, the surgeon should always be prepared to perform the major operation. Piecemeal extraction at one sitting is greatly to be preferred to several successive sittings.

Fourth stage. Toilette of the uterus; suture of the cervix.—As soon as the tumour is removed, there is seen a large pocket that freely communicates with the uterine cavity. Artery forceps with long handles seize the bleeding points, and are left in situ to the number of 12, 15, or even 20. These forceps can only be placed in position by the aid of sight. During the whole operation small pieces of sponge on holders are used by Péan for wiping the uterine walls, and disclosing bleeding points. I replace the sponges by tampons of absorbent wool. This last part of the operation constitutes the toilette of the field of operation, and must be carried out with great care. The smallest clots must be removed. Between the forceps left in situ, to a varying number according to the exigencies of the haemorrhage (10 to 15), it is well to place tampons of iodoform gauze, but before their application the uterine cavity should thoroughly be irrigated with some warm antiseptic lotion. The forceps can be removed 36 to 48 hours after the operation. In cases where the tumour is small, and the cavity left after its removal is of no great extent, the operation may be ended by suturing the divided lips of the cervix. Small doses of ergot should be administered to the patient for the first few days after the operation.

It is difficult to pronounce any opinion on the danger of piecemeal removal by this method. Péan has not published the full statistics of his cases. Terrillon,* on five operations, had five cures, and Bouilly four successful cases out of five operations. In the single case where I have performed it I also obtained a cure. It seems to me certain that this bold method will yield excellent results whenever the tumour, even though of very large size, is sub-mucous or purely interstitial, and provided with a capsule that allows of the operation being terminated by a true enucleation. But if one attack, at the outset, or secondarily, a tumour that is either sub-peritoneal or intimately bound up with the uterine parenchyma, so that there is no line of demarcation

between the pathological and the normal tissues, it is clear that the operation becomes very serious, and almost infallibly leads to the performance of a vaginal hysterec-tomy, and that too under bad conditions. No doubt, in a very bold operation, Mikulicz,* after having inverted the uterus for the purpose, resected a portion of the uterine wall to remove a tumour of this kind, and then sutured the peritoneal wound of 10 cm. in length with cat-gut, and lastly returned the uterus to the bottom of the vagina; but though the patient recovered, one would hardly wish to make such an extremely bold surgical operation an ordinary rule.

It is not sufficient recommendation for an operation, that it is possible, or even that it has yielded some brilliant results. It is chiefly necessary, in addition, to determine that it is preferable to other operations that could be performed in the same cases, that is to say, that it is less dangerous.

Now, in the absence of comparable statistics, it does not seem, à priori, probable that piecemeal removal of very large myomata per vaginam is simpler and less dangerous than abdominal hysterectomy, or intra-abdominal enucleation (Martin). One might almost say that the bias and habit of mind of the surgeon very often play the principal part in deciding which operation it shall be.†

Vaginal hysterectomy.—Total removal of the uterus for fibromata has been recommended under two different circumstances. 1. In the case of small simple or multiple tumours giving rise to serious accidents; 2. In the case of large tumours, when at the end of a piecemeal operation the surgeon finds himself absolutely obliged to remove a portion of the uterine wall. Under these latter conditions it is an operation of necessity, and upon this I have no reason to dilate. But in the case of small tumours, on the contrary, the operation of hysterectomy by choice only reckons as yet a few supporters, and the majority of surgeons prefer to it, rightly I believe, an operation that is less serious, viz., ovariotomy. It seems that here also individual tendencies are of paramount importance. Thus Péan, for example, seems

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† I need no other proof of this than the comparison of the two figures given by Hofmeier in the Grundriss der gynäkol. Operat., figs. 105 and 106, which are so similar from the point of view of the connections of the tumour, and which represent, the first, a fibroid removed per vaginam (Hofmeier); the second, a fibroid removed through the abdomen (Schröder); recovery in both cases.
to perform vaginal hysterectomy, or what he calls uterine castration, for the same cases in which another would perform abdominal hysterectomy, and yet another, ovarian castration. As a matter of fact, each one of these operations has a particularly good chance of success in the sole cases where any real hesitation between them could occur, that is to say, in the case of small multiple fibrous tumours giving rise to secondary symptoms.

Colpo-hysterectomy for fibromata was first methodically described by Kottmann, * but it was Péan † who first systematically performed it in France. Démons ‡ has also spoken favourably of the operation.

Successful cases have been published by Sänger, Mandach, Leopold, Richelot, Terrier, and Spaeth.§ According to Gavilan, of fourteen cases of vaginal hysterectomy for fibroids, only two cases ended fatally, or 14·28 per cent. Leopold, in 21 operations, only saw three deaths, or 14·3 per cent. Martin∥ has been less fortunate; in 9 operations he had 2 deaths, or 22 per cent.

The method of performing the operation is that which I shall describe later for vaginal hysterectomy in cancer. It need only be remarked here that piecemeal removal presents no danger of infecting the wound, the new growth (with the exception of when it is suppurating or gangrenous) not being septic. Consequently, great advantage has been derived from section or piecemeal removal of the uterus in facilitating its extraction. Recourse has also been had either to preliminary dilatation of the vagina and vulva (Péan), or to incisions of these parts (Mikulicz, Leopold), which, at the end of the operation, must be restored with care. I note the absolute necessity of performing a complete hysterectomy without leaving in the abdomen any portion of uterine tissue adherent to the broad ligament. Decomposition

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of such a remnant brought about death by septic peritonitis in one of Terrier's cases.*

This method of treating fibroids seems to me applicable only to cases in which the uterus, relatively of small size, but compressing important organs, may be extracted without great force, and without any long-continued breaking up by the vagina, ligature of the broad ligaments being at the same time easy. It is only under these conditions that the operation is benign, and may be substituted for abdominal hysterectomy. To make matters more definite, I shall recommend vaginal hysterectomy in the cases in which the uterus does not notably exceed the size of the fist, and under the following circumstances: 1. Hæmorrhage threatening to become rapidly fatal if the source be not immediately removed; 2. Serious compression (ureter, bladder, nerves, rectum) exerted by a small pelvic fibroid, on the development of which the indirect action of ovariotomy would be long in becoming established, and possibly might be insufficient. In all other cases, if the tumour cannot be enucleated by the vagina or by the abdomen, the uterus being preserved, I should prefer ovariotomy for hæmorrhagic symptoms and abdominal hysterectomy when the volume and the connections of the tumour call for extirpation of the organ. In spite of the undeniable dangers of laparotomy, a simple abdominal hysterectomy will always be less serious than a very laborious vaginal hysterectomy.†

Destruction of fibroids per vaginam.—I unite under this name various operations that do not come into the preceding classes, and which ought at least to be mentioned, even though it may be only from an historical point of view.

Partial destruction by laceration.—Baker Brown; has proposed to provoke the natural process by which the cure of fibroids is sometimes brought about, viz., gangrene and consecutive elimination. This is the method he followed: incision of the capsule; introduction into the middle of the fibroid a pair of special scissors, cutting by their external borders, and laceration

* Gavilan. Loc. cit., p. 44.
† Removal through the pelvis after resection of the sacrum seems likely to be of great service in many cases of pelvic fibroids for which hitherto vaginal or abdominal hysterectomy has been performed. For the method of this operation I refer the reader to the chapter on the treatment of cancer of the uterus, for which especially it has been adopted.
of the morbid mass. On other occasions, removal of a conoid fragment or perforation of the tumour with a kind of trephine.

*Partial destruction by cauterisation.*—Greenhalgh,* with the same object in view, incised the capsule with the actual cautery, and once suppuration was established, removed portions by the hand. In the case of retro-vaginal tumours, he perforated on several occasions with the actual cautery the most prominent points of the tumour through the vaginal wall. In two cases out of three, death supervened from peritonitis. The same objections may be made to the course that Koeberlé† adopted for fibromata, which seemed to him inaccessible by the supra-pubic operation. Having dilated the cervix, he made, in a case of this kind, a series of parallel incisions in the tumour in which he introduced a sufficient quantity of iron perchloride to determine the mortification of the interposed layers.

† Koeberlé. Gaz. méd. de Strasbourg, 1875, No. 6, p. 72.
CHAPTER IV.

TREATMENT OF FIBROIDS OF ABDOMINAL EVOLUTION.—MYOMECTOMY AND HYSERECTOMY.


Hysterectomy, or the removal through the abdominal wall of fibroids projecting into this cavity, is a daughter of ovariotomy. At its commencement this operation was not premeditated, but it was the product of errors in diagnosis. After having opened the belly to remove a presumed ovarian tumour, surgeons sometimes found themselves in the presence of fibroids of the uterus. The first who made this mistake shrank from the dangers of an unknown operation: they hastened to close up the belly again without proceeding further. Such were the cases of Lizars in 1825, of Dieffenbach in 1826, and more recently those of Atlee (1849-51), Baker-Brown, Cutter, Deane, Mussey, and Smith. About this period fourteen cases of this kind were published, and of these five ended fatally.* Some surgeons went so far as to extirpate pediculated sub-serous fibroids. Granville in 1837 had one such unsuccessful case; in 1844, Atlee and Lane suc-

ceed. Clay and Heath in 1843, then Burnham in 1853, undertook the first partial amputations of the uterus. G. Kimball* was the first surgeon who deliberately performed hysterotomy for an interstitial fibroid, giving rise to violent haemorrhage. The patient recovered. Koeberlé† was only the second, but the exact determination of the diagnosis, the well-reasoned choice of a method of operating, the absolute novelty of the subject in Europe, give an exceptional value to his case. It was the work that he published on this occasion that really placed hysterotomy on a firm footing.

Koeberlé was the initiator of the ligature of the pedicle with a metallic loop and a serre-nœud, and this formed a considerable progress over ligature en masse with threads, which had hitherto been the custom, and which especially exposed the patient to the danger of haemorrhage. The first stage was thus passed. From this time isolated facts were multiplied. Even in 1866, Cater- nault, a pupil of Koeberlé, published 42 cases of amputation of the womb, and 20 cases of laparotomy with extirpation of pediculated tumours. Many surgeons, instead of the serre-nœud, used then the écraseur and the clamp, a kind of vice that was left in situ on the pedicle; but this method was far inferior to Koeberlé's serre-nœud. The eminent Strasburg had scarcely made known his operations when Péan‡ threw his energies into the same direction with rare good fortune. The successes he obtained were spoken of on all hands; they were obtained at Paris, a place that was reputed unhealthy and unfit for large abdominal operations, and where ovariotomy itself still seemed a very hazardous undertaking. The presentation of a patient who had recovered, at the Academy of Medicine (August, 1870), followed three years later by an important work§ in which the rules of the improved operation were laid down with a precision hitherto unknown, have resulted in uniting indissolubly the

† Koeberlé. The history of sub-pubic extirpation of fibroid tumours of the uterus (Gaz. méd. de Strasbourg, 1864, Nos. 2 and foll.). Koeberlé's first hysterectomy was performed Dec. 19, 1855.
‡ Péan. Union méd., Dec. 1869, 3rd Series, vol. 8, p. 874, &c. When Péan was performing his first hysterectomy (fibro-cystic tumour, complete extirpation of the uterus and ovaries) Koeberlé had already operated nine times with four recoveries.
name of Péan with that of hysterotomy with extra-peritoneal treatment of the pedicle. The method consisted especially in the constant use of forcipressure (used at this time to the same extent by Koeberlé alone), in the breaking up of large tumours after ligature with wire, so as not to increase the size of the necessary abdominal incision, and in the fixation, outside, of the pedicle traversed by needles and surrounded by a loop of iron wire tightened by means of Cintrat’s ingenious serre-nœud. This method, the general lines of which still exist in spite of later improvements, was long adopted by all surgeons in France and elsewhere. It is, therefore, to two French surgeons, Koeberlé and Péan, that the merit belongs of having established this operation on a scientific basis.* After this first step in the progress of abdominal hysterotomy, marked by the adoption of metallic means of compression of the pedicle (serre-nœud or clamp), a step that was also very strongly opposed,† it is agreed to recognise a second. This step is characterised by the application of antiseptic methods to this operation, like all others in surgery.

Lastly, a third phase has been inaugurated by improvements in methods, and in particular by the introduction of the elastic ligature for temporary or definitive arrest of hemorrhage;‡ the

* Hegar and Kaltenbach, loc. cit., French trans., p. 345. Hegar is wrong in not mentioning Koeberlé’s right to the legitimate praise he yields to Péan. Zweifel (loc. cit., pp. 8-10) is not guilty of the same injustice.
† Abdominal hysterotomy was formally condemned by the Academy of Medicine of Paris, after a report made by Demarquay upon the work of Koeberlé and Péan.—Professor Richet alone expressed a reserved opinion (Bull. de l’Acad. de méd., 1872, pp. 1062-1075). Vide also Boinet. Laparotomy in cases of uterine fibroid tumours, &c. (Gaz. heb., 1873, p. 117).—In 1875, the Fellowship committee, presided over by Professor Richet, gave, amongst the subjects for theses the following which fell to my share, “On the value of hysterotomy in the treatment of fibroids of the uterus.” At the head of my conclusions I felt justified in placing the following: “Abdominal hysterotomy is an operation which, although very serious, is perfectly justifiable in certain cases, and is worthy of a definite place in surgery,” a statement that seemed very bold at the time it was enunciated (1875).
‡ The first operation in which the elastic ligature was used was performed by B. G. Kleberg, of Odessa, July 6th, 1870 (St. Petersburg, med. Woch., Sept. 24th and Oct. 6th, 1877, p. 333).—Martin, in a systematic manner, recommended the use of the temporary elastic ligature in 1878, at the congress of German scientists and medical men at Cassel.—Hegar afterwards applied it for the permanent ligature of the pedicle (Dorff. Centr. f. Gyn., 1880, p. 265).—I introduced it in France at the Surgical Society of Paris (Nov. 28th, 1883).

Schroeder first described his method of treating the pedicle at the Cassel Congress in 1878, and the following year, at the Baden-Baden Congress (Arch. f. Gyn., 1880, vol. 13, p. 271), and afterwards his definite procedure was fully described at the
most salient features of this period are, firstly, the struggle between intra- and extra-peritoneal treatment of the pedicle; and secondly, the introduction of ovariotomy that was substituted for hysterotomy in a large number of cases.

Signification.—It is necessary at the very beginning to thoroughly understand the meaning of the words. The term “hysterotomy,” which etymologically signifies section of the uterus, is essentially comprehensive; with the qualification “abdominal,” it may be applied to any operation whatsoever in which the uterine tissue is cut, after opening the belly. Another epithet may still further define the operation; thus “supra-vaginal” hysterotomy means section and ablation of the uterus above the vagina. Tillaux, in a communication to the Academy in 1879, proposed the use of the word “hysterectomy,” which implies the idea of removal for cases in which a part or the whole of the organ was removed. This term, which is more exact, has rapidly gained ground, although the old expression is still often met with in writers. The Germans use the word “myomotomy” or “myomectomy” to designate removal of fibroids when the uterus is left. Consequently the term to them includes both hysterotomy for pediculated fibroids and partial hysterectomy for interstitial fibroids. Lastly, under the name “enucleation” (intra-peritoneal) is designated a simple incision into the uterine walls allowing of the removal of the tumour, but preserving the whole of the organ.

Thus, the terms myomotomy and myomectomy, which are almost interchangeable, mean at the same time what is called in France “partial hysterectomy” and “removal of pediculated fibroids.” Here the terms will be reserved for the latter. The French “hystérectomie sus-vaginale” is generally denominated abroad “amputatio uteri supra-vaginalis”; it is unnecessary to mention that “complete removal” signifies extirpation of the entire organ, including the cervix.

General indications for abdominal hysterectomy.—We shall see

Salzburg Congress in 1881 (Arch. f. Gyn., 1881, vol. 17, p. 478).—Spencer Wells, working quite independently and not in any way inspired by Schröder’s work, arrived simultaneously at similar results. At the 48th Congress of the Brit. Assoc. at Cambridge (B. M. J., 1880, vol. 2, p. 873) the described the method he had employed since 1878 on the analogy of the treatment of ovarian pedicles—viz., ligature in mass or in several parts, apposition of the peritoneum over the surface of the stump. He did not stitch the uterine mucous membrane.
later on that the possibility of sometimes substituting for this operation, which is always serious, another operation which is less serious (ovariotomy), restricts in some definite circumstances the field of action of hysterectomy. Nevertheless the indications for abdominal hysterectomy may be thus formulated: rapid growth and "galloping progress" of the tumour; serious haemorrhage not yielding to any palliative measures; ascites produced by the irritation of a very movable fibroid; compression of the pelvic or abdominal viscera; large size of the tumour, and in particular its cystic, oedematous, or suppurative degeneration; symptomatic prolapse of the uterus; and pregnancy, when the fibroid must clearly be a serious cause of dystocia (I shall return to this subject in a special chapter, quod vide).

From an operative point of view (through the abdomen) the following classification may be drawn up:—

I. Pediculated fibroids.

II. Fibroids with one (or one chief) nucleus—enucleable.

III. Fibroids with several nuclei.

IV. Intra-ligamentous and pelvic fibroids.

For the first class, removal of the tumour is extremely simple, and scarcely differs from ovariotomy—it alone should be exclusively termed "myomectomy."

For the second and third classes, as a rule, the operation would be "partial hysterectomy," or "supra-vaginal hysterectomy," according to the arrangement of the tumours. In certain particular cases "intra-peritoneal enucleation" might be possible.

For the fourth class, the operation should consist in shelling the tumour out from between the layers of the broad ligament, when ovariotomy is not resorted to as a palliative operation.

Lastly, total extirpation through the abdominal walls has been performed for some multiple myomata, penetrating right into the cervix with so much hypertrophy of the tissues that preservation of the stump was impossible.

Before passing in review these various operations and their modifications, I shall say a few words upon one operative manoeuvre that is applicable to all of them, and which has completely changed the technical conditions of abdominal surgery since its introduction.

Preventive haemostasis during hysterotomy.—Whatever be the
nature of the operation practised upon the uterus inside the abdominal cavity, it is extremely advantageous to be able to perform it without any loss of blood—immediate, at all events. With this object, older operators often used constriction by means of the écraseur. Billroth invented an enormous pair of forceps (fig. 44,1), which cannot be of use in all cases. A valuable means of preventive hæmostasis is the temporary elastic ligature, which must not be confounded with the definitive elastic ligature, of which we shall have to speak later. It was Kleberg* of Odessa who first took advantage, when tying the uterine pedicle, of the elasticity of india-rubber, and of its property of assuring a constant amount of constriction. He used it instead of the metallic wire that Koeberlé and Péan used; he afterwards left the elastic tubes on the stump, and his patient recovered. He cannot be refused the credit of having invented the elastic ligature for arrest of hæmorrhage during and after operation. Nevertheless it is only right to recognise that just as it was Hegar who brought the definitive elastic ligature into general use, so it was Martin† who first systematised Kleberg’s method and made its use general, so that it fills in uterine surgery the part that in general surgery is taken by Esmarch’s tourniquet.

In Germany they generally use thick india-rubber tubes, of which the lumen is about 5 mm. in diameter. I prefer simple cords of 5 mm. in diameter, which have generally been adopted in France since the communication by which I introduced their use into that country.‡ It is easier to make certain of their asepsis, and volume for volume they are more resistant. For preventive hæmostasis the elastic cord must be applied by drawing its ends fully apart, and then making two turns around the part that is to be constricted. Afterwards a strong pair of catch forceps is placed on the two crossed ends of the ligature. Hegar has constructed some forceps with short bent blades that are fairly convenient. I have myself invented an elastic constrictor which is useful when one is obliged to operate in a limited space, and which is much less cumbersome than forceps.

† A. Martin. Naturforschersammlung in Cassel, 1878.
Various surgeons, mistaking the real object of this instrument, have had similar ones constructed, which they designed for permanent ligature. Now permanent ligature is never better obtained than by the use of a double thread of silk. My instrument should never be any but an agent for obtaining temporary constriction.*

I. Pediculated fibroids. Myomectomy.—In the first place an elastic ligature, for the purpose of temporary arrest of haemorrhage, is placed on the uterus as low as possible by depressing the broad ligaments. Then if the pedicle is thin, it is sufficient to pass a needle, armed with a thread of double silk, through it, the two ends of which should be tied with either a Bantock or a Lawson Tait knot (fig. 31, 5, 6). If the surgeon be not familiar with this special knot, the loop will simply be cut, and knots will be tied on the right and on the left after having crossed the ends by a half turn (fig. 31, 3, 4). The thread must always be passed twice to make the surgical knot (fig. 31, 2).

If the pedicle is thick it will be well to seize it in the large clamp-forceps of Billroth (fig. 44, 1) and to compress it very energetically while the fibroid is cut a finger’s breadth above it, taking care at this level to preserve a kind of collarette of peritoneum and of the cortical substance of the tumour. The clamp is then removed, and in the furrow that it has left upon the pedicle is placed a series of silk stitches. The excess of the tissue preserved above the compressed spot is removed, only keeping enough to perfectly cover the wound, which is brought into apposition with previously passed, deep, and a few superficial stitches. The temporary elastic ligature is removed, and if blood oozes through the stitches, a few deep stitches are inserted. If when the tissues were cut, it was possible to see the lumen of some vessels, they, of course, would be separately tied.

It is only after the surgeon has thoroughly satisfied himself that all oozing of blood has ceased that he returns the pedicle into the belly. If he still have some fear with regard to the arrest of the haemorrhage, he would employ Wölffler-Hacker’s method (described below), which allows of the plugging of the stump.

The surgeon may, especially in the case of pediculated fibroids, find himself in the presence of considerable adhesion to the intestine, these adhesions forming secondary vascular roots, which

* For the method vide p. 68 and figs. 36 and 42.
are more important than the primary root, viz., the one contained in the pedicle. To detach these adhesions when they are very close, the procedure recommended by Schröder should be adopted: the superficial or peritoneal surface of the fibroid should be left adherent to the intestine, and then at this spot one or more catgut sutures should be passed so as to thoroughly appose the two ends of this bleeding surface (fig. 151).

II. Fibroids with one (or one chief) nucleus, encapsulated. Intra-peritoneal enucleation.—Such cases as these are relatively rare, for generally the fibroids are multiple, destroying the shape of some part of the uterus, which is riddled and stuffed with fibroid growth (figs. 131 and 132).

Enucleation of these numerous foci, and isolated treatment of each pocket that was left by their removal, would be impossible. But the case is different when the tumour is single, whether it be formed by a simple or an agglomerated mass, whether it be interstitial or sub-mucous. Then, the project of removal by enucleation has been conceived and been carried out, the integrity of the uterus and its appendages being respected, and no interruption being made in the generative life of the woman. This consideration is not of great importance unless the patient be far removed from the menopause, and therefore it will only rarely come into play. As a rule, therefore, enucleation must only be considered as a simplification of the operation, applicable to some definite cases.
Spiegelberg* seems to have been the first to use it. Spencer Wells† also has long practised it; but A. Martin‡ is the chief authority to recommend it, and he has laid down definite rules for its performance.

The surgeon begins by drawing the uterus out of the abdomen and placing it upon a bed of compress-sponges; around the cervix is placed an elastic cord, whose two crossed ends are held by a pair of catch forceps, or by Pozzi’s "ligateur." Having thus ensured a bloodless operation, the uterus is incised over the prominence of the fibroid, and the tumour is enucleated, while care is taken not to penetrate, if possible, into the uterine cavity.

As this procedure has often been adopted for sub-mucous fibroids (that other surgeons attack from choice through the vagina) the uterine cavity has often been opened (10 times out of

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† Spencer Wells, cited by Zweifel. Die Stielbehandlung bei Myomectomie, p. 82.
16, Martin); in these cases Martin closes the mucous membrane by a continuous catgut suture.

The wound in the uterine wall is closed by a series of deep sutures, passing beneath the whole extent of the wound (fig. 152). In passing I may add that Martin uses for these sutures, catgut prepared with essence of juniper, which he has substituted for the carbolised silk that he used at the commencement.

When the cavity resulting from enucleation seems too large, Martin inserts into it a drainage tube with a cross-piece, the end of which he passes through the cervix into the vagina. Freud,* in a beautiful case, followed by a recovery, which is all the more remarkable as the fibroid was inflamed, replaced the india-rubber drainage tube by a strip of iodoformed gauze, and then plugged the uterine cavity with iodoformed gauze. The cavity resulting from enucleation may also be made smaller by resecting portions of its walls.

Martin, on one occasion, removed the two ovaries, which had undergone morbid changes, and on another occasion, a single ovary; he advises the performance of castration in those cases in which the presence of another inaccessible fibroid in the uterine wall is suspected.

In sixteen cases he has seen three deaths; once he was obliged to perform supra-vaginal amputation of the uterus at a second operation, on account of the development of a new fibroma, the nucleus of its origin having been passed over at the first operation. This possibility is evidently the weak point of such a method. To avoid it, it would be always necessary to combine it with ovariotomy. But then the very object of enucleation is done away with,† and the generative functions are not preserved; the case merely becomes a simple case of one particular kind of partial hysterectomy, with intra-peritoneal treatment of the pedicle.‡

† Kränlein (Zurich). Einige Bemerkungen zu Gunsten des conservirenden Verfahrens bei der Myomatose, in Centr. f. Gyn., 1890, No. 48, p. 876) relates a case which he says is unique, where an extensive resection of the uterus for a fibroid springing from a large base at the fundus uteri was followed by pregnancy that pursued a normal course.
‡ Martin (Ueber Myomoperationen, in Centr. f. Gyn., 1890, p. 797) has recently published a table of 96 cases of abdominal enucleation divided in the following way: 24 times the uterus was opened with 8 deaths; 72 times the uterine cavity was respected with 10 deaths.
III. Fibroids with multiple foci. Supra-vaginal hysterectomy. —According to Schröder, it is necessary to distinguish two different conditions according as the fibroid is situated at the fundus of the uterus above the level of the appendages, the body of the uterus being itself nearly uninvolved, or as the body of the uterus is invaded so that the appendages are raised by the tumour, at whose side they form a kind of appendix more or less sessile.

In the first case, the rule is not to detach the broad ligaments, and this makes the operation more rapid and less serious. But as one can never be certain that one or more small nodules which can take on growth do not exist in the rest of the uterus, it is prudent to remove the ovaries as the last stage in the operation. Generally, the adoption of this course does not give so narrow a pedicle as removal of the whole uterus: this reason would be sufficient to condemn partial hysterectomy did not an important consideration militate in its favour, at least in the eyes of the partisans of the intra-peritoneal treatment; I mean the possibility of performing the operation without opening the uterine cavity, which thus allows of the pedicle being left in the abdomen, which greatly diminishes the chances of infection. That is the reason why the distinction made by Schröder is a legitimate one, at least as far as the application of his procedure is concerned. But it loses much of its worth in the eyes of the supporters of the extra-peritoneal treatment of the pedicle, amongst whom I reckon myself.

Partial hysterectomy presents no essential differences from supra-vaginal amputation, with the exception of the stage which consists in the detachment of the broad ligaments. The elastic tourniquet is first applied below the level of the tumour, which is removed with its capsule, while a collar of peritoneum and of sub-serous tissue is preserved. This operation is distinguished from enucleation by the fact that the tumour is from the first freely removed by dividing with the knife. It ought never to be resorted to without reason; I always advise that the impossibility of enucleation be ascertained by a vertical section before proceeding to the major operation; if possible, enucleation is to be preferred. The pedicle will be treated after one or the other of the methods applied to supra-vaginal hysterectomy.
I now come to supra-vaginal hysterectomy or amputation, which is the typical operation, and that to which the surgeon must have recourse in the vast majority of cases, either at the outset or after having vainly attempted a less extensive operation, enucleation or partial hysterectomy.

Two important methods divide the opinions of surgeons.

1. That in which the pedicle is drawn outwards (extra-peritoneal treatment), to which are joined the names of Koeberlé and Péan, the originators, and of Hegar, who has brought it to a high degree of safety and perfection;

2. The method in which the pedicle is abandoned in the peritoneum (intra-peritoneal treatment), to which the name of Schröder deserves to be joined, but to which various authorities have added modifications.

Lastly, I shall have to describe some methods depending upon one or other of these methods, and, in particular, of a mixed method which participates in the peculiarities of each of the two preceding methods, and which, it is asserted, combines their individual advantages; and I shall say a few words upon removal of the uterus, including the cervix, or total hysterectomy.

Method of performing supra-vaginal hysterectomy. — The first stages of the operation are identical, whether the extra-peritoneal treatment of the pedicle (Hegar's method) or the intra-peritoneal is about to be followed.

The abdomen is quickly opened in the linea alba, without delaying to place forceps on the small vessels, particularly on the veins that bleed at the first, but are spontaneously closed by contact with the air. If the tumour is small and has markedly grown in the pelvic direction, the incision must be prolonged down to the pubic symphysis, but this must be done with great care, the situation of the bladder being at the time well taken note of by means of a sound. Increase of length of this viscus in front of the tumour* must always be borne in mind, as it increases the possibility of its being wounded. To give more room at the lower part of the incision the rectus muscle on one side may sometimes be severed from its insertion.

If the tumour is very large and soft the surgeon will ascertain

at first if its volume cannot be diminished by the puncture of some cystic cavities. If this be not possible it is better to freely prolong the incision up to the ensiform cartilage if necessary, rather than resort to the tedious, painful, and dangerous procedure of piecemeal extraction, as Péan formerly recommended.*

The uterus must then be freed in such a way that an elastic ligature may be placed around the cervix to guard against haemorrhage. The connections of the bladder with the tumour should again be made out, and for that a sufficiently long catheter must be introduced (a male sound answers very well). Even skilful surgeons have included the bladder in the ligature, and thus removed a portion of it. For its better protection in difficult cases, Albert, from the very commencement, runs a long needle across the tumour immediately above the fundus

![Diagram](image)

**Fig. 153.—Ligature in links.**
A, arrangement of the threads. B, the threads are tied.

so as to prevent the elastic ligature from gliding out to it and embracing it.

Next, the broad ligaments should be divided between a row of double ligatures (fig. 153). For this a blunt mounted needle (fig. 18, 2, 3) is used, either straight and a little curved towards the point or of the shape of a Deschamps' needle (see for the method of carrying out these manœuvres, pp. 65 and 70). The Fallopian tube and the round ligament should be separately tied. When the upper part of the cervix has been freed the elastic ligature is placed around it. Some authorities advise searching immediately below the ligature for the uterine arteries, the pulsations of which, or the prominences formed

* Péan and Urdy. *Hysterectomy,* &c., p. 201.
by them, being felt for on the sides of the uterus; to find them we must feel downwards nearly to the folds of Douglas (which limit the cul-de-sac of this name), and keep a finger's breadth distant from the cervix on account of the ureters. Ligature of these arteries is done en masse and comprehends some little thickness of the neighbouring soft parts which with the artery are encircled by a blunt needle. It is only necessary when the elastic ligature is temporary and will be removed, as in the methods of intra-peritoneal treatment of the pedicle. One of the great advantages of the extra-peritoneal method seems to me to consist in doing away with this dangerous step. It is always better to remove the appendages. Some operators, as a matter of fact, attach little importance to leaving them in situ, thinking that they are not long in atrophying after hysterectomy; their extirpation is nevertheless preferable. As a matter of fact, some accidents have been recorded, pelvic haematoccele (Péan, Koeberlé). extra-uterine pregnancy (Koeberlé), which indicate the advisability of removing the ovaries at the same time, when no difficulty is presented by reason of extensive adhesions.*

When the uterus is thus sufficiently liberated from its peripheral attachments the elastic ligature is placed on the cervix and the tumour is cut across. A first incision (antero-posterior) divides it freely down to a distance of two finger breadths from the hæmostatic ligature; then the tumour is rapidly removed by section and enucleation.

From this point the conduct of the surgeon will differ according as he intends to follow Hegar's example (extra-peritoneal treatment of the pedicle) or Schröder's (intra-peritoneal treatment).

Intra-peritoneal method of treatment of the pedicle.—I shall describe this according to Schröder's method, as described by his pupil Hofmeier.†

In proceeding to the removal of the tumour, care must be

* Grammatikati (St. Petersburg) has shown by experiments upon rabbits and by the examination of a specimen coming from a woman who had three years previously undergone hysterectomy at the hands of Professor Lebedeff, that the ovaries continue to perform their functions after the isolated extirpation of the uterus (Centr. f. Gyn., 1889, No. 7, p. 105).—From his own researches, Glaevecke (Arch. f. Gyn., 1889, vol. 33, part 1, p. 1) draws the same conclusions.

taken to end by a circular incision at least 3 cm. distant from
the ligature, bearing at first upon the peritoneum and going
deeper only after this membrane (which has retracted) has been
somewhat separated, so that the fringe of tissue preserved may
be in part formed by the serous membrane. With the scissors
this fringe is trimmed; it must be sufficient to cover the whole
wound when slight traction is made upon it. Any divided
vessels on the surface of the wound are tied with catgut.

An important stage of the operation consists in the destruction
and the disinfection of the mucous membrane of the uterine
cavity that is present at the base of the wound. There is no
doubt that this opening up of the uterus constitutes an
unfavourable condition for intra-peritoneal treatment, for this
may prove an entrance for infection. As a matter of fact, some
authors, Martin* for example, attribute little importance to it.
But Hofmeier, † analysing Schröder’s operations, has con-
clusively established this influence (in 21 operations without
opening the uterine cavity, 2 deaths; in 59 with opening, 18
deaths). It is therefore important to reduce this danger to a
minimum by taking care, on the one hand, that healing is rapid,
through the exact apposition of the wounded surfaces, and on
the other hand by energetically modifying the mucous membrane
in the neighbourhood of the wound. With this object
Olshausen‡ has counselled the free removal of the surface of the
wound in funnel shape, thus dissecting out and removing the
largest possible amount of mucous membrane. The wound
must also be cauterised with a strong solution of carbolic acid
(5 per cent.), or better, with a Paquelin’s thermo-cautery, which
must fearlessly be thrust perpendicularly into the cervical canal.
No cauterisation should be practised upon the more superficial
portions of the wound so as not to prevent union by first
intention, which should be most carefully sought. We now pro-
cceed to insert the sutures. Veit and Martin employ catgut
prepared with oil of juniper wood alone (see p. 29); Schröder
and Hofmeier combine the use of catgut and of silk. If it be a
case of a bleeding surface of limited extent it is sufficient to pass

* Czempin (Martin’s assistant). Zeitschr. f. Geb. und Gyn., 1888, vol. 14, part 1,
p. 228.
† Hofmeier. Die Myomotomie, Stuttgart, 1884.
with a strong needle deep sutures passing beneath the whole wound and forming a series of separate stitches that are tied tightly; apposition of the peritoneum is completed by superficial stitches. It is very necessary not to lose sight of the fact that perfect coaptation is indispensable for the securing of complete union by first intention; the difficulty is to tie them sufficiently tight to obtain it, and not tight enough to interfere with the nutrition of the tissues.

If the wound be of any extent this simple method must not be resorted to, for it would be necessary, to secure perfect apposition, to tie the deep sutures far too tightly, and they would then cut through the uterine tissues. Here a continuous catgut suture rising in spiral fashion should be used; it is far preferable to the silk interrupted suture* that Schröder used at the first.

* Brennecke (Ein Wort für die Schröder'sche Methode der Myomotomie, in Zeitschr. f. Geb. u. Gyn., 1891, vol. 21, part 1, p. 1) regards the careful application of sutures in stages as the best guarantee of success. He has performed Schröder's operation fifteen times without a single failure.
Nevertheless, to guard against the too rapid absorption of the catgut, that is especially to be feared if the tissues are very resistant, the surgeon will take care before beginning the continuous suture, to put in a few silk supporting stitches, passing through the whole thickness of the wound at convenient distances. These supporting stitches will not be tied till after the continuous suture has been passed. It is better to place them thus, first, so as not to run the chance of cutting the catgut. They should be arranged in a somewhat slanting direction, and not quite perpendicular to the surface of the wound (Hofmeier) so as not to be parallel to the vessels which they are intended to encircle (fig. 154).

The wound is to be united in a longitudinal direction, that is to say, in a direction parallel to that of the abdominal incision (Gersuny, Fritsch, &c.)

When he has sutured the pedicle according to Schröder's method, if he sees, after removing the elastic bandage, any drops of blood exuding at the surface in the direction of the threads, Martin* does not hesitate to thrust a strong needle provided with a quadruple thread through the middle of the pedicle from before backwards, and tie it in two halves. In the autopsies that he has had occasion to make he has never seen any trace of sloughing due to this ligature.

Leopold often uses the same kind of complementary ligature. Martin always uses a drainage tube after intra-abdominal hysterecto-

* Martin. Path. u. Ther. der Frauenkr., 1887, p. 286.
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tomy, however simple the operation may have been. He depresses Douglas's pouch by a hand introduced through the belly behind the uterus, and by means of a long pair of forceps, which serve to hold the cross-tube, he tears through the vagina from below upwards. The inferior extremity of the tube is always folded back in the vagina and surrounded with antiseptic gauze to prevent the entrance of atmospheric germs. It is removed about the third or fourth day, when the patient begins to experience a certain peculiar discomfort in the lower belly (fig. 155).

This drainage after simple operations, without laceration or soiling of the peritoneum by septic products, is not generally carried out, and seems to me to be needless.

Extra-peritoneal treatment of the pedicle (Hegar's method).—The endeavour is made to close the abdominal cavity as well as possible above the tumour, the tumour itself being surrounded with compress-sponges to absorb the blood, and then divided transversely two finger-breathths above the elastic ligature. Sometimes after the section has been completed, some fibrous nodules may be seen penetrating into the pedicle; they are enucleated without fear of hæmorrhage, the elastic band closing up immediately and compressing the cavity left by the small tumour. If any divided vessels are seen at the sides they are to be tied separately. The surface of the stump is trimmed and kept thoroughly drawn outwards with Museux's forceps. Then the toilet of the peritoneum is proceeded with, and the pedicle is fixed at the lower part of the wound. As a rule the temporary elastic ligature may be used as the permanent ligature if it is conveniently placed. If it is situated so low that the pedicle cannot be easily drawn out of the wound, another elastic ligature should be placed in a position somewhat higher than the first before loosening it. When the pedicle is very large, it is well, according to Hegar, to tie it in two halves, after having pierced it with a special kind of instrument like a skewer (Kaltenbach's needle*), carrying two elastic cords. Personally, I think this complication may be avoided by making, in the case of large pedicles, an additional turn with the elastic ligature. Tauffer,† also, has recently given up the use of this instrument.

Great care must be taken when applying the permanent ligature to make certain that no organ, bladder, intestine, omentum, is included; this has occurred even to skilful operators.* For that the fingers should always be controlled by the eyes.

This is the method of definitely fixing the ligature: while an assistant keeps the pedicle in position with some Museux's forceps, two turns are given to the instrument that holds the elastic cord fast, so as to cross the ends of this cord, while at the

same time it is slightly drawn upon. At the upper end of the twist, between the instrument and the cervix, is placed a ligature of strong silk tied with a double surgical knot (fig. 31,²). Gentle traction is again exerted upon the instrument, so as to stretch the elastic yet a little more, and give room for the application of a second ligature for safety, a few millimetres in front of the first. The ends of the silk threads may then be cut short; after removing the forceps the ends of the elastic

band may also be cut, but they should be left somewhat longer (figs. 39 and 40).

The elastic ligature is an immense improvement. The constriction it exerts is, so to speak, always active, and is kept up by reason of the elasticity called forth at the moment of its application by drawing firmly on the ends; it has no tendency to become too loose like inextensible threads.

One of the most important peculiarities of Hegar's method is the perfect isolation of the pedicle outside the abdominal cavity by suturing the peritoneum beneath the elastic bandage. Hegar

![Diagram](image)

**Fig. 157.**—Suture of the abdominal walls around the pedicle in supra-vaginal hysterectomy. (Extra-peritoneal method.)

Stitching the peritoneum in a collar around the uterine pedicle at its lower end. The suture completed. (The pedicle is very forcibly drawn upwards, which greatly increases its distance from the pubis.)

thus makes it the base of a "peri-pedicular gutter" that he leaves open by abstaining from uniting the aponeurotic, fatty, and tegumentary layers in the immediate neighbourhood of the wound. This trench prevents the pedicle, which is destined to mortify, from being closely imprisoned in the thickness of the soft parts and of infecting them. It remains separate like the pistil in the centre of the corolla of a flower, and around it local
applications can be used with the object of keeping it aseptic and of aiding the mummification process. This technical peculiarity is of the greatest importance in the case of women who are stout.

To stitch the peritoneum around the pedicle Tauffer* fixes at

![Diagram of suture of the abdominal walls above the pedicle in supra-vaginal hysterectomy.](image)

Fig. 158.—Suture of the abdominal walls above the pedicle in supra-vaginal hysterectomy. (Extra-peritoneal method.)

A, continuous suture of peritoneum with catgut.
B, continuous catgut suture of the musculo-aponeurotic layers.

the lower angle of the abdominal incision a long thread with two ends by a knot; each of these ends he arms with a needle, and sews the peritoneum to the surface of the pedicle immediately below the elastic ligature on the right and on the left. For my

* G. A. Dirner, loc. cit.
part, I prefer to overcast it with a single needle threaded with catgut (fig. 157). The greatest care must be taken at this point to perfectly appose a layer of the parietal peritoneum all around the pedicle and immediately below the elastic ligature. Nothing but the serous membrane should be included in the stitches, and a curved very fine needle should be used so as if possible to avoid bleeding of the punctures. It is well to seize and bring close up to the pedicle the stumps of the broad ligaments so as to fix them in direct contact with the uterine stump. When the peritoneal collar is sewn around the pedicle the rest of the needleful of catgut may be used to continue the separate stitching of the peritoneum for the whole length of the abdominal incision. A few separate stitches are inserted where necessary to procure perfect apposition. Suture of the other layers of the abdominal walls is only commenced two finger-breadths above the pedicle. For the union of these parts I myself employ a continuous catgut suture (figs. 158 and 160).

Fig. 159.—Handle for the insertion of the pins.

Below the pedicle itself it is rarely useful to place (over the incision in the peritoneum only) more than one or two stitches.

To prevent the pedicle from receding excessively into the pelvis under the influence of the elasticity of the tissues, movements, &c., two strong harelip pins placed at right angles are thrust through it above the elastic ligature, the pointed ends of which are immediately removed with nippers. They are passed by a special handle (fig. 159). The pins have the further advantage of preventing any slipping of the elastic ligature. Beneath their ends small pads of iodoform gauze are placed to prevent injury to the teguments (fig. 160). The last touches are then given to the pedicle with a pair of scissors, and the surface is seared with the thermo-cautery after having surrounded it with damp antiseptic compresses.

Until latterly Hegar, Kaltenbach, Tauffer, &c., followed out the after-treatment to be immediately described: In the peri-pedicular gutter they placed absorbent cotton-wool, impregnated with a 10 per cent. solution of chloride of zinc, and
carefully wrung out; they painted the surface of the stump with a 5 per cent. solution of the same salt, taking care to limit the action of the liquid, and put into the cavity which is presented by the centre of the pedicle a plug of cotton-wool impregnated with the same caustic. An antiseptic dressing (iodoform gauze) was now placed over the wound, and the whole covered by thick layers of cotton-wool, kept in position by a many-tailed flannel bandage. This first dressing they left untouched for from five to seven days unless some special indication arose. If they found it

Fig. 160.—Suture of the abdominal walls above the pedicle in supra-vaginal hysterectomy. (Extra-peritoneal method.)

Suture of the peritoneum around the uterine pedicle at its upper part (the neck is strongly drawn downwards to show the stitching better). The deep stitches for the teguments have been inserted, and the superficial stitches tied above the pedicle. (Below, these stitches have not yet been placed, so as to be able to draw the neck downwards, and afford a better view of the upper portion.)
at the end of this time dry and firm they replaced the cotton-wool plugs placed around the pedicle by strips of iodoform gauze, and touched the pedicle anew with the caustic solution so as to cause the eschar to mummify and prevent it from becoming soft and fetid; thenceforward the wound was dressed every day, and if the pedicle were large, the mortified portions were removed by degrees.

Of late, Kaltenbach* had replaced chloride of zinc (which has the inconvenience of giving rise to too extensive eschars, and also to small capillary hemorrhages) by a thin layer of iodoform gauze. But in very anaemic and very fat subjects, in whom the peri-pedicular gutter is very deep, absorption takes place with rapidity, and toxic symptoms soon arise. Kaltenbach has therefore employed the mixture of three parts of tannin to one part of salicylic acid, recommended by Freund in the operation for ectopic pregnancy. He, and Hegar also, have derived better results from its use. I myself have replaced the salicylic acid by powdered iodoform in the proportion of one part for five parts of tannin. This mixture has always given me most satisfactory results.

The dressing of the wound thus is greatly simplified. Immediately after the operation the gutter is filled and the pedicle covered with the powder (the interior of the pedicle having previously been cauterised with the thermo-cautery), and then the dressing is applied. In this way the pedicle is as if it were tanned without any fear of caustic action upon the living tissues. The first dressing may be left untouched for eight to ten days.

This modification constitutes a very great improvement; it allows of the patient's being left quiet instead of-fatiguing her by repeated dressings; and, moreover, the mummification of the pedicle being obtained at one trial and en masse, there is no need of removing portions from time to time with the scissors, a course which, by the mental agitation it causes the patient, has sometimes been the cause of small pulmonary embolisms (Kaltenbach). On the third or fourth day after hysterectomy, as after salpingotomy, it is not uncommon to see a slight sanguineous discharge per vaginam. This, however, need give rise to not the slightest anxiety.

The elastic ligature, as a rule, falls off about the fifteenth to

the twentieth day, bringing with it the pedicle and the pins. It
leaves a granulating depression that may be dressed with
iodoform gauze, moderately tightly packed. It is often of con-
siderable depth, for the mortification of the pedicle rarely limits
itself at the level of the elastic band; it always extends more or
less deeply. This cicatrix forms a weak point in the abdominal
wall and necessitates the wearing of a belt.

If the ovaries were left in situ, at each menstrual period, haemorrhage might be seen to occur through the wound.

An abdomino-cervical fistula has rarely been seen to persist.

Various methods. Hidden elastic ligature.—Although he was
anticipated in this method by some isolated cases of Czerny* and
Kaltenbach,† it was Olshausen‡ who has especially recommended
the hidden elastic ligature. He tied it first and then sutured it
around the pedicle with silk so as to prevent it from slipping.
This method has only been employed by Olshausen in exceptional
cases, in which great difficulty was met with in arresting haemorrhage. At present he seems almost to have discarded it,§
although he has obtained therewith some remarkably successful
results in difficult cases. The pedicle thus tied does not mortify,
but continues to obtain a little nourishment, either through the
elastic ligature, or, more probably, at the expense of the neigh-
bouring parts. However that may be, its nutrition is very
limited, and it undergoes a process of granulo-fatty necrobiosis.
There have been also some cases in which it has suppurated and
brought about serious accidents, ending either in elimination of
the ligature (Hegar) or in fatal peritonitis (Olshausen, Czerny,
Hegar). At other times the elastic band has been cast off without
the patient being in any way inconvenienced. Ahlfeld|| has
published a case of this kind, which is the more remarkable in
that he still further complicated the hidden ligature method by

† Hegar and Kaltenbach. Die q e r. Gyn., 1881, p. 441.
Gyn., 1884, p. 86. Vide the interesting experiments made by Hegar upon animals in
Kasprzîk, Zur intraperitonealen Stielversorgung bei Uterusfibromen, und zur partiellen
Exstirpation von Organen und Geschwülste der Unterleibshöhle, mittelst elastischen
Ligaturen (Berlin. klin. Woch., 1862, No. 12, p. 177).—Olshausen's method has been
recently taken up again in Italy by A. Martinetti, Annali di ost. e gyn., 1888, No. 3,
|| Ahlfeld. Berichte und Arbeiten aus der Klinik zu Gießen, 1881-2, p. 286, Leipzig,
1883.
Fig. 161.—Ligature of the pedicle by Zweifel's method. Insertion of the threads. (Diagrammatic.)

A, transfixion of the pedicle with a needle threaded with the first thread, Ia, Ib, and mounted on a handle; B, the extremity, Ib, of the first thread being withdrawn from the eye of the needle, a second thread, IIa, IIb, is inserted, after which the needle is to be withdrawn to bring the thread with it; C, the needle again threaded transfixes the pedicle a finger's-breadth from the first puncture. The same manœuvre is then carried out for the third thread, &c.; D, the pedicle traversed by a series of loops of threads arranged for juxtaposed ligature in portions (la ligature partielle juxtaposée).
fixing the indiarubber cord with a ring of lead, 5 mm. in diameter. He passed two turns of the ligature around the pedicle, applied the lead ring to the ends, and crushed the metal together by means of a strong pair of forceps. This method of fixing the elastic ligature was first adopted by Thiersch,* but only for the extra-peritoneal treatment. He was afterwards imitated by Sänger,† who later on discarded it for his mixed method, after having obtained therewith nine successful cases and not a single unsuccessful one.

I only mention the following methods by reason of their originality:—

Sub-peritoneal hidden elastic ligature.—Schwarz‡ has suggested the covering of the elastic ligature, after temporary haemostasis, with a layer of peritoneum cut on the pedicle.

Reversion of the pedicle into the vagina.—Meinert.§ has proposed to open Douglas’s pouch and pass the pedicle into the vagina. The only time that he tried this method the patient died.

I simply mention hysterectomy in two stages, the first consisting in opening the peritoneum, and followed by the production of adhesions; the second consisting in the removal of the fibroid. Nussbaum¶ followed this dangerous course in a case where the myoma had suppurated; the patient died. Vulliet‖ recently thought fit to resort to it; his patient at the time when the operation was published had not yet recovered.

Juxtaposed ligature in portions (Fortlaufende Partienligatur),—Under this name Zweifel has described a method of ligaturing the stump that certainly better provides for arrest of haemorrhage than does Schröder’s method, but which seems a priori a step backwards in the technique from the point of view of the early uniting of the stump and of its chances of mortification. Never-

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¶ Nussbaum, cited by Zweifel, loc. cit., p. 25.
theless the excellent results announced by Zweifel* command attention. Out of ten patients operated upon by this method he had only lost one at the time of the publication of his book (1888), and in the month of February, 1889, he announced a series of 22 operations followed by cure. The following is his method:

For all the ligatures he uses disinfected silk, and he employs a grooved needle mounted on a handle (Brun’s first model), which bears a great resemblance to a strong Reverdin’s needle with a blunted end.

He first ties the broad ligaments in a series of partial ligatures. He then cuts these ligaments and applies an elastic band. The two silk ligatures used for the broad ligaments nearest to the uterus he has taken care previously to leave sufficiently long to allow of their being included under the elastic ligature (fig. 162). He excises the uterine tumour in

such a manner as to fashion a small musculo-peritoneal flap in front and behind (fig. 163), and cauterises with the thermo-cautery the uterine and cervical cavities. Grasping then a mounted sharp needle he proceeds to make a series of partial ligatures forming a continuous series; of these the diagrams give a sufficient description. He terminates the operation by some superficial catgut stitches in the peritoneal covering (fig. 164). No drainage unless there be persistent oozing; then he would drain into the vagina, using a cross-tube.

Fig. 163.—Ligature of the pedicle by Zweifel's method.
Figure showing the shape to be given to the excision of the tumour so as to preserve the pedicle. The mounted needle is about to bring back the end of a thread which already traverses the pedicle.

Mixed method (this might also be called the juxta-parietal method).—This method owed its origin to the impossibility of fixing very short pedicles beyond the abdominal walls when the surgeons at the same time did not dare to freely abandon them within the abdomen. Such is the case of Kleberg of Odessa, whom I have mentioned as the inventor of the elastic ligature; he, in 1877, allowed a thick and short stump to slip to the
bottom of the wound, where he fastened the ends of the elastic band constricting the pedicle: he obtained a cure.

Péan in the same way has sometimes been obliged to leave a bunch of forceps hanging outside the abdomen, and has had successful cases. But these were methods adopted of necessity. Fixation of the pedicle immediately below or in the thickness of the abdominal walls, with persistence at this level of a means of communication with the external air, has been recently proposed and executed as a method of election. It has for an object the allowing of supervision in cases where the arrest of haemorrhage has been difficult and the assuring of an exit for the septic products that might infect the wound.*

Two Viennese surgeons, pupils of Billroth, Wölfler † and

* The complicated and somewhat impracticable method of Freund need only be mentioned because it was the first attempt at the mixed method. After amputating the uterus for a large tumour, Freund (Homburger Centr. f. Gyn., 1882, p. 481) united in one mass the uterine pedicle and the broad ligaments, surrounded them by an elastic band, and fixed the extremity of the stump in a pill-box, in the bottom of which he made a hole. A large glass drainage-tube was placed in the interior of this pill-box immediately over the pedicle, which was left in the abdomen. The ends of the elastic ligature were passed through the lumen of this tube, in which was also introduced some iodoform gauze. The patient recovered. But it is evident that it was the rapid formation of protective adhesions that served as a barrier to infection of the peritoneum, and not the pill-box. Plugging with iodoform gauze above the pedicle would have been at the same time simpler and safer.

von Hacker,* first, and then Sänger of Leipzig,† the ingenious author of the improvements in the Cæsarian operation, have more recently proposed mixed methods, which, though differing in some unimportant points, present more than one analogy. They are worthy of detailed description, for they may prove of real service.

The Wölfler-Hacker method.—It was von Hacker who first conceived the idea of the method, inspired doubtless by an observation of Billroth.‡ It was Wölfler who first performed it, August 21st, 1884.

The pedicle is sutured as in Schröder’s method, then it is allowed to slip back so that its summit is at the level of the

‡ Billroth. Vide Langenbeck’s Archiv, 1877, vol. 21, part 4, p. 960.
deep surface of the abdominal walls. To fix it here level with the incision in the parietal peritoneum, on the right and on the left a needle threaded with carbolised silk is passed through the superficial layers of the pedicle and then through the abdominal walls; these loops are tied over small rolls of iodoform gauze so as to draw the surface of the stump between the lips of the peritoneal wound. This wound is left open at this particular spot, but above it is carefully closed and the parietal peritoneum is moreover stitched to the stump, so that the abdominal cavity is closed above it and it has really become extra-peritoneal, though at the same time it is juxta-parietal. The abdominal walls are sutured, space only being left for a strip of iodoform gauze and for a drainage tube that is inserted right down to the pedicle

![Diagram](image_url)

**Fig. 166.**—Treatment of the pedicle by the mixed method (Wölfler-Hacker).

- c, skin
- m, muscles
- pp, parietal peritoneum
- pr, visceral peritoneum
- ut, uterine pedicle
- a, suture of the skin
- b, suture of the musculo-aponeurotic layers
- c, suture of the peritoneum with catgut
- e, supporting suture of the pedicle fastened over rolls of iodoform gauze. (Diagrammatic transverse section.)

(figs. 165 and 166). Wölfler and Hacker's first two patients recovered after a little suppuration and sloughing; they would probably have died of septic peritonitis if the pedicle had been completely abandoned at the bottom of the abdominal cavity. Since that time a great number of cases have been registered. Fritsch* had 19 successful cases without a single death, while by Olshausen's method (the hidden elastic ligature) and Schröder's

method (intra-peritoneal suture of the pedicle) he had 12 deaths out of 39 operations.

Even if this process were not adopted as a matter of routine it is certainly a very useful one to know. It is applicable to a large and short pedicle that cannot be drawn through the lips of the abdominal wound without excessive traction, and in which, nevertheless, the numerous vessels and ligatures seem to render it dangerous to abandon the pedicle within the abdomen, on account of the possibility of consecutive haemorrhage, or of sloughing and septicæmia. I have obtained a recovery in such a case by resorting to this method.

*Sänger's method, intra-peritoneal sequestration (intra-peritoneale

![Diagram](image-url)

Fig. 167.—Treatment of the pedicle by the mixed method (Sänger).

Intra-peritoneal sequestration of a pedicle, sutured according to Schröder's method; pp, parietal peritoneum stitched to the posterior surface of the pedicle; u, uterine pedicle; v, vagina; d, drainage tube.

Abkapselung).—Sänger thus designates a method of operating which consists in stitching the peritoneum over a very large area of the pedicle, by drawing on the parietal peritoneum and fixing it over the whole length of the posterior surface of the uterine stump stitched in front. By this means there is separated from the abdominal cavity a region in which the pedicle lies. Sänger distinguishes two classes of case.
1. The pedicle is treated by suturing it according to Schröder's method, but haemorrhage is feared.—It should be fixed below the level of the abdominal wall by suturing the parietal peritoneum above it; a drainage tube will be inserted (fig. 167).

2. The pedicle is too short to be drawn outwards: pins placed at some considerable distance from the elastic ligature, which is placed as in Hegar's method.—In this latter class of case the peritoneum must be stitched to the upper part of the pedicle, even in front of the elastic band, so as to separate it from the peritoneal cavity. A kind of barrier is made above it, and the endeavour is made in this way to carry out an extra-peritoneal, although an intra-abdominal operation. Sänger thus obtained a most satisfactory result in a difficult case, where the stump was short, thick, and very vascular (fig. 168).

If Sänger's two methods be closely considered it can be seen
that the first differs in no essential point from that of Wölfler and Hacker, for the substitution of stitching of the parietal peritoneum to the posterior surface of the stump for the two lateral stitches, which suspend the pedicle in the Wölfler-Hacker method, can hardly be called an essential point. With regard to the second, it is in sum and substance Hegar’s method applied to a short pedicle, in which the peri-pedicular is replaced by supra-pedicular stitching of the peritoneum. It presents, however, this original point, that the peritoneum is stitched (with catgut) above the elastic ligature, and consequently over the portions that are destined to die. Sänger powders the stump with a mixture of salicylic acid, iodoform, and tannin. To this I personally should add plugging with iodoform gauze.

*Extirpation of the pedicle or complete hysterectomy.*—Bardenhauer* has recommended the adoption of this course as one of choice, even in the simplest cases. He advises that the broad ligaments, upon which firm ligatures are placed, should be afterwards brought down towards the vagina; drainage, and this Bardenhauer considers as essential, is also provided.

One might be tempted to do a complete hysterectomy in those cases in which the cervix is saturated with fibroids so that the preservation of a pedicle seems impossible. However, one always succeeds in fashioning one, after removing them from the stump and leaving it clear, and on this shell an elastic ligature can be placed. This pedicle would be abandoned in the peritoneal cavity, or better, treated by the mixed method if it be of insufficient length to be drawn outwards. In short, Olshansen’s and Sänger’s methods seem to me to be less dangerous than complete extirpation, although Bardenhauer has had since he commenced the operation six recoveries out of seven cases; but it seems as if he was then dealing with quite simple cases that would have recovered with any other method. The cases published since have not been very numerous,† which well evidences the legitimate distrust that has been awakened by the application in the case of fibromata of Freund’s operation or cancer, which is to-day utterly condemned.

Of late, however, fresh attempts have been made to re-model complete extirpation. Martin* has recommended it; he first performs through the abdominal walls a supra-vaginal hysterectomy, using a temporary elastic ligature. Then an assistant frees the cervix through the vagina, after which the surgeon terminates the operation through the abdomen† by tying the broad ligaments and peeling off the bladder. Martin recommends that the intestines should be protected with a sponge soaked in oil, so as to lubricate them. He thinks that he thereby prevents the subsequent development of adhesions. T. J. Crofford‡ has published a successful case of this kind, but his method (he uses the écraseur) seems very defective.

IV. Intra-ligamentous and pelvic fibroids—Decortication.—The fibroids that take their origin from the supra-vaginal portion of the cervix, or from the lower portion of the body of the uterus, increase in size below the peritoneum, which they raise and unfold, never becoming covered therewith to any extent, and having on the contrary a tendency to insinuate themselves into the cellular spaces of the pelvic roof. They have been seen to separate the layers of the meso-rectum up to the upper end thereof; others raise the utero-vesical cul-de-sac, at the same time compressing the bladder against the pubis; the majority, however, extend laterally between the layers of the broad ligaments, whose fold is very soon entirely overcome and effaced. From a surgical point of view, all these varieties are united into one natural group by the following common characters: extreme difficulty of forming a pedicle, intimate and extensive relations with the walls of the true pelvis and the pelvic viscera.

† Boldt (Centr. f. Gyn., 1890, No. 38, p. 683) has, in three cases, followed Bardenheuer's method with this peculiarity, viz., he removed the cervix through the vagina.—Guermonprez (Commun. à l'Acad. de méd., Sept. 15, Gaz. des hôp., 1891, No. 108, p. 1009) has published a successful case of complete hysterectomy, performed entirely through the abdominal wall.
§ R. Chrobak (Zur Exstirpation Uteri myomatosi in Centre. f. Gyn., 1891, No. 35, p. 713) has just proposed an interesting modification of Bardenheuer's method. He shells out the uterus from its peritoneal covering, resects it as low as possible, so as to leave in situ no more than a ring of the cervix, and on this he fixes the two lips of the peritoneal serous membrane. Out of 17 cases operated upon in this way he has had 17 recoveries.
The surgical treatment of these tumours is beset with the greatest difficulties. It would be right, after opening the belly, if they seem too great for extirpation to offer any real chances of safety, to resort to ovariotomy (palliative instead of extirpation, curative). Nevertheless it must be recognised that as in such cases it is not the hæmorrhage but the compression symptoms that are most to be feared, ovariotomy has then only a very doubtful value—if it be performed it is only as a last resource.

I propose to give the name of _decortication_ exclusively to the operation which consists in extracting these tumours from the cellular tissue in which they lie, and to reserve the name of _enucleation_ for the extraction of fibroids from the uterine tissues. The general use of the same word for two operations that are so very different has often led to great confusion.

It is absolutely impossible to give a regular and typical description of cases that themselves come under no rules, and are, as has been remarked, atypical. The application of an elastic ligature for restraint of hæmorrhage would only rarely be possible, and only then over a portion of the tumour; and in this point an extreme amount of care must be taken not to include the bladder in this ligature, for it is generally much elongated upon the anterior surface of the uterus. If a portion of the fibroid projects prominently into the peritoneal cavity, the elastic ligature would be placed as deep down as possible towards the base of this lobe, which would then be fearlessly removed. An attempt is made to enucleate the deep portions by exerting strong traction; the elastic band contracts upon the diminution of the tumour, and again exerts a sufficient hæmostatic constricting power over the shell that has just been emptied of its contents. Generally it is necessary to commence the operation by ligaturing and dividing the appendages upon the side on which the operation is to take place. If it be possible at the very outset to place a ligature deeply upon the main trunk of the uterine artery, that of course would never be omitted.

It may occur that these manœuvres are impossible, and that the fundamental stage of the operation has to be undertaken from the commencement. This consists in making a free opening into the capsule formed by the ligaments, seizing the lips thereof firmly with forceps, and then proceeding to decortication by the fingers and the spatula. Powerful traction must always be exerted by
hooked forceps; the new growth must be very thoroughly cleared out and catch forceps placed upon the bleeding points, without ever losing sight of the situation of the ureters. Once the fibroids are removed the veins (sometimes of enormous size) of the broad ligaments collapse, and one is surprised at having to apply far fewer ligatures than was expected.

The connections of the tumour with the uterus determine the line of action that should be adopted with regard to this organ. When they are of small extent the surgeon contents himself with applying the necessary hæmostatic ligatures or sutures, and leaving the uterus itself; but if they are very close, and the arrest of hæmorrhage is difficult, it is much better to decide without any hesitation upon supra-vaginal hysterectomy. It may happen, moreover, that that is done almost without any consideration of the question, and that at the end of the laborious decortication of a fibroid filling completely the true pelvis, the surgeon finds himself face to face with a kind of pedicle which very soon is found to be the cervix itself.

The question of the treatment of the cavity resulting from decortication still remains. This cavity is often of large size, and sends processes behind the rectum and bladder or on the sides of the vagina. One or other of the two following plans should be followed:—

If full confidence can be had in the aseptic condition of the operation itself, and of the surroundings in which the operation is being performed, immediate union without drainage would be attempted. If there have been no lacerations and no tearing of the peritoneum, as in certain operations for tumours that are relatively small or have loose connections, one would content oneself with putting in a few stitches to unite the divided parts, performing the toilette of the peritoneum and reclosing the belly. If the pocket is very deep and vascular, a continuous suture rising gradually upwards might be put in; it would serve at the same time to ensure arrest of hæmorrhage and quick union. No hesitation should be felt in removing any fragments that would be liable to slough.

But this risky conduct would only be justified in exceptional cases; however small the cavity, and however little oozing is to be feared, drainage will be more prudent. It may be effected by
two ways: Martin* recommends the vagina by means of a cross drainage tube that he introduces, forcing it through the vaginal cul-de-sac. Kaltenbach has adopted the same method.† Sänger‡ having returned a pedicle into the abdomen, after removing therefrom a fibroma from the upper part of the cervix, was obliged, immediately after he had closed the abdominal walls, to open and plug through the vagina the cavity that had filled with blood. His patient recovered.

Drainage through the lower portion of the abdominal wound would be preferable in some cases, having regard to the situation of the pocket; it offers the advantage certainly of exposing less to infection, but this is counterbalanced by the absence of a downward direction for the drainage tube. Terrier§ has recently treated in this way the cavity left after removal of a fibroid of

![Diagram](image.png)

**Fig. 169.—Intra-ligamentous fibroid.**

A, transverse sectura, to show the connections of the tumour, which weighed 14 lbs. B, suture of the pocket, resulting from the enucleation of the preceding fibroid. Drainage per vaginam. Recovery (Kaltenbach).

the broad ligament; the patient recovered, but a sinus was left. Howard A. Kelly|| left open and drained the cavity resulting from the decortication of a pelvic fibroid that compressed the bladder. He speaks very highly of weak carbolic lotions injected boldly through the drainage-tube, without any fear of its effusion into the peritoneum, as the peritoneal cavity is shut off, after the first few days, by protective adhesions. I personally prefer to

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* Martin. Path. u. Ther. der Frauenkr., p. 290.
† Hegar and Kaltenbach, loc. cit., p. 498 (3rd edit.).
employ as a means of capillary drainage, and at the same time as a means of arresting haemorrhage, plugging with iodoform gauze. I adopted it successfully in the case of an intra-ligamentous fibroid weighing 15 lbs.*

Kuster† in the same way stuffed the cavity and united the edges to the lower part of the abdominal wound. The gauze should be withdrawn gradually and replaced by drainage tubes at the end of a few days. Tauffer‡ has obtained some very remarkable successes with partial resection of large intra-ligamentous fibroids, the stump of which, fixed in the abdominal wound, was afterwards treated with energetic cauterisation by chloride of zinc.

Accidents of the operation.—Haemorrhage formerly constituted


Fig. 170.—Intra-ligamentous fibroid. Decortication and stitching up of the resulting cavity, and drainage through the vagina. (Martin.)
one of the most formidable dangers, and many patients died therefrom on the operating-table. It may be avoided at the present time by the judicious use of the temporary elastic ligature. Nevertheless, it must be noted that here it is not a question of procuring ischæmia of the tumour, as when Esmarch’s tourniquet is applied to the limbs. This idea—ingenious but scarcely practicable—put forward by L. Labbé, has not passed from beyond the domain of theory; beside the insurmountable difficulties of its application in the vast majority of cases, it would necessitate an excessive amount of manipulation, and doubtless would also expose the patient to the dangers of embolism. The surgeon ought not, therefore, to be surprised, when dividing the uterus above the constricting band, if he sometimes sees poured out a very considerable amount of residual blood that has been imprisoned in the organ when the ligature was applied. If the tumour be of the telangiectatic variety, or if the broad ligaments are simply overrun by very dilated veins (tubo-ovarian varicocele), these ligaments must be tied with the greatest care, and only divided between two ligatures. The sutures must only be inserted by means of blunt needles so as to avoid pricking the vessels, as this has several times caused extensive sub-serous extravasation. For greater rapidity ligatures on the side of the uterus may often be replaced by artery forceps or clips.

When dividing the tumour above the elastic band great care must be taken not to carry the knife too close to this band, for fear that the pedicle should escape at some point or other of its circumference from its grasp.

Extra-peritoneal treatment with elastic ligature of the pedicle completely guards against secondary hæmorrhage. It is not so with the intra-peritoneal treatment, where the stump is ligatured with catgut or silk. It must be remembered that the uterine arteries must then be tied directly by means of a very tightly drawn ligature placed on the right and the left of the pedicle and passed by a strong needle, which traverses a certain thickness of tissue. In spite of this precaution, fatal hæmorrhage has often been seen to supervene some hours, and even some days, after the operation by reason of shrinkage of the tissues, which relaxes the ligature.

The operator ought always to bear in mind the possibility
of wounding the bladder. Many are the cases in which it has been opened, or torn, or partially included in the permanent elastic ligature. If it be elongated in front of the tumour it must be separated therefrom for a sufficient extent to allow of the elastic ligatures being placed beneath it.

In the case of wounds—even if of great extent—of the bladder, * an attempt ought to be made to secure primary union by means of an uninterrupted catgut suture placed in two or three superposed layers. Catgut is preferable to silk when the pedicle is treated outside the peritoneum, for silk, which is porous, may be infected by the secretions of the peri-pedicular wound. On the contrary, silk may be used if the pedicle is to be returned into the abdomen, as in myomectomy. A retention-catheter, soft, and provided with a tube forming a syphon, should be kept in the bladder for ten days. Leopold had a perfectly successful case of this kind; I myself applied this treatment to a wound of the bladder 12 cm. in length, and it healed perfectly, although the patient, who was intractable, tried to remove the catheter on the sixth day, and this produced a partial and temporary disunion of the vesical suture, which, however, was rendered innocuous by the iodoform tampons placed behind it.

In a previous case which occurred during ovariectomy, and in which the wound was enormous (20 cm. in length), I had sutured the intra-peritoneal portion and preserved an abdominal button hole as a safety-valve. My patient recovered after this period of preliminary fistula-formation, and by a small operation I easily succeeded in closing the fistula.

Sänger has employed a different method, which was imposed by circumstances in a case where the elongated bladder had been taken for the pedicle of an ovarian tumour and had been

traversed by sutures. He left these and contented himself with securing the peritoneum carefully around and above the vesical pedicle by a sequestration similar to that which he adopts for the uterine pedicle. The patient recovered without any fistula.

The urachus remaining permeable and divided during the operation has very rarely caused fistulæ. They have, however, a tendency to close of themselves (Atlee, Sänger). It is advisable, nevertheless, to guard against this accident by carrying the abdominal incision to the outer side of this cord if it be encountered. If it be wounded it should be fixed in the thickness of the abdominal wall by deep sutures (Spencer Wells). If the opening be of any extent it should first of all be closed with a few catgut stitches. The catheter must be passed every three hours, rigorously, to avoid distension of the bladder.

I believe that the ureter has often been tied during the hæmostasis of stumps that have been returned into the abdomen, or during the decortication of intra-ligamentous fibroids, and that more than one case of death imputed to "shock" ought to be attributed to this cause. The anatomical relations of these ducts must not be lost sight of when the surgeon is going to place ligatures deep down on the sides of the cervix by transfixion.

The intestine may be simply applied to the surface of a fibroid that has separated the two layers of the meso-colon; it can then easily be separated therefrom. But it may also be fused with a tumour which draws from it some nutrient blood-vessels. I have seen this condition in the case of a large sub-peritoneal fibroid having a small pedicle that contained very few blood-vessels. The surgeon must then resolve on leaving a thin layer of the tumour adherent to the gut, and this layer must be detached by a careful dissection. If not of too great an extent, this fibrous lamella may be folded on itself and stitched (fig. 151). But if, on the contrary, a considerable portion of the intestine is thus adherent, such a method of apposing the bleeding surfaces would risk the narrowing of the calibre of the gut. It would then be better to touch this surface very lightly with the thermo-cautery and then fix it by a few catgut stitches to the parietal
peritoneum as near as possible to the abdominal wound. To abandon it simply in the belly would be to run the chance of its contracting adhesions which would favour the occurrence of ileus.

Causes of death after abdominal hysterectomy.—Hæmorrhage, septicæmia, and the complex series of symptoms denominated "shock" are the three chief causes of death after operation. Some much rarer causes are embolism, ileus, tetanus.

I have already spoken of primary hæmorrhage during the operation. When the pedicle is treated after Schröder's method, slow secondary haemorrhage is always to be feared. The surgeon is warned of it by the extreme restlessness of the patient, acceleration, softness, and smallness of the pulse, swelling of the abdomen, pallor of the face and of the mucous membranes. Certain patients have had a very distinct sensation as of a warm stream flowing in the abdomen; in others, bloody serum has been seen to exude through the wound in the skin. The blood may also be effused in great abundance beneath the peritoneal surface between the layers of the broad ligaments, and form enormous retro-peritoneal hæmatoceles, or again, accumulate in the cavity left by the enucleation of a tumour from the pelvic cellular tissue, and then cause a projection which greatly depresses the ecchymosed vagina.

If there is a suspicion of internal hæmorrhage there must be no hesitation in re-opening the abdomen, so as, at the same time, to tie the vessels and to remove the liquid and the clots which would serve as a nutrient medium for micro-organisms come from without through the tubes, or perhaps from within, across the walls of the paralysed intestine. O. Küstner reports a remarkable case in which he saved a woman who had hæmorrhage from a pedicle that had been returned into the abdomen after ovariotomy. In addition it is necessary, if the state of the circulation allows it, if the strength of the heart does not seem to be affected to an irremediable extent, to hasten and inject into the cephalic vein about a litre of sterilised water at 38°C. containing 6 per 1,000 of chloride of sodium. The only apparatus needed is a disinfected trocar and canula, and a glass reservoir provided with an india-rubber tube 1 metre long, both of which have been sterilised by boiling water. If the pulse was so small that it might be considered dangerous to suddenly increase the
amount of fluid in the vessels, 100—200 grammes of salt water should, by preference, be injected into the subcutaneous cellular tissue in small quantities, where it would very quickly be absorbed.*

*Septicæmia* may arise in different ways. It may arise from faults in the operation, from insufficient antisepsis, and particularly from incomplete asepsis; but the most frequent cause is certainly infection of the peritoneum by germs come from without through the intermediary of the pedicle, if it be returned into the abdomen. Hence the precautions recommended of destroying the mucous membrane, of carefully apposing the surfaces so as to obtain complete occlusion, and hence also the other methods of treating the pedicle.

The constriction of sutures clearly does not suffice to explain the mortification of a returned and sutured pedicle. It is well known that in the absence of bacterial action, tissues deprived of blood only undergo a granulo-fatty change. Moreover, the circulation may be re-established by adhesions, or even by bridges of tissue thrown over the ligature, which is thus gradually encapsuled. The action of micro-organisms is indispensable.

Some cases have been observed of late or secondary infection of the sutures of a returned stump, whether they be threads of silk or elastic bands. Infection may then have come through the Fallopian tubes (such a case has been seen after a difficult labour), or perhaps even through the intestinal walls by reason of some temporary paralysis of the gut. Lastly, in some cases latent bacterial parasitism may be invoked as an explanation. But in any case, fatal events by pelvic suppuration and peritonitis supervening long after the pedicle has been abandoned are not very rare.

Abroad in the first place, and later, in France, under the name of *shock*, has been included a series of symptoms of depression arising from very various causes, in the midst of which death supervenes as the result of operations that are serious or of long duration. There is no doubt that a large number of these cases may be imputed to haemorrhage, the importance of which some operators are too much inclined to disregard. Other cases are perhaps nothing but acute uræmia, arising either from the

accidental ligature of the two ureters or from the complete
abolition of the functions of the kidneys, which already had
long undergone degenerative changes, as a result of traumaatism
and the absorption of anaesthetics. Then, too, degeneration of
the heart, which has been thoroughly studied by Hofmeier, * and
on which I have already dilated at some length, must be
accused in a very large number of cases. This myocarditis is
more common than is ordinarily supposed in enfeebled women.
Cohnheim † has shown that persistent hæmorrhages alone are
sufficient to bring about fatty degeneration of the cardiac muscle.
Ungar and Strassman ‡ have especially pointed out in these
cases the harmful effects of chloroform. Various writers § have
further shown that the action of antiseptics upon the heart
cannot be neglected. A certain part in the production of
phenomena of depression must also be attributed to the exposure
and the manipulation of the viscera, the influence of which has
been well demonstrated by Goltz’s experiments on abdominal
shock and by Olshausen’s observations on evisceration. || To
these various causes of prostration Landau † thought he could
add chronic intoxication by ergotine, which produces weakening
of the heart, ** and even the similar action of iodine. †† These
substances have sometimes been absorbed in large quantities
by reason of the hypodermic or intra-uterine injections to which
so many patients operated upon for fibroids have long been
subjected.

Against shock, in the first place as a preventative measure,
must be recommended the adoption, in enfeebled patients or
those in whom the circulatory system is affected, of the mixed
method of anaesthesia with a preliminary hypodermic injection of
morphia and atropine (p. 38). I cannot lay too great stress
upon the especial necessity of performing the operation with

p. 366).
rapidity; the depressing action of any laparotomy which lasts over an hour is aggravated by considerable proportions. Care must also be taken to avoid completely any exposure of the intestines to the air. This can be done by protecting them with warm compress-sponges, and keeping the abdominal opening pressed together as soon as the tumour has been drawn outside. Further, ordinarily, only a small incision should be made; the tumour should only pass through it with a certain amount of difficulty as through an elastic button-hole, and, if necessary, its exit from the abdomen must be facilitated by rotating it upon its axis, or even by pushing it up forcibly from below, an assistant introducing his fingers into the vagina for this purpose.

To combat the symptoms of extreme depression and of chill, friction with warm cloths, hypodermic injections of ether, alternating every quarter of an hour with injections of caffein, should be resorted to.* Lastly, if it be supposed that acute anaemia may have some share in producing the symptoms, injections of 100 to 200 grammes of sterilised water, lukewarm and containing 6 per 1000 of common salt, should be given under the skin over the sub-clavicular region.

Embolism† has caused the death of several patients even during convalescence. Too much stress cannot be laid upon the necessity of absolute repose, especially if the tumour was very vascular, or if the broad ligaments were varicose.

Intestinal obstruction has been seen after hysterectomy, as after all abdominal operations.‡ But the fact must not be disguised that some of the cases published under this category were only pseudo-strangulation due to intestinal paralysis, which indicated an unrecognised infective peritonitis.

To steer clear of this terrible complication, the surgeon should be very cautious in the use of antiseptics in the abdominal cavity, if he should not abstain from their use entirely. These substances react with extreme intensity upon the delicate epithelium

* The following is the formula for this injection:—

Sodii benzoatis ... ... ... ... 1 gramme.
Caffein ... ... ... ... ... 1 "
Aq. Dest. ... ... ... ... ... 3 "

† Péan. Lectures on clinical surgery, 1879, p. 309.
of the serous membrane, and predispose to the exudation of plastic material. Further, so far as possible, no bleeding surface ought to be left in the abdomen. The divided surface of stumps should be covered with peritoneum most carefully stitched together; and by overcasting with catgut, the broad ligaments should be closed, if they have been divided or torn in any way during the manœuvres of decortication.

In treating the intestinal obstruction, we ought, before deciding to re-open the abdomen, to try the method recommended by Leopold,* which consists in giving forced enemata, composed of a warm infusion of chamomile, to which has been added some oil and some soap; after this has been given the patient should be kept lying on her side.

Statistics of hysterotomy.—Comparison of the results of various methods.—It is extremely difficult to establish by statistics the real gravity of the operation, as the majority of writers have not taken pains to divide their observations into comparable categories. In the same way, it is not legitimate to place side by side a typical supra-vaginal amputation and a decortication of large pelvic fibromata. There is more difference between these two operations than between an amputation of the leg and an amputation of a thigh. However, from the lack of better material, we are obliged to have recourse to statistics. Below are the most recent, for it would evidently not be fair to take into great account the older observations, in which the method was incomplete and the antiseptis insufficient.† This first series is borrowed from Paul Wehmer:‡

† In 1875, in my Thesis (on the value of hysterectomy, &c.), I was able to collect 119 cases with 77 deaths, or 64 per cent.—Four years later, Letousey, in his Thesis (Supra-vaginal hysterectomy in the treatment of uterine fibroids, Paris, 1879) found 84 cases of later date than my own with 36 deaths, or about 43 per cent.—Gusserow (Die Neubildungen des Uterus, 1886), collecting the cases between 1878 and 1888, obtained the considerable number of 533 cases with 185 deaths, or 34·8 per cent.—On the other hand, Vautrin, out of 173 new observations he collected on the occasion of his Thesis (The surgical treatment of uterine fibroids, Paris, 1886), found 68 deaths, or 39 per cent.
### A. Intra-peritoneal method.

<table>
<thead>
<tr>
<th>Surgeon</th>
<th>Number of operations</th>
<th>Deaths</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gusserow</td>
<td>19</td>
<td>6</td>
<td>31.6%</td>
</tr>
<tr>
<td>Kaltenbach</td>
<td>5</td>
<td>3</td>
<td>60.0%</td>
</tr>
<tr>
<td>Martin</td>
<td>86</td>
<td>15</td>
<td>17.4%</td>
</tr>
<tr>
<td>Olshausen</td>
<td>29</td>
<td>9</td>
<td>31.0%</td>
</tr>
<tr>
<td>Spencer Wells</td>
<td>26</td>
<td>10</td>
<td>38.4%</td>
</tr>
<tr>
<td>Shröder</td>
<td>135</td>
<td>41</td>
<td>30.0%</td>
</tr>
<tr>
<td>Tauffer</td>
<td>12</td>
<td>4</td>
<td>33.3%</td>
</tr>
</tbody>
</table>

**Total:** 312 operations, 88 deaths, 28.2% mortality.

### B. Extra-peritoneal method.

<table>
<thead>
<tr>
<th>Surgeon</th>
<th>Number of operations</th>
<th>Deaths</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bantock</td>
<td>22</td>
<td>2</td>
<td>9.0%</td>
</tr>
<tr>
<td>Hegar</td>
<td>22</td>
<td>6</td>
<td>27.2%</td>
</tr>
<tr>
<td>Kaltenbach</td>
<td>22</td>
<td>1</td>
<td>4.5%</td>
</tr>
<tr>
<td>Keith</td>
<td>38</td>
<td>2</td>
<td>5.3%</td>
</tr>
<tr>
<td>Péan</td>
<td>52</td>
<td>18</td>
<td>34.6%</td>
</tr>
<tr>
<td>Tauffer</td>
<td>17</td>
<td>2</td>
<td>11.7%</td>
</tr>
<tr>
<td>Spencer Wells</td>
<td>20</td>
<td>10</td>
<td>50.0%</td>
</tr>
<tr>
<td>Lawson Tait</td>
<td>54</td>
<td>20</td>
<td>37.0%</td>
</tr>
<tr>
<td>Thornton</td>
<td>15</td>
<td>2</td>
<td>13.3%</td>
</tr>
</tbody>
</table>

**Total:** 262 operations, 63 deaths, 24.0% mortality.

Zweifel has recently collected amongst German surgeons the elements of a new series:

### A. Extra-peritoneal method.

<table>
<thead>
<tr>
<th>Surgeon</th>
<th>Number of operations</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. Braun von Fernwald (1880-87)</td>
<td>63</td>
<td>12</td>
</tr>
<tr>
<td>Féhling</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>Gusserow</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Kehrer</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Leopold</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>Saxinger</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Schauta</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Schultze</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Werth</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Zweifel</td>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

**Total:** 130 operations, 29 deaths.

*Zweifel. Die Stielbehandlung bei Myomektomie, 1888.*
B.—Intra-peritoneal method.

<table>
<thead>
<tr>
<th>Surgeon</th>
<th>Number of operations</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. Braun von Fernwald</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Dohn...</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Fehling</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Gusserow</td>
<td>23</td>
<td>6</td>
</tr>
<tr>
<td>Kehr...</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Leopold</td>
<td>19</td>
<td>7</td>
</tr>
<tr>
<td>Runge...</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Saxinger</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Schauta</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Schultze</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Werth...</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>Winckel</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Zweifel</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>116</strong></td>
<td><strong>38</strong></td>
</tr>
</tbody>
</table>

In this series the mortality for the extra-peritoneal method is 22.3 per cent., and even if we subtract Braun’s exceptional results it remains only 25.3 per cent.

The mortality by the intra-peritoneal method is 32.7 per cent. It is seen that the relative benignity of the extra-peritoneal method is shown by these figures in a startling manner.*

The following objection has been made to these statistics: in the preceding lists the avowed partisans of the extra-peritoneal treatment (such as Kaltenbach, Thornton, Skene Keith) are seen also to figure amongst the operators by the intra-peritoneal method; it is, therefore, evident that their cases were not similar in the two series, and very probably those in which they abandoned the pedicle in the abdomen were more serious than those to which they applied their favourite method. To obtain statistics free from this objection it is necessary therefore to take the figures of surgeons who practice exclusively the intra-

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* A. Büchel (Beiträge zur operativen Behandlung der Uterusmyome. Inaug. Dissert., Basel, 1890) has published a still more recent table of statistics. Fehling, out of 14 cases of extra-peritoneal treatment of the pedicle, had a mortality of 7.14 per cent. On 132 operations performed by Hegar, Kaltenbach, Keith, Bantock, Fehling, and Fritsch, by the same method, the mortality rose to 12.9 per cent. Schröder, Olshauen, Martin, and Gusserow employed the intra-peritoneal treatment in 133 cases, and the mortality mounted to 30.8 per cent. Frommel, Landau, and Hofmeier, operating in the same way, in 57 cases had a mortality of 14 per cent.
peritoneal treatment of the pedicle. Below is this list, extracted from the preceding:

<table>
<thead>
<tr>
<th></th>
<th>Number of operations</th>
<th>Deaths</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Martin*</td>
<td>86</td>
<td>15</td>
<td>17.4 per cent.</td>
</tr>
<tr>
<td>Olshausen</td>
<td>29</td>
<td>9</td>
<td>31.0</td>
</tr>
<tr>
<td>Schröder</td>
<td>135</td>
<td>41</td>
<td>30.1</td>
</tr>
<tr>
<td>Gusserow</td>
<td>23</td>
<td>6</td>
<td>26.0</td>
</tr>
<tr>
<td>Schultze</td>
<td>12</td>
<td>3</td>
<td>25.0</td>
</tr>
<tr>
<td>Werth</td>
<td>11</td>
<td>3</td>
<td>27.2</td>
</tr>
<tr>
<td>Dohrn</td>
<td>9</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Leopold</td>
<td>19</td>
<td>7</td>
<td>36.8</td>
</tr>
<tr>
<td>Runge</td>
<td>11</td>
<td>4</td>
<td>36.3</td>
</tr>
<tr>
<td>Zweifel (since his exclusive adoption of the intra-peritoneal partially juxta-posed ligature); first series of operations</td>
<td>10</td>
<td>1</td>
<td>10.0</td>
</tr>
</tbody>
</table>

345 89

The mortality falls in reality therefore by this list to 25.79 per cent.

But if a corresponding selection be made in the series relating to the extra-peritoneal method, and if the cases of Schultze and Werth, who are notorious partisans of the opposite method, be eliminated, the mortality in this case falls to 21.6 per cent. Its superiority still remains.

This superiority also shows itself in the latest statistics.

Tauffer† out of 51 hysterectomies had 12 deaths, or 23.5 per cent. (the hysterectomies being extra-peritoneal).

Fritsch‡ in the operations in which he adopted the extra-peritoneal treatment of the pedicle (slightly modified, being an intra-parietal method similar to that of Wölfle and Hacker), had five deaths only out of 23 cases, whereas he had at first 11 deaths out of 27 cases, using Schröder's intra-peritoneal method. Albert§ out of 30 operations only counted one death, operating by the extra-peritoneal method.

* Martin (Centr. f. Gyn., 1890, p. 797) has since published a less happy series; out of 135 cases he had 46 deaths, or 34 per cent.
† Tauffer (Centr. f. Gyn., 1889, No. 20, p. 350) says, by error, 22.2 per cent.
C. Braun* in his last series (1887—1890) of 38 hysterectomies with extra-peritoneal treatment only lost four patients, or 10.5 per cent; he performed two hysterectomies with intra-peritoneal treatment of the pedicle, both of which ended fatally.

Hegar has communicated to Nicaise† his series of operations from June, 1887, to May, 1889. It comprises, besides two myomectomies for pediculated fibroids that were cured, 18 supra-vaginal hysterectomies for interstitial fibroids, all of which recovered, and 12 hysterectomies for intra-ligamentous tumours with only two deaths (one being at the end of four months, the other at the end of five months).

Terrier, in a series of 38 hysterectomies with extra-peritoneal treatment of the pedicle, lost 15 patients, or 39.4 per cent. Eight times he returned the pedicle into the abdomen, and registered a death on four occasions, or 50 per cent.‡

Segond, in 20 cases in which he has performed abdominal hysterectomy by the extra-peritoneal method, has had nine deaths, or 45 per cent.§

Treub,|| out of 57 cases where he has treated the pedicle by the intra-peritoneal method, has only had five deaths, or 8.7 per cent. The same method has yielded to Richelot¶ three deaths out of 16 cases or 18 per cent.

Leopold,** operating by both methods, has had seven deaths out of 34 cases, or 20.5 per cent., by the extra-peritoneal treatment, and five deaths out of 22 cases, or 22.7 per cent., by the intra-peritoneal treatment.

Finally, at the last Surgical Congress,†† Terillon gave the statistics of his abdominal hysterectomies; out of 54 cases he had six deaths. The 54 cases are divided thus: 28 cases with internal

* Egon Braun von Fernwald. Beiträge zur Lehre der Laparotomien, &c., Vienna, 1890, p. 8.—I deduct from the 43 cases with six deaths cited by this writer, five cases with two deaths that had been operated upon by C. Braun's assistants.
§ P. Segond. Ibid., p. 689.
|| Cf. Kikkert. Die Stielbehandlung bei Myomohysterektomie. Inaug. Dissert., Leyden, 1891.—In this same work the author has criticised 11 cases of Mendes de Leon, with two deaths, and 25 cases of von Mey, also with two deaths.
treatment (three deaths); 26 cases with external treatment (three deaths).

Personally, I have remained a partisan of the extra-peritoneal treatment, which in 16 cases (February, 1889, to November, 1891) has given me three deaths, and one of the patients succumbed in consequence of cerebral trouble at the end of two months.

But it must be recognised that each of these methods has its special inconveniences and its dangers.

The existence in the middle of the abdominal wound of a pedicle that is destined to mortification, forms at the very outset a striking point of inferiority in the extra-peritoneal method, although the use of the new powder dressing, introduced by Kaltenbach, greatly diminishes the risks that might arise from this mortification. This method is also open to the objection that recovery is slower, and that a weak spot is left in the abdominal wall.

These disadvantages are compensated by a greater safety. The certain arrest of haemorrhage by means of the elastic ligature and an exit for the secretions of the pedicle do away with the double fear of internal haemorrhage and peritoneal infection, which is always a subject of anxiety when a pedicle is returned into the abdomen, and especially if the uterine cavity has been opened.

The truth is, that neither one or the other method can be absolutely proscribed; rather a well-reasoned choice must be made between them from the merits of the individual case.*

What are the dangers of the intra-peritoneal method, for it is plain that theoretically it is an ideal method? They are, extreme vascularity of the pedicle, rendering arrest of haemorrhage impossible without a great number of sutures, which in itself exposes to the dangers of sloughing and septicemia; opening of the uterine cavity, which gives access to micro-organisms come from the vagina. In two words, the dangers are in bleeding pedicles and in hollow pedicles (I mean by this term those in which the uterine cavity has been opened). These latter ought decidedly to be treated by the simple or the mixed extra-peritoneal method, which is precisely the one that will guard against their dangers. For the others, on the contrary, the

* S. Pozzi. The treatment of the pedicle in hysterotomy, and the elastic ligature (French Congr. of Surgery, 1st sitting, Paris, 1885. Reports, p. 537).
intra-peritoneal may be adopted. It must be noted that when there is suppurative or gangrenous inflammation of the tumour the extra-peritoneal treatment becomes obligatory.*

The following table gives in a glance the precepts which guide me in the choice of a procedure for abdominal hysterectomy:

**Pedicles, not vascular, and solid** (uterine cavity unopened).

**Pedicles, not vascular, and hollow** (uterine cavity opened).

**Pedicles very vascular.**

Absence of pedicle: interstitial or sub-mucous tumours, easily enucleated.

Ligature or suture with silk and catgut and abandonment of the pedicle in the peritoneal cavity (Schröder's method).


- b. Of insufficient length: mixed treatment with the elastic ligature (Sänger's method).
- c. Excessively short: intra-peritoneal treatment with hidden elastic ligature (Olshausen's method), or complete hysterectomy (Bardenheuer's method).

- a. Lateral portions of the uterus (very vascular): supra-vaginal hysterectomy and extra-peritoneal treatment of the pedicle (Hegar).
- b. Posterior or anterior surface of the uterus (not vascular): enucleation, suture of the capsule, intra-peritoneal treatment (Martin's method).
- c. Idem, the uterine cavity being opened during enucleation: supra-vaginal hysterectomy, extra-peritoneal treatment (Hegar).

Absence of pedicle: tumours excavating the pelvic cellular tissue or enclosed between the layers of the broad ligaments.

\[
\begin{align*}
\{ & a. \text{ Small tumour easily enucleated: decortication, complete suture of the pocket, no drainage.} \\
& b. \text{ Large tumour easily detached from the uterus, but leaving a large bleeding cavity or pocket: decortication, partial resection and superficial suture of the pocket; drainage by the vagina (Martin), or drainage through the abdominal wound, according to circumstances; if necessary, plugging with iodoform gauze. Uterus not interfered with.} \\
& c. \text{ Idem, with very close and vascular adhesions to some lateral portion of the uterus: supra-vaginal hysterectomy (for the treatment of the pedicle see above). Suture and drainage of the pocket, with or without plugging.}
\end{align*}
\]
CHAPTER V.

CASTRATION FOR FIBROID TUMOURS.


Clinical medicine has long known that the cessation of the female generative existence very frequently brings about a remarkable quiescence of the symptoms arising from fibromata; the hæmorrhages stop and the tumour itself diminishes and atrophies in a considerable number of cases. From this has arisen the idea of hastening the appearance of this favourable period by removing the ovaries, and thus bringing about an artificial menopause.

Castration* had already been performed in 1872 at almost the same time by Battey† and by Hegar for painful

* The term "castration," which has given rise to numberless discussions, ought to be reserved exclusively to designate the removal of healthy, or supposed healthy, ovaries, done with the object of modifying some function. This is the way in which Schröder and Hofmeier (Grundriss der gyn. Oper., p. 315) regard it, while Hegar applies the term to the removal of a healthy or a diseased ovary, so long as "it does not form a definite tumour" (Cedtr. f. Gyn., 1878, No. 2, p. 25; ibid., 1887, No. 44, p. 698, and Oper. Gyn., 3rd edit., p. 341). This definition is clearly insufficient, for then the removal of a small cyst must be called by turns, castration when it is the size of the fist, ovariotomy when it is of the size of the head. Battey and the Americans designate castration under the name of normal ovariotomy. It has also been termed oophorectomy. Confusion must, however, not be made between operations of this kind, in which the ovary and the tube are removed as being a centre for reflexes, either hæmorrhagic or painful, and operations in which these parts are removed for some disease which has been diagnosed previous to opening the abdomen. In this latter case it is rather salpingo-oophorectomy, which has been especially brought into notice by Lawson Tait, that is performed. Perhaps it would be advisable to differentiate them better than is ordinarily done, into different categories. The term castration would then be reserved for removal of appendages supposed to be healthy, and divided into hæmostatic castration (Trenholme, Hegar) and analgesic castration (Battey). The terms oophorectomy and salpingo-oophorectomy (Lawson Tait) would designate the extirpation of inflamed appendages (salpingitis, ovariis). Much confusion would be avoided in this way. An attempt at nomenclature in this direction has already been made by Mundé, in "A year's work in laparotomy" (Amer. Journ. of Obst., 1888, vol. 21, p. 25).

dysmenorrhoea, and surgeons had begun to be familiarised with this operation when Trenholme* published in 1876 the first known case of castration for fibroid of the uterus; Hegar performed it with the same object a few months later. There is no doubt that Hegar was unaware of Battey’s and Trenholme’s operations at the time when he conceived the idea and put it into execution, but there is not the slightest doubt that the publications of these writers are anterior.† None the less, Hegar remains the great propagator of this operation, which his and his pupil Wiedow’s‡ works have done so much to popularise. In England the chief impulse was given it by Lawson Tait.§ In France the works of Duplay,|| Tissier¶ and Segond** must especially be noted.

It is not yet easy to clearly point out the indications for this operation. Hegar+++ has actually gone so far as to recommend it in all cases in preference to hysterectomy, which is more serious, allowing that the latter operation may later be performed if the effect of castration is not sufficiently good. He enumerated the diverse varieties of fibroid in which it has been successfully employed, and he finds no exception. Even in a case of fibro-cystic tumour, Thornton†† obtained good results therefrom. Nevertheless, there is no doubt that there are some cases in which the operation is dangerous, by reason of its consequences, even when it is easy of performance, and that

* Trenholme. — Amer. Journ. of Obstet., 1876, p. 702.—Trenholme’s operation was in January, 1876; Hegar’s in August of the same year. Lawson Tait (B. M. J., Aug. 15, 1883) asserts that he had performed castration for a uterine fibroid in August, 1872. Unfortunately his vindication comes too late for any account to be taken of it.


+++ Hegar and Kaltenbach, loc. cit., p. 378.

there are other cases in which it is dangerous by reason of the inherent difficulties of its accomplishment.

In the first class of castrations come those which are performed for very large solid or fibro-cystic tumours.* Here there is a danger lest castration by the obliteration of the arterial, venous, and lymphatic vessels that it produces, should lead to rapid and formidable alterations in the nutrition of the fibroid mass. Edema has sometimes been seen which could own no other cause than the stoppage of the venous or lymphatic flow, in other cases it has been the precursor of mortification; thrombosis and consecutive embolism are especially to be feared if the tumour and the broad ligaments contain any large vessels.

Again, castration may be primarily a dangerous operation if it be rendered difficult by very vascular adhesions, or by the complete effacement of the expansions of the broad ligament, as occurs in the case of some intra-ligamentous tumours; then immediate haemorrhage is the especial cause of anxiety.

It is agreed to place these considerations in the front rank, for it is they that regulate the indications of the operation. They might perhaps be formulated in the following way: Whenever castration will be a much less serious operation than hysterectomy, and hysterectomy is not formally indicated by symptoms of compression, castration is the operation of election.

Hysterotomy should take precedence over castration in the case of pediculated fibroids (myomectomy) for two reasons: first, because it is relatively less serious; and secondly, because in this variety of fibroid haemorrhage is the least important symptom, and it is as treatment against haemorrhage that castration is especially directed.

Interstitial fibroids of abdominal evolution, small or of medium size, may be treated by castration if the only result to which they lead is loss of blood; the same holds good for intra-ligamentous and pelvic fibroids at the commencement of their evolution.

An anaemic condition of the patient should also be a special indication for removal of the ovaries in preference to that of the uterus.

In short, castration is contra-indicated in the case of very

* It is noteworthy that, on the contrary, hysterectomy seems less severe when the case is one of fibro-cystic tumour than when the tumour is solid (Gusserow, loc. cit., p. 293).
large tumours (danger of oedema and sloughing), of tumours even of moderate size occasioning severe symptoms of compression, of fibro-cystic tumours (on account of the relative benignity of hysterectomy and the rapid growth of these tumours), and of telangiectatic tumours (danger of thrombosis).

Such are the indications which can direct the surgeon towards a choice of an operation.

It is impossible, however, to formulate these indications in a perfectly definite manner before opening the abdomen. In fact, as many writers have justly said, castration in such a case always begins by an exploratory incision. It is then that the surgeon can fully appreciate the connections of the tumour and the greater or lesser dangers of intervention.

There is, therefore, side by side with castration determined on by choice before the operation a castration of necessity, determined upon during the operation (or, rather, a castration of secondary choice it should be called), when opening of the abdomen has demonstrated the extreme danger of a premeditated hysterectomy, while at the same time it indicates the possibility and the utility of extirpating the ovaries.

Terrillon has endeavoured to give a precise basis to the indications for castration by making them depend upon a positive and easily appreciable sign, the extent of the uterine cavity. According to him, castration gives its best results when the cavity measures from 11—14 cm. When it measures 18, 20, or 23 cm. there is little hope of obtaining a favourable result. He therefore advises that in all cases the uterine cavity should be measured by means of his flexible dial-plate hysterometer. In a word, this direction reduces itself to demonstrating anew the dangers of removing the ovaries in the case of large interstitial tumours, one of the chief signs of which is extreme increase in length of the uterine cavity. But there is every reason why such a diagnosis should be arrived at without the assistance of passing the sound. As Winter’s experiments have clearly shown,* the sound introduces into the uterine cavity micro-organisms which normally inhabit the cervix, and auto-infection of the patient would thus be induced on the very eve of an operation.

Passage of the uterine sound—if a rigid instrument be used—may be dangerous for yet another reason: it is then very easy to form false passages on account of the sinuosity of the cavity produced by the projection of the tumours into it and the softness of the mucous coat, which has generally undergone alteration. Suppuration of the fibroid and death have been witnessed as the result of such an exploration.*

Method of operation.—The most favourable time for performing the operation is the week succeeding to menstruation. The preparation for the operation and the precepts for opening the abdomen are the same as in every other laparotomy. Hegar recommends expressly that the position of the ovaries should be exactly determined by palpation before commencing to operate. The precaution is a very useful one, but it is not always possible to acquire exact information on this point before opening the abdomen.

There are three ways by which the ovaries may be reached: through the median line, or the lateral portion of the belly, or the posterior vaginal cul-de-sac. The first alone is really practicable in the immense majority of cases in which castration is undertaken for fibroids.

The lateral incision in the flanks should theoretically present some advantages, since the surgeon can arrive directly at the ovary, which is often greatly thrown backwards by the projection of the tumour. Hegar, following the example of veterinary surgeons, practised it at first. But he seems to have abandoned it by reason of the very real inconveniences which it presents: the necessity of a double wound, the very great retraction of its lips, the greater vascularity of the tissues in this region, &c. Lastly, it could only be for very large fibromata that this lateral displacement of the incision would be necessary, and I have already said that castration under these circumstances is a dangerous operation which ought not to be deliberately undertaken.

The vaginal incision finds its chief indication in that form of castration which I have qualified by the term analgesic (Battey's operation), performed in the absence of a tumour, and when prolapse of the ovary into Douglas's pouch can be made out. But

it is a deplorable method when the appendages are carried by a fibroma above the upper vaginal reflexion. Moreover, there is a possibility of confounding a small lobulated fibroid with a prolapsed ovary when digital examination is relied upon. Lastly, the danger of bleeding from a dilated vessel of the broad ligaments here takes on an extreme importance on account of the depth at which the operation is being performed.

**Median incision in the linea alba.**—When castration is undertaken the surgeon ought never to lose sight of the fact that he may be forced to perform hysterectomy, and every precaution should be taken in view of this eventuality.

**First stage. Opening the abdomen.**—The incision is made between the umbilicus and the pubis, higher or lower according to the height at which the appendages are supposed to have been carried by the fibroid. At first the incision ought not to be more than 8 cm. in length, sufficient for the insertion of two or three fingers. The surgeon proceeds rapidly down to the peritoneum, quickly placing clips upon any vessels of importance, but not waiting to pay attention to smaller ones. As soon as he reaches the peritoneum he should proceed more carefully, and should incise a fold of the serous membrane with the knife held on the flat; then in this button-hole should be placed a director. By this means wound of a coil of bowel, or of the surface of the tumour, will be avoided; the least grazing of the latter might be the source of very troublesome bleeding.

The incision being very small, and there being a possibility, in consequence, of its edges being drawn upon and injured when the tumour is of any size, it is advisable, following Hegar's advice, to insert at once some stitches above, below, and on the sides, so as provisionally to unite the serous membrane to the other layers of the abdominal wall. These threads at the same time serve to widen the abdominal wound.

**Second stage. Search for and removal of the ovary.**—A very narrow compress-sponge is introduced by one of its angles into the wound, and serves to press back the intestine and the mesentery. The first and second fingers of the right hand are thrust deeply into the wound and take their position upon the fundus of the uterus previous to going in search of the ovary, which is seized, as well as the fimbriated extremity of the tube, between these two fingers and drawn out of the wound. An
assistant immediately after draws the edges of the abdominal wound together. To obtain a stronger hold upon the ovary the fingers may be replaced by a pair of forceps. Some surgeons use special forceps for that purpose, but any forceps will do, especially if they are long and slightly curved so as to pass beneath the ovary and the fimbriated extremity of the tube. A blunt needle provided with a double thread is then thrust through the expansion of the ovary and tube (fig. 172). It is my custom when removing the appendages to tie the pedicle by a Lawson Tait’s knot (fig. 31, 6); it is quick to tie, and only leaves one single knot in the peritoneal cavity. But if the pedicle be at all large and widespread it is better to tie it with two interlacing threads.

It is rational and practicable to include the tube in the removal of the ovary, and the more so inasmuch as it is often the subject of chronic inflammation, and its removal contributes greatly to the disappearance of the pains and the bleeding.

If the pedicle is very short the surgeon may add to ligature en masse (which might slip) some complementary ligatures on the vessels, the lumen of which should be most carefully sought for on the surface of the section. In this case he must also carefully satisfy himself that the ligature has been placed well below the ovary, and that no portion of the organ, more or less drawn out, has escaped from its grasp. This flattened, and, so to speak, crushed form of the ovary, causing it to resemble a dried pear (poire tapée), is very remarkable in some cases of fibroids.

I next prefer, following Hegar’s example, for the sake of safety, to cauterise the pedicle with the thermo-cautery so as to destroy some depth of the tissues. If any vestige of ovary remains it will thereby be destroyed, or, at all events, will be so profoundly altered that it will be afterwards absorbed. The success of the operation would very likely be compromised if any such vestiges were left; besides, as P. Müller* has shown, they may themselves become the seat of cystic new formations.

This cauterisation may be carried out over a pair of forceps provided with a protecting layer of ivory, to which Hegar has given a double curvature; they are very convenient when the

pedicle is deep (fig. 171). But I generally content myself with a large ordinary curved pair of forceps for seizing the appendages above the ligature, and I isolate it from the subjacent parts by a damp compress-sponge. Instead of dividing the tissues with the thermo-cautery, which is slow, I prefer only to employ it after having divided the pedicle with scissors, leaving finally above the ligature a small portion, about half a centimetre in length, which I dry up gradually with short applications of the thermo-cautery brought to a dull red heat. This cauterisation, besides destroying the last traces of the ovarian tissue, is at the same time hæmostatic and antiseptic.
Whenever it is possible, that is to say, when the ovary may easily be drawn outwards, I avoid the use of the forceps. Seizing the ovary and tube in the left hand, I divide its pedicle in three-quarters of its extent with the scissors one centimetre above the ligature. Then, taking the thermo-cautery and holding the pedicle by means of the non-divided portion which is still in connection with the ovary, I cauterise the cut surface of the section, and only in the last place detach the extreme edge of the pedicle by means of the thermo-cautery.

The ends of the ligatures of the pedicle should only be cut after having made thoroughly certain that there is no oozing of blood from its surface, and that the ligatures themselves are properly fixed. But it is better to cut them immediately after the removal of each set of appendages, for if this point were left till the end of the operation, leaving the ends very long under the pretext of a final revision, the surgeon would expose the patient to the danger of further dragging upon the parts.

The removal of the second ovary is then proceeded with in a similar fashion.

It may happen that an incision as small as the one that I
have recommended may not allow of the surgeon's pursuing the operation sufficiently at his ease; it is then much better to enlarge it than to use any force; the incision may be enlarged either upwards or downwards. It would, however, be dangerous to make too large an opening, and he must beware of dividing the insertion of the rectus muscle to the pubic bone, as has nevertheless been recommended. If the intestines are in the way they may be pressed back more easily by placing the patient in a very sloping position, so that these viscera fall towards the diaphragm (vide the inclined dorso-sacral position).

Plugging of the vagina and of the rectum to raise the organs above the true pelvis, introduction of the fingers into the vagina with the same object, can under these circumstances rarely be so necessary as they are in ordinary operations of castration, since the ovaries are much more likely to be found above their normal situation, rather than below it.

Evisceration, or temporary extraction of the mass of the intestines, which are enveloped in warm aseptic compresses, certainly gives a great deal of room; it is an exceptional proceeding, but occasionally is necessary. I shall return to it at greater length when dealing with the treatment of the inflammatory lesions of the appendages by laparotomy.

In no case must the imprudence be committed of withdrawing the fibroid mass outside the abdomen; it would become congested and swollen, and its return would be very difficult; moreover, one would run the risk of thrombosis and of embolism. But it will be found an advantage to make it pivot on its axis inside the abdomen, so as to make the appendages more easy of access.

Adhesions of the ovary and tube to neighbouring parts ought not to be broken down except with great precaution, and, as far as possible, under the control of sight, on account of the considerable development of the venous circulation that sometimes accompanies the growth of fibroids.

Shortness of the broad ligaments, and in particular of the ovarian expansion, may constitute an insurmountable difficulty, the ligatures slipping and no pedicle being able to be formed. In such a case Hegar was obliged to terminate the operation by hysterectomy, so as not to lose his patient by hæmorrhage. One
would first endeavour to arrest the bleeding by a strong overcasting ligature. Sometimes, as Hegar* has done, the surgeon might succeed in forming a hidden elastic ligature on the ovarian pedicle.

Some surgeons attribute in castration very great importance to ligature of the tubo-ovarian vessels without absolute removal of the ovary. It would act by bringing about fatty degeneration of the ovary, or by directly modifying the vitality of the uterus and the nutrition of the new-growth, atrophy of which would thereby be favoured.† This “atrophy-producing ligature” (von Antal) that it would certainly be wrong to recommend as a procedure of choice, should it be kept even as a procedure of necessity when removal of the ovaries presents insurmountable difficulties or too considerable dangers? Terrier has declared himself in its support, and Segond‡ accepts it as an operative expedient likely to diminish the number of laparotomies that are simply exploratory. I confess that such a consideration has but little effect upon me, and that this “expedient,” the utility of which is problematical, does not seem to me entirely inoffensive.

Unilateral castration seems to have originated much rather by reason of the necessities of operation than by reason of any theoretical conceptions; these latter were only brought to its support afterwards to legitimise the operation. Sims, Battey, and their followers have evidently taken a wrong step in recommending the procedure.

It would be much better, if the two ovaries cannot be removed, to reclose the abdomen as quickly as possible without stopping to place an “atrophy-producing ligature” upon the theory of its diminishing the flow of blood. It is, however, by this mechanism that it has been asserted that unilateral castration has had in some cases a certain influence upon the development of a definitely unilateral myoma.

Removal of the ovary is here only rational when it is performed on both sides so as to produce an artificial menopause.

Third stage. Toilette of the peritoneum. Suture.—This

* Hegar and Kaltenbach, loc. cit., p. 399.
toilette is, as a rule, very rapidly completed so long as there has been no rupture of a tubal cyst, or of a cyst in the broad ligament, a condition which sometimes co-exists with fibromata. The silk threads passed through the abdominal walls at the commencement of the operation should now be removed and the peritoneum stitched with a continuous catgut suture, after which the musculo-aponeurotic layers are to be united. Suture of the skin and of the subcutaneous tissue with interrupted stitches of strong silk and a few supplementary stitches with fine catgut finishes the operation (figs. 158, 160).

If the lips of the wound have been very greatly chilled and are somewhat bruised, it is advisable to insert a small drainage-tube between the suture of the muscles and that of the skin; the tube should be removed after twenty-four hours.

The peritoneal cavity should not be drained unless pus (pyosalpinx) has been poured out into the abdomen, or, again, if the operation has been exceptionally long and laborious; in the former case the peritoneal cavity should be previously well flushed with warm water.

*After treatment.*—A short time after the operation a considerable degree of metrorrhagia often supervenes; this should not surprise the surgeon, and should be treated by warm vaginal injections and hypodermic administration of ergotine.

It is necessary not to apply too much pressure to the abdomen on account of the presence of the tumour, and of the intestinal sluggishness which always follows upon laparotomy. It would even be better to place the patient in a somewhat inclined position, by raising the pelvis so that the mass of intestines may come to occupy the upper part of the abdomen. An emollient enema ought to be given after the third day to aid expulsion of the accumulated gas.

*Statistics of the operation. Results.*—Agreeably to the method that I have adopted I shall indicate the results obtained in the practice of those surgeons who have the greatest authority upon this special subject.

Hegar* out of 55 operations had 6 deaths, or very nearly 11 per cent., of which 5 were from septicæmia (one case coming from an infection that was previous to the operation and one other from kidney disease). 16 patients, or 29 per cent., presented

more or less serious symptoms (3 slight peritonitis, 7 abscess, 4 thrombosis of the lower limb, 1 pneumonia, 1 vesical catarrh).

33 patients, or 60 per cent., recovered without the least untoward symptom.*

Subtracting from the 55 cases the 6 deaths, 12 cases still too recent to be taken into account, and 9 cases in which a large pediculated fibroid was removed at the same time, there remain 28 cases of castration who had been operated upon not less than a year and a-half previously. The following are the results from a curative point of view:—

(a) Results relative to the haemorrhage.—20 times immediate cessation of the haemorrhage; 4 times cessation after a few irregular losses of blood; once persistence of irregular metrorrhagia; once menopause, followed by irregular metrorrhagia; once temporary menopause, followed by haemorrhage and cystic development of the tumour; once menopause, followed by haemorrhages, commencing enucleation of the tumour, which was finally extirpated by Fehling.

(b) Results relative to the tumour (on the same series of 28 cases).—22 times marked diminution and generally very important diminution; 3 times no diminution; once doubtful diminution; once appearance of a fibro-cystic tumour; once enucleation.

It is therefore evident that the menopause and the atrophy of the tumour do not run on the same lines. It may happen that the haemorrhage ceases entirely, and yet the fibroid in no way diminishes in size. Nevertheless, that is exceptional; most frequently Hegar has seen the amenorrhœa followed by atrophy.

Two of Hegar's patients became corpulent; one other, five years after the operation (which had been followed by the menopause and contraction of the tumour), suffered from a double focus of suppurative parametritis, coming most undoubtedly from the pedicle. Lastly, one patient freed by the operation from a most inveterate dry cough.†

* Hegar says 70 per cent., but this is an evident error of calculation.
† This case, interesting from the point of view of utero-ovarian reflexes, has been described in detail by Schnyder. Ein Beitrag zur Lehre vom Husten (Corresp.-Blatt f. Schweiz. Aerzte, 1882, No. 7, p. 193).
The care with which these cases have been recorded, the absolute guarantee afforded by Hegar's name, give a peculiar value to these figures. It is necessary, however, to know collective results united into a table comprising the operations of various practitioners.

The following have been collected by Tissier a little less recently:

Out of 171 operations 25 deaths, or a mortality of 14.6 per cent. The causes of death were divided thus: septicæmia 14 cases; secondary hæmorrhage and septicæmia 1 case; embolism of the pulmonary artery 1 case; pyelo-nephritis 1 case; cardiac weakness 1 case (death occurred 11 days after the operation);* indeterminate causes 9 cases.

(a) Results relative to the hæmorrhage, noted in 146 cases: 89 times complete cessation; 21 times the menopause supervened after a longer or shorter period of irregular hæmorrhages; 10 times menstruation reappeared after a short period of suspension. In this category are included a case of unilateral extirpation and a case of ligature of the ovary; in 3 cases it is noted that the loss of blood is not definitely referred to, the report simply saying that the patient was cured.

(b) Results relative to the tumour (out of 146 cases): 9 times no alteration; 66 times rapid diminution; 71 times information wanting (the patients reported "cured").

Wiedow † has published a carefully drawn-up table, in which he has restricted himself to the consideration of the results of operations that had been performed at least a year previously. This table refers to 56 cases, many of which also come into the preceding table of Hegar. The operation was followed by both the menopause and retrogression of the tumour in 39 cases; in five the menopause alone was noted, information on the size of the tumour being wanting; in 5 slight irregular losses, with diminution of the tumour; in 1 menopause for 3 months, after which the tumour spontaneously began to be enucleated, which operation was completed by the surgeon; in 1, at first amenorrhœa, then return of menstruation, with atrophy of the tumour; in 1, slight losses for one day after an interval of amenorrhœa lasting for three months, no information concerning

* Tissier (loc. cit., p. 74) wrongly attributes this case to Hegar; it was Freund's.
† Wiedow, loc. cit., p. 301.
CASTRATION FOR FIBROID TUMOURS.

the tumour; in 3, menopause and diminution of the fibroid for two years, then return of the hæmorrhage and development of the tumour (in 1 of these cases the tumour became fibro-cystic); in 1, irregular and considerable hæmorrhages unaccompanied by diminution of the growth.

Lawson Tait* has performed castration for fibroids 262 times with a mortality that he reckons at 1.23 per cent. We are entirely without precise information upon the curative effects of his operations.

I shall end by giving some results derived from series that contain fewer numbers, but which are none the less of great interest from the illustrious names of their authors. Fehling† has on 8 occasions performed castration for fibroids without a single death; 5 times the menopause supervened, as in the normal physiological manner; twice, at the end of the first and of the second year, irregular hæmorrhages supervened. In all the cases the tumour diminished in size.

Prochownik‡ has performed the operation 12 times, has never lost a patient, has in every case seen the tumour diminish in size, and only exceptionally has observed the return of irregular hæmorrhages.

Bouilly§ has performed castration for fibroids 8 times; the results were excellent. The tumours, so to speak, diminished visibly.

Segond|| has had 4 successful cases and not a single unsuccessful one. In two of his patients there occurred immediate menopause and rapid atrophy. In one patient, in whom the castration had been unilateral, menstruation became normal, and the patient was relieved of all pain; the fibroid remained stationary. In the fourth case, who had only been operated upon 8 months previously, some attacks of hæmatemesis supervened.

Terrillon,¶ out of 5 cases of castration for fibroids, lost one.

* Lawson Tait. B. M. J., 1889, vol. 2, p. 299. The whole number of the fraction (1:23) is evidently due to an error in calculation, and is not typographical, for it has often been reproduced by Lawson Tait in his publications.
† Fehling. Würt. med. Corresp.-Blatt, 1887, No. 3.
patient after two months owing to the continuation of the symptoms of intestinal compression. It is very evident that in this case hysterectomy would have been performed if it had not presented enormous risks, and that castration was only performed as a last resource. Death was not owing to the operation, and simply it is proved by this case that castration is powerless to bring about rapid diminution of tumours in all cases. The haemorrhages ceased in the four other cases.

All these figures show at the same time the relative benignity of the operation and its efficaciousness when it is judiciously resorted to. The surgeons* who deliberately and in all cases prefer hysterectomy become fewer and fewer.

CHAPTER VI.

FIBROIDS COMPLICATED BY PREGNANCY.

Effects of pregnancy upon the development of fibroids.—Indications for the expectant treatment.—Replacement.—Operation for fibroids of the cervix.—Operation for polypi.—Induced abortion and premature labour.—Caesarian section.—Hysterotomy and hysterectomy.—Porro's operation.

It is well-known that the effect of pregnancy is to give a very great impulse to the development of fibromata, and often to bring about their oedematous softening. This phenomenon is the more marked the closer the connection of the fibroid with the uterus; it attains its maximum in the case of interstitial fibroids, single or multiple, with enormous thickening of the uterine tissue, as in those cases which have been improperly described under the name of hypertrophy of the womb. This sudden augmentation in volume of the fibroid exaggerates the phenomena of compression to which perhaps it has already given rise, and the pain resulting from the pressure upon the sacral plexus may become simply intolerable.* Retroflexion of the gravid and myomatous uterus may intervene and produce symptoms of internal strangulation.† If the fibroid is of the pelvic variety, that is to say, developing below the brim of the pelvis and having its point of origin in the supra-vaginal portion of the cervix or the lower portion of the body of the uterus, the resulting symptoms of compression are rapid in onset and most formidable;‡ they may bear upon the bladder, ureters, rectum, nerves, or vessels. Peritonitis has even been recorded as a complication.§

But the most common accident, and by no means the least serious in such cases, is abortion. Contraction of the uterus

* Lefour (Uterine fibroids in relation to pregnancy, Paris, 1880) cites four cases of this kind, due to Tarnier.
being hindered, the danger of immediate haemorrhage is great, and the conditions are favourable for the supralvetion of septicæmic conditions. Lefour* out of 307 cases has collected 39 cases of abortion, in 14 of which the mother died. Nauss† out of 241 cases noted abortion in 47.

The indications of treatment are drawn from the nature of the accidents and from the seat of the tumour. If the case be one of a sub-serous fibroid (pediculated or sessile) of the fundus, there are hopes that it may in no wise hinder parturition, and if there is some danger of inflammation or cystic transformation of the tumour there is also some hope of seeing it disappear along with the post-puerperal involution. Here, therefore, the surgeon may be contented to wait. But waiting is more perilous in the case of pelvic fibromata. Nevertheless, if they give rise to no serious phenomena of compression the surgeon may wait, hoping that, as has been seen, at the time of delivery either they will precede the foetal head in its descent through the pelvis, or that they will rise above the brim after the rupture of the membranes. Finally, they have been flattened out, so to speak, in front of the foetal head. All of these eventualities have been actually observed, and have, thanks to forceps‡ and version, permitted the termination of accouchement under some conditions that were apparently hopeless. In these cases an attempt should also always be made to reduce the tumour by replacing it with the hand, which has been completely introduced into the vagina for that purpose.§ But often the delivery is only accomplished after a labour that has lasted so long that the woman dies of exhaustion, even if she do not succumb to haemorrhage. The expectant treatment therefore has its limits, which can be stepped over more easily

* Lefour. _Loc. cit._
† Nauss. _Inaug. Dissert._, Halle, 1882.
‡ Felsenreich has reported a very successful case with forceps: Vienna Obst. and Gyn. Soc. meeting of March, 12, 1889 (Centr. f. Gyn., 1889, No. 35, p. 629). It was a case of a very large bilateral fibroid of the fundus uteri. Parturition was followed by partial regression of the tumour. In the same work the author reports two successful cases of abortion, induced in the 6th and 7th months respectively, followed by diminution of the tumour in size.
in proportion as the fibroid is more easily accessible, and as its extirpation presents in consequence less danger.

_Fibroids of the cervix_ come into this category. They have often been enucleated either before or during accouchement. Danyau* removed one that weighed 650 grammes (over 1½ lb.) and measured 15 cm. in diameter. Braxton Hicks† obtained enucleation immediately upon the application of the forceps, and parturition was completed without any difficulty. J. Farrant Fry,‡ has reported the curious case of a woman who had borne nine children, and in whom there existed a fibroid of the anterior lip that had complicated parturition on each occasion. At the eighth a portion of the tumour had been removed by the écraseur; at the ninth, premature labour was induced, and immediately after the extraction of the foetus (which was nearly at term and living) the fibroid, whose base of origin was 3 inches in diameter, was enucleated and removed. The patient made a normal recovery.

Mundé.§ recommends enucleation by the vagina whenever that is possible. Out of 16 cases that he relates the mother only succumbed twice, and the majority of the children were born alive. One of these cases was under his own care.

Even when the operation is performed towards the end of pregnancy, this is not necessarily interfered with. Mayo Robson|| removed in the seventh month of pregnancy a fibroid of the cervix of the size of a cocoa-nut. The operation, though performed with the galvano-cautery, was none the less followed by somewhat severe hæmorrhage that necessitated several ligatures. There was no complication, and delivery occurred at term.

_Polypi may be driven in front of the foetal head, and their pedicle may then give way. Dubois and Depaul, as well as several other writers, have related examples of this.¶ It is moreover easy to divide this pedicle, so as to facilitate delivery.*\*

Care must be taken not to commit the error that was committed

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by Fergusson,* who applied the forceps to a large polypus, under the belief that it was the fœtal head, and saw his patient succumb to a rupture of the uterus.

If the polypus be recognised before labour it may be at once removed without the pregnancy undergoing therefrom any interruption. Felsenreich † has recently published such a case; the tumour was as large as a lemon.

Interstitial fibroids with abdominal development are much more inaccessible, and the operations that their removal necessitate are so serious that the surgeon might hesitate and ask himself whether the inducement of abortion is not preferable. Here the individual temperament of the surgeon, his customs and ability for operation, will have certainly a great deal to do with the way in which he will solve this problem. He must not, however, ignore the fact that induced abortion and induced premature labour themselves present serious dangers. When the placenta is inserted at the region of the tumour, the uterus not being able to contract after the delivery, formidable haemorrhage may supervene; the patient is also exposed to a far greater extent to the dangers of puerperal septicemia. Lefour, in a series of 23 cases in which labour was induced, noted three deaths. Tarnier,‡ out of seven cases in which labour was normal, saw the mother die in one case, the child in three. Out of six cases delivered by forceps, four mothers and four children died. In six cases where version was performed three mothers and three children succumbed. Lastly, five women affected with fibroids died before parturition; once induced abortion was successful; once embryotomy was followed by death of the mother. Süsserott,§ out of 147 cases of pregnancy complicated by fibroma that he has collected, says that the forceps were applied in 20, with the result that 8 mothers and 13 children succumbed; version was performed in 20, when 12 mothers and 17 children succumbed; in 21 cases the placenta was artificially extracted, and in 13 of these the woman died. Collectively, the mortality of the mothers was 53 per cent., that of the children 66 per cent.

‡ Tarnier. Gaz. des hôp., 1869, p. 175.
Moreover, since it is generally necessary to induce the expulsion of a non-viable fetus, that fact has also to be taken into consideration. Lastly, abortion liberates the compressed organs only to a very slight extent, and if the surgeon is afterwards obliged to resort to hysterotomy he has put himself in the position of having exposed the life of the patient twice instead of once. Such are the reasons that lead many surgeons to decide in favour of early interference. Supra-vaginal amputation is manifestly preferable to caesarian section, which was successfully performed by Cazin* in the seventh month of pregnancy. This author has, moreover, collected 28 cases in which caesarian section was called for by reason of uterine fibroids; only 4 women survived, 15 children were born alive, 8 were extracted dead; no information is given concerning the 5 others. Sänger† has still more recently collected a series of 43 cases of caesarian section for fibroids; 7 mothers only were saved, or there was, in other words, a mortality of 83·7 per cent. Tuffier‡ has published an unsuccessful case of this kind.

When the surgeon has decided to perform hysterectomy he must not attempt any partial operation (myomectomy) compatible with the continuation of the pregnancy unless the fibroid be pediculated, or take its origin clearly from the middle of the fundus of the uterus. If it be in the least degree sessile, or if he were obliged to cut the uterine tissues in the neighbourhood of the cornua, he would run the risk of considerable haemorrhage, and would induce abortion under the most deplorable conditions.§

Here, also, it must be remembered that supra-vaginal amputation (Porro's operation) is rendered much easier by reason of the laxity which the pregnancy brings about in the ligaments.||

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† Sänger. Festschrift zum Jubiläum Credé's, Leipzig, 1881.
‡ Tuffier. Ann. de gyn., Nov., 1889, vol. 32, p. 321. The case was one of an intra-ligamentous fibroid compressing the ureter, and having caused pyelo-nephritis, which was discovered at the necropsy.
§ Routier (Bull. et mém. Soc. chir., Nov. 13, 1889, p. 727) succeeded in removing a fibroid with large base of insertion, and suturing the wound by over-casting, without any after trouble.
|| Cf. the complete discussion of this question in Vogel, Ueber supra-vag. Amput. des schwangeren Uterus wegen Myom. Inaug. Dissert. Giessen, 1887.—The author establishes Kaltenbach's rights of priority.—Reference may also advantageously be made to the work of Meyer (Zurich), Die Uterusfibroide in der Schwangerschaft unter der Geburt und im Wochenbett. It was analysed at sufficient length in Centr. f. Gyn., 1888, p. 723.
Below is a table showing the published results:

1.—**Myomectomy alone : uterus respected.**

<table>
<thead>
<tr>
<th>Operator</th>
<th>Date of Operation or of Publication</th>
<th>Period of Pregnancy</th>
<th>Anatomical condition</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Péan</td>
<td>Dec. 15, 1874, Clin. Chir., vol. 1, p. 679</td>
<td>5 months...</td>
<td>Fibro-cystic tumour</td>
<td>Recovery. Abortion the day after operation.</td>
</tr>
<tr>
<td>Thornton</td>
<td>Trans. Obst. Soc., June 4, 1879</td>
<td>7 months...</td>
<td>Pediculated tumour</td>
<td>Death on 7th day.</td>
</tr>
<tr>
<td>Schröder</td>
<td>Nov. 16, 1879 (cited by Hegar, loc. cit.)</td>
<td>16 weeks...</td>
<td>Multiple pediculated tumours</td>
<td>Recovery.</td>
</tr>
<tr>
<td>Frommel</td>
<td>Münch. med. Woch., 1882, No. 32</td>
<td>5 months...</td>
<td>Soft fibroid, size of child’s head. Signs of peritonitis</td>
<td>Recovery. Pregnancy uninterrupted.</td>
</tr>
<tr>
<td>Martin</td>
<td>Berl. klin. Woch., 1885, No. 3, p. 39</td>
<td>6 months...</td>
<td>Myomectomy with cuneiform excision of fundus uterus only</td>
<td>Death on 7th day from haemorrhage after abortion.</td>
</tr>
<tr>
<td>Landau</td>
<td>Berl. klin. Woch., 1885, No. 13, p. 195</td>
<td>3 months...</td>
<td>Myoma of size of child’s head on the right, and one of size of a hen’s egg on the left</td>
<td>Recovery. Normal delivery.</td>
</tr>
<tr>
<td>Barnes</td>
<td>1885 (cited by Routier, Ann. de Gyn., Mar. 1890)</td>
<td>3 months...</td>
<td>Pediculated fibroid...</td>
<td>Death.</td>
</tr>
<tr>
<td>Martin</td>
<td>Berl. klin. Woch., 1886, No. 29</td>
<td>3 months...</td>
<td>Large tumour with thick pedicle</td>
<td>Recovery.</td>
</tr>
<tr>
<td>Martin</td>
<td>Ibid.</td>
<td>4 months...</td>
<td>Large tumour, anterior surface, and another small tumour</td>
<td>Delivery at term.</td>
</tr>
<tr>
<td>Martin</td>
<td>Ibid.</td>
<td>3½ months...</td>
<td>Tumour at fundus, with thick pedicle</td>
<td>Recovery.</td>
</tr>
</tbody>
</table>
### Fibroids Complicated by Pregnancy

<table>
<thead>
<tr>
<th>Operator</th>
<th>Date of Operation or of Publication</th>
<th>Period of Pregnancy</th>
<th>Anatomical condition</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routier</td>
<td>Bull. Soc. Chir., Nov. 1889</td>
<td>3 months</td>
<td>Sub-serous fibroid, with large base of origin 15 lbs.</td>
<td>Recovery</td>
</tr>
<tr>
<td>A. Bergh</td>
<td>Hygiea, 1889, vol. 51, No. 5, p. 292</td>
<td>4 months</td>
<td>Two tumours, the largest size of two fists. Enucleation.</td>
<td>Recovery. Normal de- livery</td>
</tr>
</tbody>
</table>

2. Supra-vaginal amputation of gravid uterus.

<table>
<thead>
<tr>
<th>Operator</th>
<th>Date of Operation or of Publication</th>
<th>Period of Pregnancy</th>
<th>Anatomical condition</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>R. Barnes</td>
<td>St. Geo. Hosp. Rep., 1874-6, vol. 8, pp. 91-95</td>
<td>3 months</td>
<td>Fibroid masking pregnancy</td>
<td>Death</td>
</tr>
<tr>
<td>Wasseige</td>
<td>March 18, 1880</td>
<td>5 months</td>
<td>Interstitial fibroid of fundus, weight 4,500 grammes</td>
<td>Death on 6th day</td>
</tr>
<tr>
<td>Nieberding</td>
<td>Feb. 10, 1882</td>
<td>4 months</td>
<td>Interstitial fibroid, size of adult’s head</td>
<td>Death in 49 hours</td>
</tr>
<tr>
<td>Schröder</td>
<td>Jan. 10, 1883</td>
<td>3 months</td>
<td>Colossal tumour</td>
<td>Recovery</td>
</tr>
<tr>
<td>Schröder</td>
<td>June 29, 1884 (cited by Brit. Med. Assoc. Liverpool, 1883)</td>
<td>4 months</td>
<td>Fibroid masking pregnancy</td>
<td>Death on 9th day</td>
</tr>
<tr>
<td>Walter</td>
<td>Apr. 1885</td>
<td>3 months</td>
<td>Fibro-cystic tumour</td>
<td>Recovery</td>
</tr>
<tr>
<td>A. Patterson</td>
<td>Glasg. M. J., April 1885</td>
<td>4 months</td>
<td>Fibroid masking pregnancy</td>
<td>Death from peritonitis on the 11th day</td>
</tr>
<tr>
<td>Etheridge</td>
<td>Amer. Journ. of Obst., 1887, vol. 29, p. 69</td>
<td>3 months, inef fectual attempts to induce abortion</td>
<td>Recovery</td>
<td></td>
</tr>
<tr>
<td>Karström</td>
<td>Hygiea, April 1887 (Anal. i Cent. f. Gyn., 1887, p. 550)</td>
<td>5 months</td>
<td>Intra-ligamentous fibroid pedicle returned—drainage</td>
<td>Recovery</td>
</tr>
<tr>
<td>Freund</td>
<td>Unpublished case communicated to Van der Veer</td>
<td>8 months</td>
<td>Fibroid masking pregnancy</td>
<td>Recovery</td>
</tr>
</tbody>
</table>

* The six following cases are taken from Hegar and Kaltenbach, loc. cit., 3rd edit., p. 476. I have added to them the other dozen.
<table>
<thead>
<tr>
<th>Operator</th>
<th>Date of Operation or of Publication</th>
<th>Period of Pregnancy</th>
<th>Anatomical condition</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hofmeier</td>
<td>Die Myomotomie, p. 76</td>
<td>3 months</td>
<td>Fibroid, suspected pregnancy</td>
<td>Recovery</td>
</tr>
<tr>
<td>Dirner</td>
<td>Centr. f. Gyn., 1887, p. 119</td>
<td>2 months</td>
<td>Fibroid, foetus dead and macerated</td>
<td>Recovery</td>
</tr>
<tr>
<td>Kaltenbach</td>
<td>Centr. f. Gyn., 1887, p. 435</td>
<td>2 months</td>
<td>Fibroid about to disintegrate, foetus macerated</td>
<td>Recovery</td>
</tr>
<tr>
<td>Kaschkaroff</td>
<td>Centr. f. Gyn., 1890, No. 49, p. 890</td>
<td>3 months</td>
<td>Sub-serous fibroid Hydrammon</td>
<td>Recovery</td>
</tr>
</tbody>
</table>

The majority of these cases refer to operations before the ninth month. If the surgeon allow the pregnancy to go on to term and then does a real Porro's operation the prognosis undoubtedly is graver. There is, however, a compensating fact, namely, that it may thus be possible to save both mother and child.

One must never wait until the very end of pregnancy, for fear one should be surprised by the onset of labour, but the operation should be performed some days before the supposed date for delivery. The operative procedure which then seems to offer the greatest chance of safety from the double point of view of haemorrhage and septicæmia, both of which are especially likely to occur when a gravid uterus is in question, is the elastic extra-peritoneal ligature of the pedicle (Hegar).
