

**Various methods of dealing with the pedicle in ovariectomy / by J. Knowsley Thornton.**

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VARIOUS METHODS OF DEALING  
WITH THE  
PEDICLE IN OVARIOTOMY.

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THE pedicle of an ovarian tumour is made up of the blood-vessels, lymphatics, nerves, and ligament of the ovary, united by more or less areolar, fibrous, elastic, and unstriped muscular tissue, and covered all round with a layer of peritoneum.

Along with this true pedicle we may also have the round ligament of the uterus, and still more commonly the Fallopian tube. This latter does not necessarily always form part of the pedicle; but I believe it is always wise to include it—first, because there is no object in leaving a structure whose function is gone with the removal of its ovary; second, because I have observed several times that when the ovary is ligatured off from the tube, the latter at once becomes intensely congested. I have even seen it bleed from rupture of its distended vessels. It is quite clear that, left in this condition, it must be a source of danger; and as removing it in no way increases the danger, and is, as I have said, indicated, as its function is gone, I think it best always to include it in the pedicle.

In considering how we may most advantageously deal with this complex structure, the pedicle, when removing an ovarian tumour by ovariectomy, we shall find that each of the component parts requires some share of our attention. The bloodvessels are of course the most important, and the

\* A paper read before the Harveian Society, March 18, 1880.

first and great object of any method is security against hæmorrhage. But while attending to this, we cannot ignore the convenience of the other tissues in and around the pedicle. We have to remember that the lymphatics are closely connected with the whole peritoneal surfaces, and with those of the lower extremities, and that mischief set up in those of the pedicle may thus rapidly spread over a large area; that the nerves must not be unduly irritated; that the muscular tissue by its contraction may cause the stump to work out of the grasp of any constricting agent which we employ, and that the extreme elasticity of the pedicle tends to the same misfortune.

The method which most effectually prevents hæmorrhage, and is least obnoxious to the tissues, is the one we seek.

Keeping these essentials in view, we have also to consider what method will most effectually and speedily obliterate the pedicle without leaving to the patient any after-inconvenience. And we must not, as surgeons, forget that we practise an art as well as a science, and must therefore, after satisfying the scientific requirements of the case, consider also how to apply our method rapidly, cleanly, and neatly.

Now, bearing in mind both the scientific and the artistic requirements, we will briefly discuss the various methods of dealing with the ovarian pedicle which have been advocated or adopted by different surgeons.

I shall adopt the plan of Peaslee, and take the various methods in chronological order, and may take this opportunity of acknowledging my debt to that author for his exhaustive historical *resumé* of the subject.\*

The first method we have to consider is that adopted by McDowell in 1809. He tied a ligature round the pedicle, and brought the ends, or one end (it is immaterial which), out at the lower angle of the wound.

The objections to this plan are—

1. A single ligature, however thick and strong, should not be trusted to secure a large broad or thick pedicle, because, from the nature of the tissues which compose it, con-

\* "Ovarian Tumours: their Pathology, Diagnosis, and Treatment, especially by Ovariectomy." By E. Randolph Peaslee, M.D., etc.

siderable shrinking may take place after the ligature is tightened, and vessels which did not bleed at the time may bleed, as a result of this shrinking, sufficiently to cause death. Then, of course, from this same shrinking the ligature is liable to slip off. There are numerous cases on record in which fatal hæmorrhage has occurred from both accidents.

2. The leaving the ligatures long necessitates their ulceration through the pedicle-stump. It may happen, and probably generally did happen, in the successful cases ligatured on this plan, that the distal portion of the stump had secured for itself a new base of blood-supply by adhesion to some neighbouring peritoneal surface long before the ligatures separated. Without such fortunate adhesion the distal portion was sure to die, and the long ligatures passing down to it were equally certain to carry putrefaction. Then there was, deep down in the peritoneum, a putrid mass of dead tissue. What wonder that the mortality was large enough to bring the operation into discredit? Should we not rather wonder that any patient recovered? Besides the above risks, there was also that of secondary hæmorrhage when the ligature separated. As I shall have again to refer to the long ligature used in various ways, it may be well to point out, once for all, that its use was due to an imperfect knowledge of what really does take place in a piece of tissue more or less completely cut off from vascular supply by ligature, but remaining in the body and surrounded by healthy living tissues. Those who still use the long ligature, either for an ovarian pedicle or in any surgical procedure, display an ignorance of the present state of our knowledge on this subject, or an obstinate adherence to an old and vicious practice, which is to me incomprehensible.

Ten years after McDowell, Chrysmar adopted the improved plan of using two ligatures and securing the pedicle in two halves. This necessitated transfixion of the pedicle, and provided against both the accidents named as objections to the single ligature—against shrinking by enclosing smaller portions of tissue in each loop, and against slipping off of the ligature.

Dutoit gives Chrysmar the additional and very great credit of cutting his ligatures short; but Peaslee, after referring to the original records of Chrysmar's method, rejects this statement.

In 1821, Nathan Smith, in America, adopted an exceedingly good plan, and one which came very near to perfection. He ligatured the vessels separately, and cut the ligatures short; and he used an animal tissue for these ligatures, viz., leather.

I shall have, hereafter, to point out objections to the separate ligature of the vessels, and of course leather is not a very suitable material for ligatures, because, when wet, it is both slippery and unduly yielding.

In 1825, Lizars, in Edinburgh, used the long ligatures; in some cases tying vessels separately, and in others transfixing. Rogers of New York, in 1829, followed Nathan Smith's plan, and Bellinger of South Carolina, also, in 1835, the latter using animal ligatures.

Others tied the vessels separately, and then a long ligature round the whole pedicle.

In England, Jeaffreson of Framlingham, and Crisp, in 1836 and 1838, cut the ligatures short.

Stilling of Cassel, having lost a case from hæmorrhage which he had treated by the single long ligature, advocated leaving a portion of the cyst upon the pedicle, and making it protrude through the incision, or, if the pedicle was too short for this, then suturing the portion thus left on a level with the wound.

Our present knowledge of the histological structure of most ovarian tumours will at once lead us to condemn this practice as tending to a recurrence of the disease in the stump and cicatrix. I adopted it for part of one pedicle in my seventh case, and the patient has since died from recurrence in the cancer wards at Middlesex Hospital. Langenbeck at one time also adopted this method. Charles Clay of Manchester, Walne, Frederick Bird, and J. L. Atlee, all used the long ligature, though differing somewhat in their methods of applying it.

Siebold of Darmstadt followed the good practice of Nathan Smith.

Handyside of Edinburgh, and March, Greene, and Peaslee of the United States, carried the ends of the long ligatures out through the pouch of Douglas into the vagina; thus adding seriously to the dangers of the long ligature by carrying the long ends at once into the vagina, in which we know putrefaction is particularly prone to occur. Brought out at the abdominal incision, and with careful dressing of the wound, some days might pass without the ligatures becoming soaked with putrid fluid, and the tissues of the stump were then in a better condition to resist putrefaction when it did occur. Brought out through the vagina, the whole ligatures were probably thoroughly soaked with putrefying fluid in a very few hours.

In 1847, Langenbeck proposed to tie the pedicle without including its peritoneal covering. He still used the long ligatures, and hence lost any advantage his method might have had.

The same objection seems to me to exist, with regard to this subperitoneal method, which exists to tying the vessels separately, viz., the want of all security against serous oozing from the lax cellular tissue and from the small vessels in the peritoneum. The amount of mixed serum and blood poured out in this way into the peritoneum soon after the operation would be in some cases considerable.

In 1848, Maisonneuve of Paris treated the whole pedicle by torsion. There is no objection to advance against this method, except the impossibility of applying it in the majority of cases, and the imperfect security it affords against hæmorrhage. Heyfelder in some cases twisted the separate vessels. The same objection applies to this plan which I have urged against ligature of the separate vessels. Duffin of London, Langenbeck, and Storer of Boston, followed Stilling's method, but covered the stump with the skin after stitching it into the incision. I have already pointed out certain objections to Stilling's plan, and it is obvious that the closing in of the stump in this situation is still more objectionable.

In 1858, J. L. Atlee first used the *écraseur*, and he was followed by his brother W. L. Atlee, who used it many times, by Pope of St. Louis, and by Mr. Wells, who used it in one case successfully.

Theoretically, torsion and the *écraseur* are the most perfect methods possible, but they labour under the disadvantage of being but imperfect safeguards against hæmorrhage.

In 1858, Hutchinson suggested and employed the clamp. With various modifications, this instrument has found great favour with ovariologists. I suppose the readiness with which it can be applied to most pedicles, and the feeling of security it gives against hæmorrhage, have led to this popularity, for a more unscientific instrument it is impossible to imagine.

In spite of the success which attended its use in the hands of Mr. Wells, I early conceived a great dislike for it, for reasons which I shall give immediately, and I only used it seven times after I began to operate myself. The first and great objection to it is, that it fixes the pedicle in the wound, and causes, after cicatrization is complete, a drag upon the cicatrix, and thus predisposes to ventral hernia, which is one of the greatest misfortunes following ovariectomy. Patients suffering from this are made very miserable: they have a constant sense of weakness, dragging pains at the site of rupture, and frequently almost constant backache and lassitude.

Another evil resulting from the use of the clamp is patency of the Fallopian tube and discharge of blood at the monthly periods. This is usually only temporary, lasting for a few months after operation, but in some cases it is much more persistent; and I know of more than one case in which this condition continues years after the operation. A few days before each period, the cicatrix, at the site of the pedicle, becomes so tender that the belt can hardly be borne, then a little discoloured bleb forms and breaks, discharge continuing during the remainder of the period.

Septic peritonitis commencing in the peritoneal covering of the pedicle, and thence spreading inwards, adhesion of intestine to the pedicle with fatal obstruction, septic poisoning when the clamp separates and the stump retracts into

the wound, hernia of the pedicle and dragging pain, with troublesome vomiting, are among other rarer complications attending its use. I have seen examples of all these conditions, and many such cases have been recorded.

A still rarer accident, but one which has occurred more than once, is hæmorrhage from the clamp cutting the pedicle. To these graver evils must be added prolongation of the time during which the patient has an open sore, and the necessity for a daily dressing, with frequently an amount of offensive discharge, which is detrimental to the general salubrity of the hospital atmosphere. Serious hæmorrhage has occurred on the separation of the clamp; and cases are on record in which it has slipped into the peritoneum during coughing or vomiting, or from extreme tympanitic distension.

I do not think such a list of objections can be supported from experience against any of the other methods if we except the long ligature. I have not thought it necessary to refer in detail to the misfortunes following the use of the latter, as I think it may fairly be considered as quite obsolete.

I do not propose to allude to the many forms of clamp which have been suggested and used, but I think the pattern which Mr. Wells has used most is decidedly the most efficient and most easy of application.

Having expressed this strong opinion of the demerits of the clamp, I am bound to confess that in certain cases of removal of uterine tumours it still answers better than any method yet introduced, though I am confident that, with time and experience, we shall find something to supersede it. Koeberle's *serre-nœud* has found favour with some, though I cannot see any great difference between his method of using it, and the simple ligature with the pedicle fixed in the wound.

In 1869, Sir James Simpson proposed and successfully used his favourite plan of acupressure for the treatment of the ovarian pedicle, but it has not found favour with ovariologists, and need not detain us.

Dr. Gustavus Murray, in 1865, employed a figure-of-eight ligature, and I have myself seen him apply this ingenious method with success.



In 1864, Mr. Baker Brown introduced the actual cautery; and theoretically this is certainly one of the best methods. It is not, however, by any means of universal applicability, and in many cases its use has to be supplemented by the ligature—a fatal objection to it, in my opinion, because the ligatures have then to be applied on half-dead tissue, and the portions they include are much more likely to slough. Thus, in his first five hundred cases, Mr. Wells used the cautery thirty times, but in fourteen cases it had to be supplemented by the ligature, and, as we might expect, the mortality in the fourteen cases was double that in the sixteen cases in which the cautery alone sufficed.

The great advantage of the cautery is that it leaves no foreign substance in the peritoneum, but it leaves a lump of half-cooked tissue, and, except as affording more security against hæmorrhage, cannot claim any advantage over Maisonneuve's plan of torsion.

We cannot, however, forget the magnificent results obtained with the cautery by Dr. Keith. I am not sure whether he has ever published any accurate statement of the number of cases in which he had to supplement the cautery by the ligature; but whether his cases were treated by cautery alone, or by cautery and ligature, the results are such as must commend the method. I have rarely tried it myself, and when I have, have been obliged to supplement its use by one or more ligatures.

In 1868, Maslowsky of St. Petersburg cut peritoneal flaps, and so covered in the cut end of the pedicle, believing that this would prevent its adhesion to neighbouring organs. The objection to this is that the flaps are likely to confine the serous discharge, and thus lead to tension and suppuration in the enclosed end of the stump.

In 1869, Dr. Macleod of Glasgow invented some very ingenious forceps for complete torsion of the pedicle; but the cases in which they are applicable are very rare.

In the same year, Dr. Miner of Buffalo performed complete enucleation of a cyst without applying any ligatures. This method is very valuable in certain broad ligament cysts, and I have many times employed it for partial removal of

a tumour, but it is rarely we can complete the operation without some ligatures. Partial enucleation enables us to remove some tumours which could not be removed at all without it, but it adds much to the risk of the operation.

In 1869, Dr. Peaslee invented a very ingenious drainage-tube and knife, by means of which the ligatures could be cut and removed at any period after the operation, when they were supposed to have performed their function, but I think its ingenuity is its chief claim to our notice.

Other slightly different methods have been suggested or adopted by various operators, but they are merely slight modifications of some of the above, and do not call for special remark.

In 1861, Dr. Tyler Smith, in performing his eighth ovariectomy, reintroduced the method of Nathan Smith, transfixing the pedicle, cutting the ligatures short, and dropping the stump back into the peritoneum. To him undoubtedly belongs the credit of popularising this method with the profession, though he cannot deprive our American brethren of the honour of first introducing it.

Having seen Mr. Wells employ this method in a large number of cases, in which it was impossible to employ the clamp, I became convinced that it was *the method* of the future, and only needed to be applied constantly in a long series of cases to establish its superiority over other methods.

First. It is universally applicable.

Second. It is, when used with sufficient care, a perfect safeguard against hæmorrhage.

Third. It is scientific in principle.

Fourth. It is neat, cleanly, and speedy in application.

Fifth. It allows the incision to be completely closed at once, and thus hastens convalescence.

Sixth. It completely obliterates the pedicle stump as quickly as any intra-peritoneal method does, and more quickly than any extra-peritoneal method.

In thus claiming for the complete intra-peritoneal ligature of the ovarian pedicle in ovariectomy the foremost place among the many methods I have named, I must point out that there are many different ways of applying it, and I shall

endeavour to prove by my own practice that the method I advocated in my paper in the *British Medical Journal*,\* in January, 1878, is the most in accordance with the needs I have pointed out in my introductory remarks, and will give us the best results.

If we intelligently and carefully consider the teaching of the early cases of complete intra-peritoneal ligature in which recovery took place, it is at once plain that the distal portion of the stump did not slough. It is quite inconceivable that a patient could get well if it did, except in the few cases in which it was discharged through the wound. This important lesson seems to have been almost entirely lost sight of for many years, however, and we find writers on the subject indulging in all sorts of absurd and unlikely theories as to the action of the ligature, and the changes it produces. I have said that in 1861 Dr. Tyler Smith revived the practice of complete intra-peritoneal ligature, and with sufficient success to make it remarkable that any doubt could remain as to the changes taking place in the stump when so treated. Yet, seven years later, in 1868, Spiegelberg and Waldeyer published in *Virchow's Archives* a series of experiments on animals from which it is evident that they considered the matter still *sub judice*. For a short account of these experiments, together with valuable observations on the complete intra-peritoneal ligature, I would refer to Mr. Wells' well-known work on Diseases of the Ovaries. Other very interesting experiments by Maslowsky, of St. Petersburg, will also be found in the same part of Mr. Wells' work. Peaslee, who shows an admirable power for collecting and comparing the observations and experience of others, and whose work must ever retain a very high place as giving a complete history of ovariectomy down to his own time, makes the following astounding statement in speaking of the use of the short and long ligature:—

“It admits of a complete closure of the incision if the ends are cut close, and very nearly so if they are brought through the incision. *But this is rather a matter of taste*

\* “The Silk Ligature as a Method of securing the Ovarian Pedicle” *British Medical Journal*, January 26, 1878).

*and convenience than of much practical importance.*" (The italics are mine.) This, though he afterwards goes on to prove from his own practice that the pedicle does not slough when treated by the short ligature. I will now quote from my own paper, already referred to:—"In one of my cases I tied a large piece of omentum adhering to the cyst in two places, and divided it between the ligatures, thus leaving a stump on the outside of the tumour very like that of the ovarian pedicle. I afterwards injected the cyst with Beale's Prussian blue fluid, and, when the injection was complete, noticed that the distal end of this stump was blue, though not so blue as the proximal part, and there was no appreciable escape of the fluid from its cut surface. Microscopic examination showed that the injection had passed into the minute capillaries, but not into the larger vessels, except where it had passed into them by the anastomoses beyond the ligature. If the injection would so pass, the blood would also pass; and in this way the vitality of the part would be at any rate partially sustained until the other processes by which the distal end of the stump is nourished had time to be completed."

I afterwards enumerated certain of the processes by which the stump is nourished, as observed by myself, as follows:—The ligature buries itself in the peritoneal coat of the pedicle, and vascular connexions are rapidly established between the parts adhering over it. Lymph is thrown out over the end of the stump and over the ligatures; in this new vessels form. The stump adheres to some neighbouring surface, and from that derives its main blood-supply. In either case the passage of blood through the capillaries under the ligature is an important aid. By whichever method the nourishment of the stump is carried on, the strands of the ligature are separated by ingrowth of new cells, and it is soon absorbed and disappears. Sometimes the knot (or the whole ligature, if very thick silk is used) becomes encapsuled, but complete disappearance is the rule. It will be obvious that the least favourable method is that in which the cut surface of the stump adheres to some neighbouring part; because if it be to intestine it may cause a kink

and direct obstruction, and if it be to some other part it may form a bridge, under which a coil of intestine may become adherent or strangulated, and thence may follow indirect obstruction.

It may be as well here to allude to another objection which has been raised to the complete intra-peritoneal ligature, and that is the risk of hæmatocele, similar in origin to that occurring externally after the use of the clamp. That this is extremely unlikely is theoretically apparent when we study the above processes of repair and obliteration of the stump. And as a practical proof of the truth of the theory, I may mention that I have only had one case of hæmatocele occurring after ovariectomy in over 170 cases treated by the complete intra-peritoneal method, and that was in a case of twisted pedicle—the vessels and tube being obliterated by the twisting, and consequent inflammatory changes, before I ligatured it,—and the hæmatocele came on so distinctly after chill at the period-time that I think it is quite likely it was altogether independent of the pedicle and of the operation.

I have little to add to the advice I gave in the paper from which I have quoted as to the kind of ligature and the method of applying it.

No. 3 or 4 Chinese silk, applied by one or more transfixions, according to the breadth of the pedicle, each loop interlocking with its neighbour so that a perfect chain is formed. In my previous paper I advocated the use of a special fine ligature, applied so as to include the veins of the pampiniform plexus in the outer part of the pedicle, “whenever the outer edge of the broad ligament feels tight as one passes the fingers along it.” I now always use this special ligature, and I may take the opportunity of saying that I was the first to use it in the Samaritan Hospital, and also the first to advocate and use the complete interlacing of ligatures in pedicles in which a single transfixion does not afford sufficient safeguard against hæmorrhage.\* I have recently made

\* In the discussion which followed the reading of this paper, Mr. Bryant called my attention to a paper of his in the *Guy's Hospital Reports*, vol. xiv., 1868, which clearly proves his claim to priority as having been the first advocate of this very important detail. He actually figures the locked ligatures, and also gives some valuable experience in ligature of the ovarian pedicle which I had overlooked.

a very interesting and important observation with regard to the method of using this outer-edge ligature. For it to be of service it is essential that it should embrace the whole of the mass of veins already referred to—a fact entirely lost sight of by some of those who have copied the method without understanding my reason for adopting it, and use it as if its sole aim were to make a little groove in the outer edge of the pedicle as a guide to tying the other ligatures.

When it is properly applied, almost all the venous channels for the return of blood from the cyst are closed, and the main arteries not being interfered with, the cyst rapidly becomes injected and congested. We have thus a beautiful method for bleeding the patient into her own tumour, if it seem desirable that she should lose a little blood, and I have twice lately been able to demonstrate this fact to those present at my operations. It will at once be seen that when operating on a feeble patient, or on one who has lost much blood from adhesions, it becomes of vital consequence to apply this ligature *after* the arterial trunks have been secured by the ordinary transfixing ligatures. No. 1 Chinese silk, which I also use for the sutures, I use for this special ligature.

With the view of avoiding the occasional complications arising from adhesion of the cut surface of the pedicle to neighbouring organs, I adopted the plan of sewing over the posterior edge of the cut surface to the peritoneal surface of the anterior uterine *cul-de-sac*, and I still occasionally do this. It cannot in all cases be neatly done, and it adds somewhat to the length of the operation, but I am sure it is very efficient in gaining the end I proposed to myself in adopting it; and I have recently had an opportunity of examining a pedicle I had thus treated ten months before, the patient having in the interval developed a tumour of the other ovary, which I have recently successfully removed. The place where I had sewn up the pedicle was indicated by a very minute projection (half the size of a horse-bean), and there were no adhesions to any other surface. I now guide my practice in this respect much by the position which the pedicle seems inclined to occupy when I push it back into the peritoneum. In the majority of cases, if the ligatures

have been carefully applied, it will naturally curl over the edge of the broad ligament, and lie conveniently out of the way in the anterior *cul-de-sac* without being sewn there. I still hold to my opinion that it is not advisable to tie the pedicle too tight; and I am convinced that this too-tight tying is the cause of unnecessary pain and occasional high temperature, and I incline to the belief that it explains occasional cases of tetanus. It also tends to complete strangulation of the distal portion. If I am not quite satisfied as to my first ligatures being secure, I tie another round the whole, using the ends of one of those already tied or a separate ligature. This by bunching up the pedicle exerts sufficient pressure to stop any slight oozing; and this with a minimum of force in tying this final ligature. I use one of the suture-needles or a finer curved one for the outer-edge ligature, and the ordinary handled perineum, or fistula-needles, of various curves for the transfixion; and I infinitely prefer a fine, sharp needle to any of the blunt ones in use. It is easy in most pedicles to avoid puncture of a vessel with a fine-pointed needle, and if one is punctured the opening is small and the bleeding stops when the locked ligatures are tied; whereas with a broad, blunt-pointed needle splitting of the broad ligament is a frequent occurrence, and vessels are quite as often opened as with the pointed needle, and with a much larger hole.

My colleague Mr. Doran has contributed two valuable papers on "Complete Intra-peritoneal Ligature" to vols. xiii. and xiv. of the *St. Bartholomew's Hospital Reports*; and I would advise those who are interested in the subject to study them carefully. I would direct especial attention to his remarks on the post-mortem of one of my own fatal cases in the second paper, and to the following among his final conclusions:—"It follows that it is much more dangerous to draw the ligatures a little too firmly than to leave them somewhat looser than is strictly advisable."

Mr. Doran's post-mortem observations thus confirm my own theory, founded on the experimental injection of the large omental adhesion. An observation of the utmost importance is also made by Mr. Doran, to the effect that where

the cut surface does not become covered by clot the edges often curl inwards and unite; thus giving us a natural illustration of the result aimed at by Maslowsky, and of course free from the objection I raised to his method.

So far I have not referred to any special method of performing the operation apart from the mere method of dealing with the pedicle, and before doing so I will give the results of my practice before I adopted Listerism, and, I may add, before I adopted what I now consider a thoroughly satisfactory method of using the ligature. Nevertheless, I claim for my results, even with these shortcomings, a fair place in the statistics of ovariectomy.

Before commencing Listerism I had performed 38 complete ovariectomies. In 6 of these I had used the clamp alone—3 of the patients died. In 2 of the fatal cases many ligatures were used on adhesions, and also in 1 of those which recovered. In the other 3, including 1 fatal case and 2 recoveries, no ligatures were used. In 1 case I clamped one pedicle and ligatured the other; the patient recovered. In 1 case I performed a pure enucleation, merely using three fine ligatures for adhesions; the patient died. In these 8 cases I do not think the method of securing the pedicle affected the result; but I am a little doubtful as to the share played by the clamp in one of them. This leaves 30 cases, of which 5, or 16·66 per cent., died—a result above the average of the leading ovariectomists before Listerism became general.

Looking a little more into detail we find:—7 cases of removal of one ovary, pedicle secured by one transfixion; 2 deaths—1 from hæmorrhage due to slipping of ligature, 1 distinctly not due to ligature. 8 cases of removal of both ovaries, each pedicle secured by one transfixion; 1 death, part played by ligature open to question. 3 cases of removal of one ovary, one transfixion and third ligature round the whole pedicle; all recovered. 5 cases of removal of one ovary, pedicle transfixed and laced with several ligatures; all recovered. 2 cases of removal of both ovaries, each pedicle laced; both recovered. 3 cases of enucleation, assisted by several ligatures; 2 recovered, 1 died—the



symptoms make it probable that the enucleation was the fatal element, rather than the ligature. 1 case of removal of both ovaries, one pedicle partly sewn into the wound (Stilling's method); patient recovered and lived several years, but had recurrence in wound and died of tetanus after a second operation in the cancer wards at the Middlesex Hospital. 1 case in which I made an imperfect attempt at Listerism, and used strong silk soaked in carbolic oil for both pedicles, also died.

Compare these results with those tabulated by Dr. Heywood Smith in his recent paper on "The Treatment of the Pedicle in Ovariectomy."\* Take the favourite method of some of the operators. Baker Brown, with the cautery, 40 cases, death-rate 12·5 per cent.—4 per cent. lower than mine, but representing a personal experience three times as great as mine. Keith, in 47 clamp cases of 50 published in 1867 (*Lancet*), had a death-rate of 19·2 per cent. (It is fair to suppose, from the frequent use of the clamp in this series, that it was then Keith's favourite method.) Spencer Wells, with 627 clamp cases (certainly his favourite method up to that time), had a death-rate of 20·73 per cent.

Since I am thus making use of my friend Dr. Heywood Smith's paper, I must refer to a few points in it which seem to me to require comment. Thus I find the following statement:—"The only scientific way, or, indeed, the only fair way, of reporting cases so as to arrive at a conclusion that will be of any use, is first of all to exclude from our calculation every case whose prognosis is unfavourable—viz., cases where the tumour is suspected or found to be malignant, and cases where the operation is undertaken as a last chance for the patient's life; when, for instance, there already exists peritonitis, or a suppurating or ruptured cyst, or where the patient's health is otherwise in the condition that would make any operation more than usually hazardous."

Now, I entirely differ from this opinion of Dr. Smith's, and I maintain that such a method of preparing statistics would not only be most unfair, but most unscientific. We do not want to know what method will give the best results in

\* *Obstetrical Journal*, November, 1879.

favourable cases, in which most methods succeed, but in all cases. Adopting Dr. Smith's plan, I would undertake with the aid of Listerism to show 100 per cent. of recoveries. To exclude the class of cases he enumerates would make statistics worse than useless, for it would make them misleading.

While on this subject of statistics, which has agitated the profession considerably during the last few months, I would take the opportunity of saying that I believe if a surgeon publishes statistics at all he is bound to make them complete in the strictest sense of the word, and I hold that any case dying within a month of a great surgical operation, whatever the apparent cause of death, cannot be omitted from the mortality of that operation.

I quite agree with Dr. Smith as to the importance of classifying methods and modifications of methods, so long as it is not carried too far; but I do not think that adhesions, except in a very few cases, affect the mortality, and I think the character of the pedicle equally rarely affects it. It might be supposed that taking away both ovaries would be more hazardous than only removing one, but experience is rather against this theory, always provided that both are diseased.

If anything like the value attached by some writers to experience is really its due, then I think the ligature is indicated clearly on account of its universal applicability.

I will now pass to the use of the complete intra-peritoneal ligature according to the method I have advised, and with the important addition of Lister's method in its every detail. The same Chinese silk is used, but it is soaked in one-to-twenty watery solution of Calvert's No. 1 carbolic acid, or a similar solution of absolute phenol.

I have now performed ovariectomy 130 times with full Listerian precautions. Of these 130 patients 14 have died, a mortality of 10.76 per cent. I am not specially concerned to-night with the antiseptic side of the question, but I must give some explanation of these figures: 7 of the 130 cases suffered unmistakably from septicæmia, the result of previous tapping without antiseptic precautions, and of consequent putridity of the cyst contents; 5 of the 7 cases died, and 2

recovered. The actual antiseptic cases were therefore 123, with 9 deaths, or a mortality of only 7·30 per cent.

Of the 9 deaths in this series 2 were from acute pleurisy, and I attribute both to the chilling from the spray; 1 with a ruptured colloid cyst, operated upon during a very acute peritonitis, died in twelve hours with complete suppression of urine—such cases were occasionally met with under similar circumstances before we used carbolic acid at all, but it is quite possible, from what we see of the effect of carbolic acid on the kidneys after prolonged operation, that the fatal result was in this case accelerated by the absorption of carbolic acid; 1 died from cardiac and renal disease, doubtless much accelerated by the operation;\* 2 after very formidable operations died very quickly from shock—possibly the method hastened the fatal result, but I think death was inevitable in either case; 1 died of some obscure brain affection—it is an open question whether my antiseptic precautions were imperfect, or whether thrombus and embolism resulted from some veins left open, as it was a case in which there was much enucleation; 1 died of obstructed intestine on the twelfth day after operation—the patient was a very bad subject for any operation, being hemiplegic and in a very depressed mental condition. This is the only one of the deaths which can be attributed to the ligature. The obstruction arose from adhesion of the ileum to the left pedicle, and to an adhesion which had been ligatured deep down in the pelvis. The remaining case, the last I lost, died of malignant disease of omentum and peritoneum. Her temperature had been much below normal for many days before the operation, but I thought it right to give her the chance of prolonged life afforded by removal of the ovarian tumour, which was also malignant.

Of the 130 cases 16 were operated upon outside the hospital, and they all recovered, though 1 of them suffered from septicæmia, the result of previous tapping.

Before classifying these cases according to the exact method of applying the ligature, I may briefly re-state the method I advocate:—1. The operation to be performed in all its

\* *Obstetrical Journal*, August, 1878.

details strictly on Lister's method. 2. No. 3 or 4 Chinese silk soaked in one-to-twenty watery solution of carbolic acid to be used for the chief transfixing ligatures, and No. 1 Chinese silk soaked in the same solution for the special ligature for the veins in the outer part of the pedicle. 3. The chief ligatures to be applied by one or more transfixions with an ordinary sharp-pointed curved and long-handled needle, all the ligatures to interlock so as to form a complete chain. 4. The special ligature for the outer part of the pedicle to be applied by transfixion, with a fine straight or curved needle, after the other ligatures if we wish the patient to lose as little blood as possible, and before them if we wish to remove a little extra blood in the tumour. 5. The ligatures not to be tied too tightly, another loop being carried round the whole pedicle if any oozing from the cut surface is observed before closing the incision.

The 130 cases may be arranged in the following classes:— Both ovaries removed in 32 cases, of which 5 died. Right ovary removed in 35 cases, of which 2 died. Left ovary removed in 60 cases, of which 7 died. One ovary removed (not sure which) in 3 cases, of which none died.

In all the fatal cases there were extensive adhesions; in 4 the tumours were very large, weighing respectively 48 lbs., 50 lbs., 75 lbs., and 82 lbs. In 6 there was much tearing and enucleation, so that the ligatures were not applied by any rule, as there was no distinct pedicle to deal with. In 2 in which the ligatures were actually applied according to the method advocated, the patients died too quickly for the ligatures to have affected the result—the two cases of pleurisy.

In the successful cases, 9 required much enucleation before the tumours could be sufficiently freed in the pelvis to form anything like a pedicle. Some of the patients were very ill for some days. Hence from the large mortality (6 out of 15) and the comparative ill-doing of many of those who recovered it is evident that this extensive broad ligament-encapsulation requiring much enucleation is a much more unfavourable condition than any shortness or thickness of the pedicle. It is also evidently much more to be dreaded than extensive

adhesions, for there were 54 cases in which the adhesions were very extensive, requiring many ligatures.

There were 17 cases of burst cyst, but only 2 of the patients died, and in both there was hopeless malignant disease of all the peritoneal surfaces. There were 43 cases without any adhesions, 5 of the cases of burst cyst being among these. The remaining 33 cases had slight parietal or omental adhesions, or both.

I might enter more into detail as to the exact number of ligatures used in each case, etc., but my paper is already too long, and I doubt if such particulars really help the solution of the question. I trust I may be considered to have proved the satisfactory nature of the results to be obtained by the constant use of the complete intra-peritoneal method of ligature; and if in so doing I have aided in spreading its general use, I feel confident the future statistics of ovariectomy will improve in proportion. When commencing this paper I wrote to all the leading American ovariectomists, and have received the most courteous replies from Drs. John Atlee, Addis Emmet, Kimball, Noeggerath, and Gaillard Thomas. Dr. Atlee still prefers the clamp in simple cases, but uses the complete intra-peritoneal method of ligature also. Dr. Emmet prefers the latter method. Dr. Kimball, after trying most of the methods I have described, now also considers the complete intra-peritoneal ligature most satisfactory. Dr. Noeggerath holds the same opinion; and Dr. Thomas does not express any decided preference, but has obtained equally good results with both the extra- and intra-peritoneal methods. There is so much valuable material in the five letters that it would be necessary to write a long paper on them alone, but at present I am compelled to give merely the general conclusions, which, as a whole, will be seen to be decidedly in favour of the plan I advocate.