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TECHNICAL MEMORANDA, OPERATIVE AND OTHERWISE.

(Under this heading will be published from time to time notes on points of practical interest in regard to methods of treatment, operative and therapeutic, and on the general management of Obstetrical and Gynæcological cases in hospital and private practice.)

Injection of the Broad Ligaments with Quinine for Prolapsus Uteri.

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When my first paper on prolapsus uteri appeared in the *B.M.J.*, 1898, confirming Savage's views on the ligaments of the uterus, it was thought that the pelvic floor and the intra-abdominal pressure were the chief factors in supporting the uterus. Clinical observation and a slight knowledge of physics are sufficient to upset these views. With regard to the pelvic floor, we constantly come across cases of *ruptured perinæum without any prolapsus*, showing that something else besides the pelvic floor is holding up the uterus.

I recently operated on a patient, at the Chelsea Hospital for Women, with a complete tear of the perinæum extending into the rectum, that had existed for fifteen years without any prolapse following; in other words, the support of the pelvic floor had been absent for fifteen years, and yet the uterus did not come down, and this is not an isolated case.

Again, in virgins with an intact perinæum the uterus comes down not infrequently, showing that the perinæum does not hold it up. Thirdly, a still further proof, if one is needed, is afforded by the results obtained from repair of the torn perinæum. However well this may be done it fails to cure the prolapse in the majority of patients.

Does the intra-abdominal pressure help to hold up the uterus? If the abdominal cavity were a vacuum something might be said for it, but even then the pressure of the atmosphere on the abdominal wall, without any counter-pressure from within, would come to something like half a ton! As a matter of fact, there is no vacuum, because the abdominal cavity communicates with the external air through the Fallopian tubes. As the pressure of the atmosphere is

history-of-obgyn.com

equal in all directions the pressure from this cause is the same above the uterus as it is below. When, however, the abdominal muscles strongly contract, as in defæcation, an increase of direct pressure on the various organs in the pelvis takes place. So far from this helping to hold up the uterus, it has an exactly contrary effect. Just as it helps to empty the rectum by pressure, or force out the intestine and produce a hernia, so also does it force the uterus down and tend to produce prolapse.

Having arrived, then, at the conclusion that there must be some other important factor in sustaining the uterus, I made a further study, fifteen years ago, of the anatomy of the uterine ligaments.

In a recent paper on the supports of the uterus the credit of discerning that this organ is mainly held up by the connective-tissues running from the side of the pelvis with the vessels to the side of the uterus, is given to a foreigner, whereas an Englishman was the first, by many years, to point out this fact.

The late Dr. Henry Savage, of the Samaritan Hospital, in his book, "On the Anatomy of the Female Pelvic Organs," p. 69, stated "that after division of the utero-sacral ligaments, obstruction to prolapse is offered by the subperitoneal cellular tissue, particularly where it surrounds and accompanies the uterine blood-vessels." On p. 26: "The utero-iliac cellular process accompanies the uterine vessels, forming a resisting fibro-cellular bond between the uterus and the sacro-iliac articulation."

Dr. Savage's work was published in 1882, just thirteen years before a similar result was arrived at abroad.

Dr. Clarence Webster, in his book "On Researches in Female Pelvic Anatomy," published in 1892, p. 87, stated that the chief ligament of the uterus was "the connective-tissue attaching the cervix to the side walls of the pelvis, and also the muscular and elastic tissue in the same position."

Several other anatomists have described the utero-pelvic band, consisting of connective-tissue and elastic tissue, with muscle strands running from the obturator fascia to the cervix.

That Dr. Savage's observations were correct seemed extremely probable, because they at once explained the clinical facts observed in connection with prolapse, viz., that the uterus would often keep up when the support of the pelvic floor is lost by rupture, and that the uterus sometimes comes down when the pelvic floor is intact and giving all the support it is capable of. In the former case the ligaments can hold up the uterus because they are strong, and in the latter the uterus comes down because they are weak. The strength of Savage's ligament varies greatly in different women; on the one hand, it may be so strong that nothing can stretch it, while in another case the margin of safety is so little that the drag of the vaginal walls following on a ruptured perinæum may be sufficient to

history-of-obgyn.com

upset the balance and start the prolapse. In such cases as these, if the perinæum is repaired *at once* and the drag of the vaginal walls taken off the uterus, the ligaments *may* recover without further treatment, but in the majority the prolapse goes on.

The treatment of prolapse in the past has not been successful in the majority of cases. An attempt was made to grapple with the condition by doing ventrofixation. For many reasons it has proved unsatisfactory except in slight cases of prolapse. In order to hold up the uterus a broad hand of adhesion is necessary, otherwise it comes away from the abdominal wall.

Before the menopause these strong adhesions interfere with pregnancy. After the menopause the abdominal wall in many women is too weak to sustain the uterus and is dragged down into a pouch by the descending uterus, much to the discomfort of the patient. These objections do not apply to ventrosuspension for retroflexion by Kelly's method. Only two sutures are used, and the area of adhesion is quite small. This is enough to keep the uterus in position with simple retroflexion, while its mobility is not altogether abolished. Expansion during pregnancy can then take place, and it is quite the exception for any difficulty to arise. In the absence of prolapse there is no drag on the abdominal wall to produce discomfort.

If it is allowed that the uterus is chiefly kept up in health by the ligaments already described the ideal treatment would be some method of strengthening these ligaments rather than creating a new one by attachment to the abdominal wall.

It occurred to me that this might be done by irritating the cellular tissue with quinine so as to produce an effusion of lymph that would form new connective-tissue.

In all probability effusion would occur naturally and repair follow if the uterus were suddenly and violently dislocated, just as effusion and repair follow after sudden dislocation of an ordinary joint. But as the uterus comes down very slowly there is never, at any time, sufficient stimulus to produce an effusion of lymph.

My friend, Dr. Aikman, told me that, when he had injected sulphate of quinine into the subcutaneous tissue of the arm for malaria it produced effusion and caused a small swelling, that remained for some months. This seemed an ideal agent to use because it is a strong antiseptic and is non-poisonous.

The first patient was a woman, aged 61, with a procidentia of six years' duration. I explained to her that she would be the first to undergo a new operation, but that I had considered the question for some years in all its aspects and did not think there could be much risk. Her answer was that, as she had been to several hospitals and no one had cured her, she was ready to undergo any operation. The solution first tried in 1897 was 1–4. This produced a slight suppuration; the quantity injected was 30 drops on each side. As

history-of-obgyn.com

my object was to produce lymph and not pus the solution was altered to 1–5, and to this I have adhered ever since. This first patient did very well, and the uterus was held up. The discharge of pus amounted in all to about 2 drachms.

My candid friends tried to dissuade me from going on, and predicted all sorts of dreadful catastrophes that would follow. One of the most common arguments used was that inflammation would be set up, which could not be controlled. As a matter of fact, the reaction set up by any irritant or injury is in proportion to the amount of that irritant, and the vitality of the individual provided that no microbic infection occurs.

Shortly after the operation on the first patient I treated a case of cancer of the cervix, beyond excision, with injections of methylene blue, which was then being advocated on the Continent. An intense reaction was produced in this patient and profuse suppuration, but in a few days it subsided. After this experiment with methylene blue I felt fairly certain that my injection of quinine would do no harm, as I had no intention of setting up inflammation.

After injection there should not be any rise of temperature, nor does it often occur. Out of 178 cases I have only had 3 with suppuration, and they occurred in women exhausted by large families and in low condition. I am happy to say they were none the worse for it, and the uterus was well held up.

The best time to operate is a week after menstruation is over. Before the operation is performed the bowels are thoroughly cleared out, and the vagina well douched with 1–2000 perchloride of mercury. An anæsthetic is advisable, although the operation only takes a few minutes. The patient is placed in the lithotomy position. The next step is to pass the bladder sound and ascertain to what extent it falls down on each side of the uterus. A Sims speculum is then passed to hold down the posterior vaginal wall and a retractor to hold up the anterior vaginal wall. The retractor should be fairly wide so as to draw the bladder well up and out of the way. A straight sound is then passed into the uterus and held horizontally by the left hand of the operator, while the syringe containing the solution is held in the right hand. The injection is then made on each side of the uterus through the vaginal wall at a distance of three-quarters of an inch from the cervix, and a *little below* the level of the external os. The needle is one inch long. If the cervix is much enlarged, which often happens in prolapsus, the point of injection will be nearer to the cervix. The aim of the operator should be to insert the needle exactly half-way between the position of normal cervix and the pelvic wall. Then the nearest portion of the uterine artery and veins and the ureter lie on the inner side of the needle and above it. Another point is that, in the outer half of the broad ligament in this situation there are no veins of importance. Luschka's

history-of-obgyn.com

illustration of this is most misleading, and must have been arrived at by forcible dilatation of the veins on the cadaver. In doing other operations on the pelvis I have constantly examined this cellular tissue and found no vessels of importance in it.

When operating on cases of chronic procidentia it is advisable to inject somewhat *lower* on account of the tendency of the bladder to pouch down on each side of the cervix. After the needle is in the cellular tissue the point should be slightly rotated so as to ascertain if it is free. Should the point have been passed into any other structure its movement would be restricted, as it would be held at two points.

The syringe must be efficient and its joints watertight, otherwise the solution may simply ooze into the vagina. That which I use has a long, thin, straight nozzle with the needle fitted to the end; the object of this is to prevent the light being excluded from the vagina by the body of the syringe, and to enable the operator to see clearly the point of injection. The needle is very apt to be corroded by the acid in the solution, and should therefore be tested before use and thoroughly washed out after in warm water. After the injections are made the operator proceeds to antevert the uterus as much as possible. A cup-and-stem indiarubber vaginal pessary is then inserted and secured by tapes to a band round the waist. It is very necessary to see that this *pessary is well secured* in position so as to keep the uterus up for the first three days while the effusion is forming. After three days it may be taken out. If kept in longer it does no further good, and may do harm from pressure. There is no pain after the operation. In this respect the operation shows to great advantage compared with other operations; in fact many patients say they would hardly know they had been operated on. There should be no rise of temperature. This shows that there is no inflammation and that the process is a reparative one. When a rise does occur it is usually at the end of 6 to 7 days.

The patient is instructed to lie on her face or side so as to throw the uterus forward as much as possible and keep it in good position. The bowels should be kept open every day. An accummulation in the rectum, in near proximity to the effusion, is not desirable. On the other hand, free purgation must be avoided, as it would tend to restrain the formation of lymph. Occasionally there is slight cystitis. This generally passes off in a few days if it occurs at all. The catheter may have to be passed for the first few days or longer, but in most cases it is not necessary.

After injecting some 24 to 30 grains of quinine one might expect some symptoms of cinchonism. This, however, is absent in many cases, and is explained no doubt by the precipitation of the quinine after injection. This precipitation very likely favours the formation of the fibrous strands, which can be felt in most patients at the end

history-of-obgyn.com

of 2 or 3 months. The exact solution consists of 12 grains of the ordinary sulphate of quinine, dissolved in 30 minims of dilute sulphuric acid and 30 minims of distilled water. It should be freshly made for each patient, because after a time, and more especially in cold weather, some deposit will take place. The stopper of the bottle is very liable to stick, the slight precipitation round acting like cement. The amount of solution injected will depend on the case. The worse the case the greater the amount required. The maximum that I have used has been 80 minims on each side, and the minimum effective dose for early cases of prolapse is about 40 minims. As the space on the left side is encroached on by the rectum I usually inject 10 minims less on that side than on the right. The quantity to inject will also depend on other factors, one of these being the general condition of the patient. Speaking broadly, one may say that the healthy, florid country woman will form more effusion than the pale, anæmic town dweller if the same dose is given to each. These anæmic patients should be fed up with a meat diet and iron for some weeks before being treated.

The duration and extent of the prolapse must be taken into account. It stands to reason that a patient who has had complete procidentia for ten years will require more effusion to hold up the uterus than one who is only in the first stage and can get about with the aid of a ring pessary.

For cases of chronic procidentia, such as one comes across in hospital practice, it may be necessary to do more than one injection. An interval of at least fourteen days should elapse for the second injection. The quantity injected should also be less by one-third because the patients react more.

In one instance the procidentia recurred when the pessary was taken out after the first and second injections, but a third injection held up the uterus. When a rise of temperature does occur, it is nearly always after a second injection, so I try to avoid it, if possible. To estimate the amount of rest required after the operation, so as to secure organization of the effusion into fibrous tissue, and to prevent this from being stretched until it is strong enough to stand the strain, the following factors must be taken into account:—(1) The duration of the prolapse; (2) the extent of the prolapse; (3) the amount of the effusion found on examination 10 days after the operation; (4) the social position of the patient and the amount of work she will have to do after going home. It is quite easy for failure to occur if these factors are not properly considered, and if too much strain is thrown on the new ligaments before the fibrous tissue has formed. Even when the amount of effusion is much smaller than it should be, a successful result generally follows if the patient is prevented from throwing much strain on the uterus for the first year.

history-of-obgyn.com

For a case of prolapse in the first stage a week to ten days in bed may be sufficient, followed by another ten days on the sofa. If a ring pessary is then inserted in order to take the weight off the uterus the patient can go about the house and out for drives, but must still avoid anything that throws much strain on the ligaments, such as lifting weights, etc. At the end of three months the ligaments are usually strong enough to do without the ring, but the full strength of the new fibrous tissue is not reached under six months or more.

This was strikingly illustrated in a farmer's wife sent to me six years ago, by Dr. F. Bovill, for chronic procidentia. Although the uterus was held up she was not able to do her full amount of work at the end of four months, but at the end of six months she could work 10 hours a day, on her feet most of the time, and she has remained quite well ever since.

If the perinæum is ruptured it should also be repaired. Although I do not believe that the pelvic floor in any way keeps up the uterus it stops prolapse of the vaginal walls and prevents them from dragging on the uterus, bladder and rectum. Repair of the perinæum therefore, adds much to the comfort of the patient and also helps the ligaments.

For minor cases of prolapse the two operations can be done at one sitting. The ligaments are first injected, and then a perinæorraphy is done. As the use of a pessary under these conditions is impossible, the patient's hips are kept raised a little, while she is in bed for the first three days so as to cause gravitation of the uterus to a high position in the pelvis.

I do not advise the two operations together in cases of procidentia, because vomiting after the anæsthetic might force the uterus right out, unless kept in place by a pessary. It might then be fixed too low down or the pressure on the perinæum might prevent union of the wound.

The best means to adopt so as to secure organization of the effusion into fibrous tissue is somewhat of a problem. Neither physiologists nor pathologists have ever thrown any light on this subject. Why, after parametritis from a microbic infection, the effusion should in one case apparently entirely absorb, and in another should form stout adhesions, we are quite in the dark. Empirical knowledge in respect to this question helps us a great deal. After dislocation of any joint in the body there can be no doubt whatever that organization of the effusion into fibrous tissue takes place more extensively and rapidly if that joint is kept absolutely at rest. If kept at rest too long repair may be overdone, and the normal movements of the joint be interfered with. The application of this lesson to the treatment of prolapse indicates that after injection the patient should be kept at rest. The greater the amount of fibrous tissue required to keep up the uterus the longer should the patient

history-of-obgyn.com

lie up. When we wish to cause absorption of adhesions or effusion round a joint we use massage, which increases the circulation locally through the part. In the pelvis, therefore, after the effusion is formed, we must avoid anything likely to cause an increase in the local circulation.

The results are on the whole very good. Taking all the easiest cases and also the most difficult, the latter forming by far the larger proportion and including a great many cases of chronic procidentia, I find that in 75 per cent. the uterus has kept up permanently, 20 per cent. were greatly improved and 5 per cent. failed. Taking only those cases of comparatively early prolapse, such as one usually meets in private practice, the percentage of successes is as high as 98 per cent. Other doctors, who have followed me, are able to claim a higher percentage of success than I can, which shows that I am not biassed in favour of my own work. If every patient in the early stage were operated on we should not see many cases of chronic procidentia. In time this condition might almost be abolished.

Causes of Failure.

1. Want of reaction in anæmic and cachectic patients. This can be remedied by feeding up the patient and giving iron some weeks before the operation.

2. Faults in technique. If the solution of quinine is not made up of the full strength, or if the joints of the syringe are not water-tight and allow the solution to escape into the vagina, the amount of quinine injected will not be sufficient to produce the required reaction.

3. If the patient is allowed to go about too soon before the effusion is organized into fibrous tissue it will stretch and may even give way entirely.

My first case was in 1897, so that I have had 11 years' experience. Up to now I have done over 178 cases, and in addition I may quote 80 cases done by other medical men as follows:—

Dr. Rice, of Derby, has operated on 31 patients. All but one of these were successful. Three of the patients had children after the operation without any return of the prolapse. One patient was aged seventy-two.

Dr. Eugene Carlier, of Brussels, operated on 15 cases, and wrote to say he was very satisfied with the results.

Dr. S. Kent, of Bexhill, operated on 9 patients, all successful. Two of these had children without recurrence of the procidentia.

Dr. Lea Wilson operated on 12 patients at the Dhankorbai Hospital, Nasik, India; 10 of these were successful, but she had not been able to follow them up to know the remote results, except in one patient, who was quite well after a year, and was seven months pregnant.

history-of-obgyn.com

Dr. John Aikman, of Guernsey, has operated on 7 patients. In every case the uterus was held up and has remained so for years, although procidentia had preceded the operation in most of the patients.

Dr. Crewdson Thomas published a case in the *British Medical Journal* of a successful result, followed by conception and parturition, with no return of the prolapse.

Dr. Hugh Fenton has done 7 cases most successfully.

Dr. Eden operated on a case in which ventrofixation completely failed, and was able to hold up the uterus by injection.

One great advantage of this operation is that it does not in any way interfere with pregnancy. Taking all the patients under 35 years of age, nearly 40 per cent. of them have had children, and without any difficulty. In conclusion I may say that the operation is fairly simple and takes only a few minutes to perform; it appears to be free from risk if carried out properly; it causes no pain afterwards; it is more effective for its purpose than any other treatment.

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