Cause and Treatment of Procidentia Uteri as it occurs in the Parous Woman.

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Over a quarter of a century has passed since Schultze laid the foundation of modern gynæcology by demonstrating the normal position of the uterus. Had he confined himself to this splendid achievement his work would have been without alloy. Unfortunately, he permitted himself to speculate as to why the uterus rests in this anteflexed and anteverted position. His hypotheses were so plausibly expressed and so convincingly urged that they obtained ready and wide acceptance, and even now are held by many eminent gynæcologists as cardinal articles of faith.

His hypothesis suggests that the uterus does not need the support of ligament, but lies snugly wedged between the opposed pressures from the abdomen and its contents above, and the levatores acting from below; one tending to drive the body of the uterus on to the emptied bladder, which in its turn rests on the anterior wall of the vagina, whilst the other, by reason of their fixed attachment to the pubes and their attachment to the posterior vaginal wall, suffice to close this canal and prevent the descent of the bladder. The acceptance of this idea of mutual support had one inevitable result, namely, the attempt to cure prolapse by fixing the uterus in anteversion and repairing the torn perineal muscles. The resources of gynæcology offered many different means of effecting these results, but in spite of the perfection of these operations, thousands of unfortunate patients are living witnesses of the uselessness of this treatment and the falsity of the hypothesis on which it was founded.

In the light of present day knowledge it is hard to understand how we could have been so far led astray in our anatomical data. Were the uterus a rigid, board-like substance it possibly could be held in position in the manner suggested by Schultze, but it is not rigid, and the force which presses the fundus down will also operate on the cervix. The upper edge of the levator muscle is situate an inch below the fixation point of the cervix,—a situation which precludes the cervical position from being dependent on the muscle. Were it otherwise the cervix would be driven downward to its upper border in response to abdominal pressure, and such a descent would cause the body of the uterus to slide from its place as wet soap slips from the enclosing hand. This displacement is easily shown by placing a bullet forceps on the normal uterus and pulling it downwards. The uterus is thus made vertical, and the first stage towards prolapse is

obtained. Abdominal pressure then, if maintained, brings about retroflexion, as the round ligaments cannot support a continuous strain. These ligaments, though all important in preventing the backward displacement which tends to occur whenever the bladder fills, can only operate when the cervix is normally elevated. In the presence of the descent of the latter they are powerless to prevent a backward displacement. The key then to the position must be sought by finding the structures concerned in the fixation of the cervix, and our first enquiries will naturally be directed towards the so-called uterine ligaments. For practical purposes these may be considered to consist of three pairs—the sacro-uterine behind, the broad ligaments on each side, and the round ligaments in front. To Schultze these ligaments presented as great a puzzle as they have presented to more recent observers. To him they appeared, as they appear to us, flaccid structures, never felt or seen in tension under normal conditions. The unstriped muscle fibres they contained caused him to conclude that they were prone to periodic contractions, that these contractions were coincident with the emptying of the bladder, and that these sacro-uterine ligaments, by lifting the cervix upwards and backwards, and the round ligaments, by forcing the fundus forward, restored the temporarily displaced uterus once more to the normal.

A closer study of these ligaments will show the inherent improbability of so fantastic an idea.

The round ligaments justify their title. They consist of rolled muscular fibre derived from the superficial layer of the uterus. Their chief use is in connection with pregnancy, labour, and the puerperium. During this period they are hypertrophied and become very important structures, sharing in all the contractions of the uterus. Though thin and flaccid in the unimpregnated state, they have a reserve use in the manner already indicated. The pain that is sometimes felt in the scar left after an Alexander Adams operation, particularly experienced during the menstrual period, suggests that they share with the uterus in the contractions of menstruation.

The broad ligaments are double folds of peritoneum, which enclose blood-vessels and nerves placed in two separate planes. Around these vessels are massed a certain amount of fibrous connective-tissue arranged there as a framework to the vessels and not as a support to the uterus. These ligaments can be entirely severed without causing any uterine displacement. The sacro-uterine ligaments have structures similar to that of the broad ligaments, but, according to anatomical authorities, are characterized by the possession of fairly important bundles of unstriped muscular fibres derived from the uterine wall. No one has ever seen or demonstrated the action of these muscles; neither during operation nor during micturition have they been observed to contract, and whatever be

their use it certainly is not that suggested by Schultze. They, too, can be severed entirely, and yet the position of the uterus will remain unaffected, a statement that is also true for all six ligaments.

Immediately below the peritoneum there stretches across the pelvic inlet a very remarkable fibro-muscular diaphragm, which has until recently received scant notice from anatomists. This diaphragm is deficient in many places to permit of the passage of diverse structures, but below the bases of the broad and sacro-uterine ligaments it is gathered into fibrous, muscular and elastic bands of great strength and significance. It is only in the most recent and authoritative works that the subperitoneal fascia is considered as constituting an important portion of the pelvic fascia. To Mackenrodt we are indebted for first drawing attention to these fibro-muscular bundles which he termed the " ligamentum latum transversalis colli." This structure passes below the base of the broad ligament and is firmly inserted into the upper cervical portion of the uterus, its fibres closely interlacing with that portion of the fascia which lies below the base of the sacro-uterine ligaments. Mackenrodt showed that the stability of the uterus entirely depends on these structures; that their severance results in immediate dipping and displacement of the cervix; whilst, on the other hand, when they remain intact the uterus does not descend, despite the severance of all its so-called ligaments. Every operator on the abdomen has now had ample opportunity of verifying the truth of these observations, and is familiar with the tough, gristle-like structure that is divided as a last step in the removal of a cancerous uterus by Wertheim's method. It is to this structure then that we must direct our attention if we are to attain any success in the permanent cure of procidentia uteri.

The salient features of Alexandroff's operation were first brought to my notice in the year 1906, and in that year I had the honour to read before this Section of the Academy a paper based on three operations which had been performed by me according to the principles laid down by him.

The details of his procedure were unknown to me, and this I fully explained at the time. Further experience has shown imperfections in my early technique, and these were particularly in evidence in the first operation, with the result that a relapse finally occurred. The patient was an exaggerated example of prolapse, and I had subsequently to fit her with a ring pessary. Since leaving the Rotunda I have ascertained that she has undergone the operation of hysterectomy. She, so far as I know, represents my one and only failure.

For the purposes of the present paper, I took the liberty of addressing a personal letter to every gynæcologist holding a public appointment in Dublin. I asked them for an expression of their views on the following two points:—First, as to the most important lesions to which prolapse owes its origin; and, secondly, the operative

procedures recommended for its cure. I desire to take this opportunity of conveying my thanks to those who so graciously and promptly responded to my queries.

The replies I received well demonstrate the state of present day knowledge, as every shade of opinion is represented in these letters. Amongst the many divergent views it is impossible that all can be right, and an error in ætiology must inevitably lead to error in treatment. That these errors are made is abundantly evident in the thousands of living failures after surgical interference.

The advocate of a new operation assumes a very grave responsibility, and I only ask for consideration similar to that you would afford to the suggestions of others, accepting the operation only if it stands the test of criticism in respect to theoretical perfection and practical utility.

The majority of those who have replied to my queries name stretching of the ligaments as the chief lesion in the causation of prolapse; but there is no agreement as to the relative importance of the several sets of ligaments. The sacro-uterine ones are those most constantly mentioned, but defect of the round and of the broad ligaments have each their adherents. Some have gone into particulars as to the cause of their stretching, and have explained that it is due to (*a*) uterine enlargement and weight, and (*b*) undue manipulations of the uterus during the puerperium. Relaxation of the pelvic floor is assigned as a cause by many, and indeed almost all who have replied suggest relaxed perinæum either as the chief or as a contributory cause. Tearing of the pelvic fascia—by which is meant the portion which covers the inner aspect of the levators—is suggested as a cause by two writers. One of these refer to a deficiency in Mackenrodt's ligament, but both are careful to add that prolapse may arise independently of these lesions. One writer mentions a relaxed abdominal wall as an important predisposing condition. This, I take it, to be a revival of Matthew Duncan's view that the uterus is sustained by a negative atmospheric pressure, which pressure is lost in the absence of a normal abdominal tonicity.

In comparing the assigned causes of prolapse with the treatments suggested there is an entire lack of relation in the majority of instances between one and the other, and the following operative procedures have been variously recommended:—

1. Alexander's operation with colporrhaphy.
2. Shortening the round ligaments by other devices.
3. Ventro or vaginal suspension with perineal repair.
4. Ventro-fixation or uterine fixation to the abdominal aponeurosis with salpingectomy to prevent further pregnancy.
5. Vaginal and perineal repair with no further operation.
6. Hysterectomy.

7. Two writers say that in some cases the ligamentum latum transversalis colli may be stitched in front of the cervix.

8. Two suggest interposition of the uterus as an adjunct to vaginal repair.

9. One of my correspondents answers my letter by forwarding me a reprint from a paper published by him in the *Journal of Surgery, Gynæcology and Obstetrics,* August 1911, entitled "A New Operation for the Vaginal Shortening of the Utero-Sacral Ligaments." He writes: "The purpose of this paper is to describe my methods of shortening the utero-sacral ligament," which procedure he combines with some one or all of the following: curettage, supra-vaginal amputation of the cervix, interposition of the uterus (Wertheim's operation), colpo-perinæorrhaphy. Further on we read: "The association of these two procedures (shortening of the utero-sacral ligaments and interposition of the body of the uterus between the bladder and the anterior wall) is of course by no means new, as Wertheim habitually associates the two when necessary. His method of shortening the utero-sacral ligament is, however, quite different from mine." "In general terms the operation consists in exposing the utero-sacral ligaments at their insertion into the uterus, in cutting them off the uterus," "without necessarily opening into the peritoneal cavity," "and in bringing them round in front of and below the cervix."

It will be seen from these quotations that the claim to novelty falls under two heads—(1) the extra-peritoneal severance of the sacro-uterine ligaments from the uterine wall; (2) their advancement to the anterior portion of the cervix, slinging the latter upward and backward.

It has already been shown that the sacro-uterine ligaments consist essentially of peritoneal folds enclosing some bundles of unstriped muscle and fibrous tissue and that they are directly contiguous with the fascial diaphragm which stretches across the pelvic inlet. It is not possible, consequently, to divide these ligaments completely without opening the peritoneal cavity, and if the peritoneum be not separated from the underlying connective-tissue structures these latter will be found to be directly continuous at their insertion into the cervix with the ligamentum latum transversalis colli of Mackenrodt. It would seem therefore that the structures brought in front of the cervix in the operative procedure above described are not the sacro-uterine ligaments as believed, but fibres of that fascial diaphragm which covers the pelvic inlet.

This is the essential feature of Alexandroff's operation, as those who have done me the honour to recall my communication will remember. Lest, however, it has escaped the memory of some, I shall briefly recapitulate the manner in which I perform it:—

1. Anterior colporrhaphy, causing free exposure of the prolapsed

bladder. 2. Elevation of the bladder from the cervix until the peritoneal fold is reached. 3. Free lateral splitting of the cervix, with wedge-shaped amputation of its lips to an extent sufficient to reduce it to its normal length. 4. Closure of each wedge with catgut ligatures which do not include the vaginal mucous membrane, and which are left sufficiently long to provide tractors for the cervix. 5. Free opening of the peritoneum and dislocation of the uterine fundus through this hole. 6. The placing of two catgut or silk sutures in the following manner: (*a*) through the mucous membrane of the vagina as close to the urethral orifice as the raw surface permits; (*b*) through one lateral flap of the peritoneum, which will be found lying on the posterior wall of the dislocated uterus in the neighbourhood of its cervical portion; (*c*) through the anterior wall of the uterus, midway between the tubes, and about half an inch below them; (*d*) through the peritoneum at the other side; (*f*) through the corresponding vaginal mucous membrane. The second suture follows the direction of the first, but is placed half an inch beneath it. These sutures are held in a catch forceps, but not at present tied. The uterus is returned into the abdomen and the peritoneal rent completely closed with fine catgut, a procedure made easy by traction on the cervix. Mackenrodt's ligaments are now easily exposed by wiping the mucous membrane from the cervix, the latter being fixed to facilitate the procedure. Silk ligatures are passed at each side of the cervix through these ligaments, and are placed sufficiently far outward to take up all slack when they are drawn together; they are then tied in front of the cervix in the neighbourhood of the internal os, and this structure is pierced to secure the ligaments in their forward positions. It is well to add further catgut sutures to make the permanence of the union more certain. If it be desired to bring the ligament in front of the cervix in its entirety there should be a free severance of its fibres at its cervical insertion, and if such severance is deemed necessary the portion of the fascia least likely to cause hæmorrhage will be that which lies beneath the sacro-uterine ligaments. Its advancement to the front of the cervix causes an immediate tightening of its lateral part. The vaginal mucous membrane is now closed so as to cover the raw surfaces of the cervix and to complete the anterior colporrhaphy. The uterine sutures are tied and a modified Lawson-Tait's perineorrhaphy brings the operation to an end.

The beginner may consider that he has not gained sufficient elevation of the cervix after full attention to these details, but he must remember that it is not natural that the cervix should be markedly elevated, and when he examines the patient at the end of three weeks he will be struck with the normal condition of the parts.

The cystocele is permanently cured, the cervix has no tendency to dip, and should pregnancy occur normal delivery may be looked

forward to. We have had no personal record of trouble during labour in our entire series of vaginal suspensions, and at least eight patients on whom the operation was performed have delivered themselves naturally.

Now, in comparison with this, let me contrast the methods that have been suggested. Reasons have already been given which demonstrate the futility of the Alexander-Adams's operation for the cure of prolapse, and the methods devised for suspension of the uterus by means of the round ligaments are all open to the disadvantages that these latter are liable to stretch under continuous strain, and this stretching will be attended with pain.

The failure of ventro-suspension is a common experience amongst the leading gynæcologists of the world, and fixation of the uterus to the rectal aponeurosis, though possibly effective in preventing recurrence of prolapse, requires sterilization of the patient to ensure against pregnancy, and for this reason must be condemned.

The combination of curettage and amputation of the cervix with vaginal and perineal repair, once largely adopted for the cure of prolapse, has now rightly fallen into disfavour. If the patient can lead an indolent life such measures may at times be productive of lasting relief, but in the case of the hard-working women the retroverted uterus will bore its way outward despite the repaired levator; that this sinking results from a positive pressure exerted on it by the abdominal contents is proved because of the fact that it comes down in a retroverted position. Had atmospheric conditions any part in the support of the uterus we would not find this backward displacement associated with prolapse.

Hysterectomy is the operation of despair, and has not the merit of preventing in every case the recurrence of intestinal hernia. If cicatrization of the raw surface left after hysterectomy suffices to make taut Mackenrodt's ligament there will be no recurrence of prolapse, but if the contracting tissues fail to accomplish this a hernia follows and the last stage is worse than the first.

Interposition of the uterus was first brought to our notice by the writings of Freund. The operation was modified by Schauta, and is now practised by Wertheim. The originator of the operation intended that the markedly displaced uterus should act as a natural pessary by making its enlarged fundal pole fill the vagina. In performing it the vaginal mucous membrane is split from the cervix to the urethra. The edges at each side of this cut are undermined so as to free the flaps from the underlying bladder. The bladder is pushed up till the peritoneum is reached, and the latter is then freely opened to permit the uterus to be brought out into the vagina in such a manner that its fundal end approaches the urethra close to the pubes. The peritoneum is now stitched closely to the back wall of the uterus near the cervix. The vaginal skin flaps are pulled over

the protruding uterus and sutured if possible. If the flaps cannot be approximated they are stitched to the side of the uterus, and the body of the latter is left exposed and protruding into the vagina. A subsequent pregnancy after this operation would be a disaster, and it become imperative therefore to resect the tubes in cases in which the menopause has not become established. Even when the woman is past the child-bearing period the deformity of the vagina induced by the protruding uterus and the difficulty in the drainage of uterine discharges are sufficiently potent reasons for condemning this operation, and when we hear that Wertheim now in addition shortens the sacro-uterine ligaments we have proof that it is not to be relied on unaided as a cure for prolapse.

Finally, there is the so-called extra-peritoneal shortening of the sacro-uterine ligaments. This seems to me, for the reason I have already given, to be one of the many modifications by which the principles of Alexandroff's operation may be carried out. I have myself performed it, and am satisfied that it is quite effective in making taut the ligamentum latum transversalis colli and bringing it in front of the cervix.