

EDEBOHLS. (G.M.)

A Modified Alexander-Adams
Operation.

BY

GEORGE M. EDEBOHLS, A. M., M. D.,

GYNAECOLOGIST TO ST. FRANCIS HOSPITAL, NEW YORK.

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A MODIFIED
ALEXANDER-ADAMS OPERATION.*

By GEORGE M. EDEBOHLS, A. M., M. D.,
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THE operation for shortening the round ligaments has established itself in the favor of comparatively few gynæcologists. This I believe to be due in very great part to the difficult and unsatisfactory technique of the operation as usually practiced, leading to disappointment and mortification and rendering it unpopular with operators.

During my earlier experience with the operation, embracing five cases, I shared the general unfavorable impressions, and was on the point of practically abandoning the operation in favor of ventro-fixation of the uterus in all cases of retroflexion and version where the symptoms and the failure of milder methods to relieve called for operative interference.

In a paper entitled *Aus der gynäkologischen Abtheilung des St. Francis Hospitals in New York: Die Laparotomien des Jahres 1889*,† I reported four hysterorrhaphies, of

* Read before the Gynæcological Section of the Tenth International Medical Congress.

† *New Yorker medizinische Monatschrift*, May, 1890.

which three were performed for retroversion, one for retroflexion of the uterus. All of the patients were seen between six and twelve months after operation, and remained completely relieved of their former symptoms. In all, the uterus remained in anteversion. I quote from the paper :

Notwithstanding these favorable results, I shall in the future perform laparotomy for ventro-fixation of the uterus only in case the latter be adherent, or when other intra-abdominal conditions calling for operation complicate retroversion of the non-adherent uterus. The hysterorrhaphies just described were performed at a period when I was dissatisfied with the Alexander-Adams operation for shortening the round ligaments. This dissatisfaction was grounded chiefly on the difficulty of really shortening the ligaments, when found, in their intra-abdominal course. Since December, 1889, I have performed the operation for shortening the round ligaments eight (at present thirteen) times after a modification of my own, which I intend shortly to publish. In every case I easily succeeded in shortening the ligaments from three to four inches in their intra-abdominal course. The immediate results have been perfectly satisfactory; the final results remain to be tested by time. In case the good results prove permanent, I shall probably never again perform laparotomy for uncomplicated retroversion of the uterus, but shall, in such cases, resort to shortening of the round ligaments, or perhaps to a modification of the operation of vaginal ligature after Schuecking.

This quotation defines my present attitude, which I have found no occasion to change since writing the foregoing. In the latter part of 1889, as a result of some thought relating to the difficulties to be overcome and of study upon the cadaver, I elaborated for myself a modification of the technique of Alexander's operation. This I have since practiced in thirteen cases—seven times for retroversion or retroflexion, and six times for prolapse. These cases I have herewith tabulated, as likewise, for purposes of comparison, five

cases in which I operated after the usual method. These eighteen cases include my entire experience in the operation of shortening the round ligaments. In all of the thirteen cases an immediate anatomical success was achieved. The retroverted uterus was brought into and held in normal anteversion; the prolapsed uterus, with the added aid of plastic operations performed at the same sitting, was sustained at its proper level in the pelvis.

About the permanent results it is as yet too early to speak. I have seen all of the patients at greater or less intervals since the operation, and thus far know of no case where the uterus has again become prolapsed or retroverted. Up to the time of my latest knowledge, an anatomical and a therapeutical success has been the result in every case. I shall on a future occasion report the final results as far as I may be able to ascertain them. The present paper is concerned chiefly with the technique of the operation which I shall now attempt to describe.

On the day preceding operation the patient receives a purgative, a pubic and vulvar shave, and a full bath. After being anaesthetized and placed upon the table, the site of operation and the surrounding parts are thoroughly cleansed with soap or mollin and water, irrigated with bichloride solution (1 to 3,000), dried, washed with ether, and again irrigated with the sublimate solution.

The spine of the pubes is located by the index finger. The incision begins just above it, over the site of the external abdominal ring, extending upward and outward, parallel to Poupart's ligament, for two inches and a half to three inches, according to the amount of adipose tissue. The adipose tissue is divided by clean cuts and without the aid of retractors until the glistening aponeurosis of the external oblique is laid bare. In the use of retractors there is danger of drawing too much upon one side or other of the

wound and of dislocating its center, so that after cutting through the adipose tissue we may find ourselves upon the muscular aponeurosis at quite a distance from the external ring.

If there is much subcutaneous fat, it is advisable, while cutting through it, occasionally to feel for the spine of the pubes, so that the inner and lower end of the incision may bear directly down upon it. After exposing the fibers of the external oblique, the external abdominal ring, its pillars, and the intercolumnar fibers are readily distinguished.

Up to this stage the operation is identical with the one usually practiced; here the divergence begins. A grooved director is inserted into the external ring, just beneath its outer and upper margin. It is advanced along the inguinal canal, hugging closely its anterior wall, to a point opposite the internal ring. The anterior wall of the canal, along its whole length, is now divided on the director, observing care to cut as nearly as possible in the exact direction of the course of the aponeurotic fibers. The internal ring is gently felt for but not dilated, and sometimes the ligament can be distinctly felt emerging therefrom. Generally, however, it is not easy to be sure of feeling the ligament. A blunt hook is next passed down to the ring and its point made to sweep across the bottom of the wound from above and within along the posterior and inferior walls of the canal. The ligament is found in the inferior and outer part of the canal nestling close behind Poupart's ligament. It is brought out by the hook and liberated from its cellular attachments. The fibers of insertion into the canal are likewise separated from the walls of the latter. It will be found that the ligament, at its emergence from the internal ring, constitutes a well-marked, oval, strong band of fibers; that it immediately begins to spread out and attenuates

rapidly as it proceeds inward and downward in the direction of the external ring.

The only difficulty in performing the operation is likely to be encountered here. If the ligament is picked up in the canal at a distance from the internal ring, it fails to present its peculiar ligamentous sheen, owing to its separation into fibers for insertion into the walls of the canal. The operator has the ligament upon his hook, but fails to recognize it. From its resemblance to muscular fibers he is liable to mistake it for the latter. If the seized bundle, however, is made tense by traction, it can be traced by the finger directly to the internal ring. Recollecting that the canal contains nothing but the ligament and the accompanying small ilio-inguinal nerve, the operator draws confidently upon the seized tissues and finds the round ligament, *in propria forma*, emerging with its peritoneal investment.

The broad ligament covering the round ligament is drawn out in the form of an inverted funnel. With one hand pulling on the round ligament in a direction at right angles to the plane of the aperture of the ring, two fingers of the other hand strip or peel back the peritonæum of the broad ligament from the round ligament, until three to four inches of the latter have been pulled out and bared. In doing this the reflection of the peritonæum should be distinctly kept in view. It is easily recognized as a white line running transversely across the round ligament, anteriorly and posteriorly, and all but meeting at the sides.

In three of the twenty-six ligaments thus treated, I have torn and opened the peritonæum in stripping it back. The resultant little holes gave no trouble. By spending a little time over the work, and stripping the peritonæum back gently and slowly, this accident can be avoided.

The wound is now protected with bichloride gauze and the operation performed in the same manner on the oppo-

site side. The next step in the operation consists in stitching the drawn-out parts of the shortened round ligaments securely in the inguinal canal. The ligament is pulled out as far as it will go. I have never failed to draw it out three inches, nor ever secured a shortening of more than four inches.

One who has done the operation in the usual manner, drawing upon the ligament at the external ring with fear and trembling lest it at any moment break, will be agreeably surprised at the firm traction which can be exerted upon it at the internal ring without the sensation of impending stretching or rupture. Of the twenty-six ligaments thus drawn out, not one has ruptured, although in several instances they were so slender in structure that from my previous experience I felt certain the risk of tearing at the external ring would have been considerable.

The drawn-out ligament, still attached at the pubes, is now handed to the assistant, who, by means of the blunt hook, exerts sufficient traction to hold it taut.

This traction is made in the direction of the opened canal; so that a portion of the ligament which, previous to operation, was situated within the abdominal cavity, now occupies the space along the course of the canal formerly filled by the extra-abdominal portion of the ligament. In this situation it is secured by sutures of silk-worm gut passed in the following manner: The first suture traverses the wound at the level of the internal ring. It is introduced through one lip of the wound, embracing skin, superficial fascia, and the aponeurosis of the external oblique, into the inguinal canal. Here the taut ligament, as it emerges at the internal ring, is pierced transversely by the needle, which then traverses the other lip of the wound, penetrating in succession the cut fascia of the external oblique, the subcutaneous fat, and the skin.

Although very partial to the Hagedorn needle in most of my operative work, I here prefer the ordinary surgical needle curved on the flat. The Hagedorn, in traversing the ligament, cuts the longitudinal fibers, which the ordinary needle merely crowds between and separates.

Three to five sutures are passed in a similar manner through all the tissues on either side of the wound, into and across the canal, in their course through the latter piercing the ligament. These sutures, when tied upon the skin, close the opening in the anterior wall of the canal by bringing into juxtaposition the divided edges of the fibrous aponeurosis of the external oblique, as well as of the more superficial structures, while at the same time they moor the shortened ligaments safely inside of the canal, where they properly belong.

The operation is completed by cutting away the excess of ligament projecting beyond the lower angle of the wound. Drainage is effected by three or four strands of silk-worm gut running along the bottom of the wound along its entire course and emerging at either end. I take care that these silk-worm gut drains reach into the inguinal canal at one point by passing them beneath the deepest portion of one of the wound sutures.

I consider this matter of drainage very important, as considerable serum is apt to be effused. If no vent be given to it externally, it may burrow along the tissue planes in various directions and even suppurate. Indeed, this happened in two among my first cases in which I endeavored to dispense altogether with drainage in any form and closed the wound tightly. Pus formed and burrowed in various directions between the subcutaneous fat and the fascia of the external oblique, and even through the internal ring into the subperitoneal areolar tissue, necessitating free incisions and secondary drainage of these parts. It is but fair

to state that both of these cases were operated upon during the height of the epidemic of "la grippe," and both were attacked by the disease after operation. The convalescence in both cases was tedious, though the anatomical success of the operation was fortunately not impaired.

Although in two of the first six cases I obtained primary union without the employment of drainage, the experience in the other four led me to adopt drainage systematically in all of my subsequent cases. An attempt was first made with rubber tubing, then with catgut, and finally, and with the most completely satisfactory results, with silk-worm gut. The smooth surfaces of the latter act as excellent conveyers outward of the pent-up fluids. On their withdrawal the tissues come together, closing and immediately obliterating their tracks. The wounds are dressed with pads of bichloride gauze laid across the lower part of the abdomen and kept in place by a double spica bandage. This latter is securely pinned, and, unless wound complications occur, the dressing is allowed to remain undisturbed for nine to twelve days. At the end of this time the sutures and the silk-worm gut drains are removed and the wound is redressed.

As to support of the uterus after operation, I have designedly avoided it, as far as possible. One patient with retroflexion wore a pessary for a month after operation. In the other cases of retroversion the uterus was sustained for two or three days by a tampon of iodoform gauze placed in the vagina on the completion of operation. Whenever a plastic operation upon the vagina or perinæum was simultaneously performed—*i. e.*, in all cases of prolapse and in some of version—absolutely no support of the uterus after operation was practiced. The round ligaments were thus severely tested as to the security of their new anchorages and as to their ability to sustain the uterus in normal position. They successfully stood the test in every case.

I believe, however, with Alexander, that in every case where the operation is performed for retroflexion a glass intra-uterine stem should be worn during convalescence, in the first place to counteract the recoil influence of the flexion upon the round ligaments, and secondly to establish conditions favorable to the cure of the flexion. The only one of my cases that has given me any anxiety in regard to the anatomical success was one of retroflexion in which I did not insert a stem. For three or four months after operation the anatomical condition was one of retroflexion of the anteverted uterus. When last seen, the retroflexion was growing less, while the anteversion was securely maintained.

No one can seriously dispute the fact that shortening the round ligaments in their intra-abdominal course really shortens the distance between the fundus uteri and the abdominal walls, and thus holds the uterus in the position of normal anteversion and of suspension at the proper height in the pelvis. The objections to the operation are really based, not on theoretical, but on technical grounds—*i. e.*, the technique has heretofore not been satisfactory.

The principal difficulties in the performance of Alexander's operation, which have stood in the way of its popularity, are experienced, first, in finding the round ligament, and, secondly, in drawing it out when found. The following quotation from Mundé* will serve to emphasize the first difficulty:

My great objection to the operation when I first attempted it was the doubt whether the ligaments could always be found. I heard this doubt expressed by experienced gynæcological surgeons who had tried and succeeded, and again tried and failed;

* The Value of Alexander's Operation for Shortening the Round Ligaments. *Am. Jour. of Obst.*, November, 1888, p. 1123

and I myself had passed through this experience, being easily successful in my first, failing on one side in my second, and on both sides in my third case. I may say that it was with fear and trembling that I approached each Alexander's operation, never feeling sure that I would not disgrace myself by failing to find the ligaments, etc.

This difficulty of finding the ligament may also serve to explain the frequency with which the ligaments have been reported absent or wanting. In my eighteen operations I have found thirty-six ligaments.

My own difficulties have been experienced in drawing out the ligament when found, or in causing it to run satisfactorily.

Of ten ligaments in five operations performed after the usual method, four ran out satisfactorily to the extent of two inches or more; three ran out partially; in one instance I desisted from further traction, warned by the sense of impending rupture; and twice the ligament tore.

A brief consideration of the anatomy of the ligament will, I believe, serve to explain these results. Immediately after passing out of the abdomen, through the internal ring, as a compact, rounded cord, the fibers of the ligament separate, the greater number diverging to be inserted into the inner surface of the walls of the inguinal canal throughout its entire length. Comparatively few of the fibers pass out through the external ring to be inserted into the structures adjacent to the pillars of the latter.

In operating after the usual manner, it is this smaller bundle of the fibers of the ligament which is grasped and pulled upon in the attempt to draw the ligament out through the external ring. This minority of the fibers of the ligament is frequently not strong enough to stand the traction necessary to draw out the ligament from within the abdomen, especially as the firm attachment of the larger num-

ber of the fibers within the inguinal canal adds to the difficulty.

Another element to be taken into consideration in this connection is the direction of traction, which is manifestly most unfavorable. The abdominal part of the ligament runs outward to the internal ring; the part within the inguinal canal runs inward and forward. The two form a very acute angle with each other at the internal ring. In drawing upon its outer end, the ligament must be drawn over the sharp margin of the inner pillar of the internal ring at a very great mechanical disadvantage.

All these disadvantages are, to a great extent, overcome in my method of performing the operation. By laying open the inguinal canal, the round ligament is readily found and picked up. By picking it up as it emerges from the internal ring, the entire ligament is secured before any of its fibers are given off. This gives us in all instances a ligament sufficiently strong to stand the traction necessary to draw out efficiently its intra-abdominal portion. This more especially since we are at liberty, by reason of free access to the internal ring, to draw in the direction of the intra-abdominal portion of the ligament.

Another great advantage presented is the certainty of really shortening that portion of the ligament (the intra-abdominal), to shorten which is the prime object of the operation. As already stated above, upon traction being made upon the round ligament, the peritoneal folds of the broad ligament embracing it are drawn out through the internal ring in the shape of an inverted funnel. Under guidance of the eye the broad ligaments are gently stripped back from the round ligament, until the intra-abdominal portion of the latter is seen to have been liberated, for three or four inches of its length, from the embrace of the former. This denuded intra-abdominal portion of the ligament is

converted into the extra-abdominal portion by being sutured into the inguinal canal.

The distinctive features of the method of operation advocated in this paper, briefly recapitulated, are as follows :

1. The inguinal canal is laid open along its entire length.

2. The round ligament is sought for and picked up at its point of emergence from the internal ring.

3. The ligament is drawn out approximately in the direction of its intra-abdominal portion.

4. The ligament is drawn out from its peritoneal investment by aid of the sense of sight. The shortening of its intra-abdominal portion is thus rendered a matter of absolute certainty.

5. The method of suture, which, while it closes the canal, at the same time secures the ligament within it.

6. The method of drainage by silk-worm gut.

Many and various are the modifications of Alexander's operation which have from time to time been proposed by different surgeons and gynæcologists. I am not aware, however, that the combination of procedures above described has ever been advocated. The nearest approach to it which I have found recorded is in a paper, read before the Gynæcological Society of Chicago, by Dr. Henry P. Newman, entitled Alexander's Operation, with Report of Cases,* to which I must refer for the details of Dr. Newman's technique.

An objection that may be urged against the plan of operation herewith presented, as compared with the original method, is the apparently greater probability of a resultant hernia. While I do not believe that the operation, carefully performed after either method, predisposes to hernia,

* *American Journal of Obstetrics*, December, 1888, p. 1291.

I think a little reflection will show that the liability to this accident is really diminished in my modification.

In describing the technique of Alexander's operation, Mundé * says: "The operator need not be afraid to pass his finger or the scalpel handle along the ligament into the inguinal canal and break up these adhesions." Add to this dilatation of the canal the subsequent drawing down into it of the peritoneal pouch which follows the round ligament, and we certainly have established conditions not unfavorable to the formation of hernia. These conditions were clearly in the mind of Dr. W. L. Reid when he wrote: † "I also believe it wise to pass one or two deep sutures across the inguinal canal in order to occlude the pouch of peritonæum which is dragged down into it."

In my method the peritonæum is well stripped back from the round ligament and returned fully within the abdomen. The round ligament, denuded of its peritoneal coat, is in a condition most favorable to firm union with the internal wall of the canal, likewise denuded by the detachment of the fibers of insertion of the round ligament. The method of suture insures retention of the round ligament within the inguinal canal along its whole length. The walls of the canal are adjusted snugly around the contained ligament, and the lumen of the canal is now probably smaller than before operation.

As already stated, the object of this paper is to call attention to a method of shortening the round ligaments which I have thus far found easy of performance, and delightfully certain in its immediate anatomical results. That it constitutes a somewhat more serious procedure than the original operation I am free to admit. This is, however, more than counterbalanced by the greatly increased, I might

* *American Journal of Obstetrics*, November, 1888, p. 1127.

† *Trans. of the Ninth Internat. Med. Congress*, vol. ii, p. 763.

almost say absolute, certainty of finding the ligaments, and the positiveness with which they can be really shortened when found. The hesitancy and lack of confidence with which I formerly approached the operation have given way to a feeling of assurance based upon the certainty of accomplishing that for which the operation is undertaken.



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