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SUTURING WITHOUT KNOTS, MORE PARTICULARLY IN WOUNDS OF THE ADOMINAL PARIETES.

By Richard H. Gibbons, M.D., Scranton, Pa.

Dr. George M. Edebohls has long since shown it to be highly advantageous to be able to close the wound of Cœliotomy by means of a suture with but as few knots as possible. In a method recommended by him one knot only is made in his entire line of suture. This single knot I believe to be a fault with the method, so I have ventured further, doing away with even the one knot. I have tried it many times to my entire satisfaction.

I have further enlarged upon the continuous plan of suturing by having extended it to the skin and its underlying layers. I have also carried the suture line to the extent of taking in, by the one thread, wounds of the kidney and to hold this organ, when loose, in proper place. One can utilize this plan of stitch to loop together parietal with uterine peritonæum, after having restored the retrofixed uteri.

A strand of No. 1 chromicised cat-gut, varying in length from twelve to thirty-six inches, according to the extent of the wound to be dealt with, is threaded in a Hagedorn needle of suitable size and curve—No. 5, ⅝ circle—which is easily managed by the fingers of the rubber gloved hand without a needle holder, which is ordinarily a needless as well as useless instrument.

Inserting the needle into the cut edge of the skin, at the upper angle of the wound to be closed, which, in this instance, we will suppose to be such as the incision made in the method given to us by Dr. McBurney in his operation for the removal of the appendix, the needle is first curved downward into the sub-cuticular structure, then upward to come out into the skin edge again. A combination of the intra-cuticular

and the sub-cuticular stitch is thus effected, giving to us another modification of Doctors Hall and Marcy's most valuable suture.

Fig. 1. The first loop of the stitch as it has been passed within the skin.

After passing the first loop we can then go through the divided layers of the deep fascia; passing still farther, through the edge of the separated striæ of the aponeurosis of the external oblique, thence through the delicate fascia, covering the internal oblique, through this muscle and the transversalis, at the point of the outer angle of the divided peritonæum, through which the needle is now passed, giving us a single thread of suture from the skin through all of the structures into the peritonæal "Cavity."

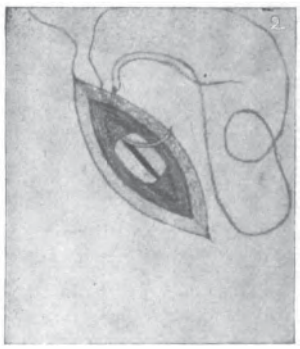

Fig. 2. The needle as it comes through the peritonæal opening at the upper or outer angle.

The needle end of the suture is now drawn upon until but several inches remain on the outside; this should be held by one's assistant, who should keep up gentle traction through the entire procedure to

follow. Through means of the needle both edges in the transversalis fascia and peritonæum are now brought together by continuous suture,

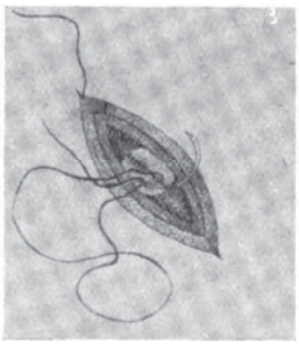

Fig. 3. The peritonæal opening closed by suture and the needle appearing through the internal oblique.

or by purse string, or by any other method one may choose to apply to this portion of the closure, until the lower section of the opening in these tissues is closed.

We then drive the needle through the separated aponeurosis of the internal oblique, continuing the suturing outward, as far as may be necessary, until we have brought together these and the muscular fibres and their overlying delicate fascia. We next bring the needle out on

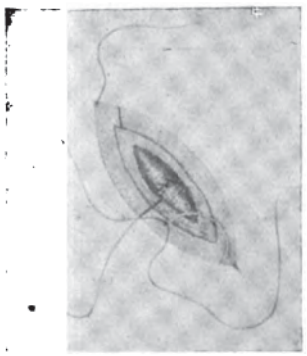

Fig. 4. The internal oblique separation united by suture and the needle passing through the aponeurosis of the external oblique.

the inner side, and at the lower end, of the separation through the external oblique aponeurosis, the stitching being continued over and over, thus gradually bringing together the edges of this layer of the

separation up to the upper angle. We then come to the closure of the skin and its underlying structure.

Fig. 5. The external aponeurosis closed and the needle coming through the deep layer of the sub-cuticular fascia.

At this point we may proceed in one of two ways, depending on how much fat there may be to deal with, and as to whether or not we wish to bring together more closely, by means of suture, the superficial and the deep layers of the sub-cuticular fascia.

If there is not considerable fat in the skin and under skin portion of our wound, rendering it desirable to bring together more closely these parts of the wound, the needle may be brought out into the lowest portion of the angle, in the edge of the skin cut; then it can be re-

Fig. 6. The skin portion of the wound partially closed, the united ends being left open to show the method of emergence of the needle that will place the distal end of the suture by the side of initial end at the point of its original insertion.

inserted into the skin margin and the deeper skin structures brought

out again through the intra-cuticular layer but on the side of the wound opposite to the one on which the suturing was begun.

If we have up to this time been careful to keep our suture-line sufficiently taut, all spaces will have been necessarily obliterated and all of the divided edges of the various deeper structures entering into the makeup of the abdominal walls will have been restored to thorough apposition.

The foregoing having been carried out carefully we have now but to bring together the edges of the skin portion of the wound to place it under the most favorable conditions for normal healing to take place, without interruption, thus gaining tight closure of the entire line of separation. This can easily be done by continuing the suture, from side to side, in and out at the margin of the skin, in the manner described in the beginning of the demonstration.

When we shall have brought together the skin portion of the incision we will have, without a single knot, made restoration as perfect, perhaps, as possible. Should we now mar the procedure by making a knot? It does not seem to be necessary to do so, even at this time. By simply crossing the thread ends and holding them in this position the dressing may be applied between these and then they can be laid over the first portion of the dressing to be covered by the additional portions. One can, if he wishes, twist the ends together up to the point of exit and entrance of the stitch or he may fasten them, after passing them through a button of gauze, by means of knots, perforated shot or any other means he may choose, but there is no *necessity* of either tying or clamping; gently pulling together the ends is all that is required to fix them.

Where fat is over plentiful, the divided edges of the sub-cuticular structures being thereby forced away from one another, it may be necessary to bring these edges together and this can be done by running upwards with the stitch after it has come out of the lowest portion of the aponeurosis of the external oblique; then, after having gotten up to the upper angle of the wound again, we must close the skin incision by the intra-"sub-cuticular" stitch, the end of the now nearly exhausted thread being brought out of the intra-cuticular layer at the lowest angle of the skin incision, and by pulling it in an opposite direction to the other end, we have the edges of the skin closely approximated. Both ends of the thread need only to be laid over the innermost part of the dressing to fasten them sufficiently for all purposes.

By means of this suture, without a knot, we have the best means, it would seem, of bringing together the edges of wounds of any kind,

no matter where situated, where it not only seems necessary, but where it seems best, to bring disrupted parts together, in the layers of their original association, as nearly as may be in our power.

Knots, in cat-gut, have been shown by Dr. Edebohls to be the chief causes of failure to have the tissues appropriate this material when the non-removable suture is used, the lesser cause, now-a-days, unreliably prepared absorbable animal suture material, having been done away with by the painstaking methods of preparation of cat-gut by reliable parties.

This is the ideal suture for hernia, *no knots* to be used in closing the peritonæal opening. The so-called "neck of the sack" can be obliterated by passing the suture as a running or pucker stitch all around the opening from the point of entrance, from above, into the peritonæum back to this point, by passing the stitch out upon the internal oblique and pulling upon the suture at both ends, the assistant holding the closure thus gained, and which may, if one chooses, be made still more secure by passing the needle end of the suture, as it comes out of the peritonæum for the last time, in forming the purse-string, around the other thread of the stitch, then up to the internal oblique and from there to the shelving process of Poupart's ligament, to be passed over and over again in continuation; thus shortening the excessive extent of the arched fibres of the internal oblique. Additionally we can add transplantation of the rectus muscle fibres, having exposed them by opening the muscular sheath as practiced by Dr. Bloodgood, thereby obliterating the "canal" and the mistakingly so-called "conjoined tendon."

After dealing with the separation of the fibres of the external oblique and its aponeurosis by continuance of the same suture material, then, in turn, the super-imposed layers of the connective tissue and the skin, there need be no knots to contend with. By the aid of a simple dressing exact union may be obtained.

The simplest of all dressings is the best. Sterile gauze wrung out of hot salt solution freshly boiled is all that is necessary.

For the above illustrations I am indebted to my son, Dr. Horace J. Gibbons.
R. H. G.

441 Wyoming avenue.