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A NEW METHOD OF OPERATING UPON TURBINAL HYPERTROPHIES WITH A DESCRIPTION OF THE INSTRUMENTS AND THE TECHNIC OF THE INTRANASAL SUTURE.*

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There are certain conditions affecting the middle and inferior turbinates that cannot be relieved without surgical interference: these are familiarly known to us as enlarged middle turbinate and hypertrophied lower turbinate.

The operative procedures upon the various forms of enlarged middle turbinate will be discussed on some other occasion; at the present time we will consider only those cases of lower turbinal hypertrophy in which the enlargement is due to organic thickening of the mucous membrane from hyperplasia of its connective tissue and glandular elements, in which its surface is thrown into folds and has a polypoid or mulberry appearance. The disease may involve the anterior end, the inferior border, the posterior end, the periosteum and bone, either singly or in varying combinations. In these cases, the function of the organ, in other words, its contraction and dilatation with the varying conditions of the surrounding atmosphere, is interfered with or destroyed, the drainage of the lower meatus is imperfect, the respiratory channel is obstructed, and a number of reflex and nervous symptoms are usually present.

For the removal of these hypertrophies a variety of surgical methods and instruments have been devised: the spoke-shave, the saw, the crushing forceps, the cutting forceps, the scissors, the punch, the snare. That the galvano cautery, used either by superficial cauterization or by ignipuncture, still has its adherents, is witnessed

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by the cases of synechia which we see with more or less frequency, resulting therefrom; but cauterization with the mineral acids seems to have been entirely abandoned.

It is an old rule in medicine that where there are many remedies for a condition, none of them is satisfactory; and if we examine these various procedures we find that they have one defect in common, namely, that each one of them leaves an open wound which must heal by slow process of granulation. In the case of the caustic methods, when the slough is cast off, a granulating wound remains, similar in all respects to that left after the use of cutting instruments.

That this slow process of healing by granulation is the true cause of all the disagreeable after-effects of even a partial turbinectomy will be evident from a brief consideration of the disadvantages and complications which have been reported as following this operation. Even when the nose is packed after the operation, hemorrhage from the dilated veins may be severe. When the packing is removed there is always some bleeding, so that repacking may be required. The removal of crusts and blood clots causes frequent small hemorrhages which continue during the entire course of the healing. True secondary hemorrhages, from sloughing of the ends of the blood-vessels, are said to occur in nearly one per cent of the cases. It takes several days before visible granulations begin to form, but even in favorable cases, where the granulations do not become exuberant or polypoid, epithelialization is not completed for several weeks, the time of healing, according to the latest reports, being from 2 to 8 weeks. During this time it is practically impossible to prevent infection of the wound. While this infection is rarely severe enough to cause general symptoms, it does cause increased secretion and crust formation, and delays the healing; it gives rise to an infiltration of the edges of the wound, which may remain as a permanent thickening and thus defeat the object of the operation, while if, in the endeavor to prevent this, larger portions of the turbinate are removed, the resulting loss of function is a cause of permanent annoyance. The wound always becomes larger than the excised portion of tissue, owing to the retraction of the cut edges of the mucous membrane, and when healing is finally completed after weeks of troublesome after treatment, there is left a broad, dry cicatricial surface, which is covered with squamous epithelium, a condition which should be avoided whenever it is possible to do so. Scar tissue is unfavorable to drainage, and that portion of the turbinate which is covered with the scar has permanently lost its function.

Now, in the present state of modern surgery, wounds made in a clean field, in other parts of the body, are not left open and allowed to heal by granulation, but the wound is sutured and healing by primary union is the rule. If proper asepsis has been maintained, the edges of the wound become agglutinated in a few hours, and in three days healing is practically completed. All the dangers and annoyances of the infected granulating wound are avoided, and to attempt to compare, or rather to contrast, the advantages of an aseptic sutured wound with the disadvantages of an infected granulating wound would be altogether too primitive. There is no reason why these surgical principles should not apply to the interior of the nose as well as to other parts of the body. The writer has, accordingly, devised and perfected a method of sewing up an intranasal wound, and has succeeded in demonstrating that primary union may be obtained in our operations upon the turbinal bodies, if we suture the wound after the excision of the hypertrophied parts.

It is perfectly feasible in actual practice to insert a suture into a wound in any part of the nasal chambers which is accessible to direct vision; upon the turbinated bodies, as far back as the posterior end of the inferior turbinate, and as high up as the anterior end of the middle turbinate. Each suture is closed by tying its ends together with a double or triple knot, as firmly, as securely and as accurately as it can be done upon the external parts of the body. Nor is this procedure a particularly difficult one; in fact in the anterior half of the nose, say within 4 cm. from the naso-labial junction, it is a simple and easy thing to do. It is accomplished with specially devised instruments which are few in number, very simple in their construction, and inexpensive, and by means of a novel technic which can be readily acquired by any surgeon. It is no more difficult to sew up a wound in the interior of the nasal passages than to perform any other delicate intranasal operation, and any one who can perform, for instance, a submucous resection of the septum, will be able to use the intranasal suture.

The cases which I have operated upon were selected from the material of the clinic at Mt. Sinai Dispensary by the chief of the clinic, Dr. Emil Mayer, with whom I am associated there. Dr. Mayer was also kind enough to assist me himself at most of the operations, and to inspect all the cases during the course of the healing and subsequently thereto.

There were altogether 14 cases of hypertrophy of the inferior turbinate. In 4 of these cases, the hypertrophy was limited to the anterior end; in 4 cases to the anterior end and inferior border;

in one case to the inferior border alone; in 3 cases to the inferior border and posterior end; in 2 cases, anterior end, inferior border and posterior end were all hypertrophic and polypoid.

The operation consists of two stages: 1st, the excision of the hypertrophied tissue; 2nd, the suture of the wound. It is performed in the following manner:

After the use of cocaine and adrenalin an incision is made with a knife above, and another below, the hypertrophy, the two incisions meeting at a sharp angle in front and behind. The included mass is then dissected out with elevators and scissors. Enough of the bone is then removed with punch forceps to bring the edges of the wound together. In some of the cases the entire mass, including the bone, was removed at one stroke with strong scissors, but owing to the retraction of the mucous membrane it was necessary to remove an additional strip of the bone. As the bone is very rough, especially near its inferior border, it is difficult to separate the soft parts in a satisfactory manner. The available scissors and punch forceps are also too thick and clumsy so that this part of the operation is tedious and consumes the greater part of the time. When the wound has been properly prepared, the edges are brought together with sutures. For this purpose number 0 catgut is used, sterilized by boiling it in a supersaturated solution of ammonium sulphate as described by Dr. Elsberg.* From 2 to 10 sutures were used, the average number being 5. The sutures were placed about one-fourth inch apart, beginning posteriorly and working forward. The nose was then packed with spunk impregnated with aristol powder.

The course of the healing was as follows: In a few of the cases there was oozing of blood-stained mucus through the dressing, but in none of the cases was there any hemorrhage. The packing was removed after 48 hours. As there was usually at this time some secretion, the patients were given a spray of Dobell's solution. When they returned on the following day, the secretion had disappeared, except a very slight amount in the immediate neighborhood of the sutures. On the fourth or fifth day the sutures were absorbed and their projecting ends discharged from the nose. On the sixth or seventh day all secretion had disappeared and the patients were discharged from treatment. In one case a fibrinous exudate, such as is occasionally seen after the use of adrenalin, appeared and remained for a week. That this exudate did not interfere with the healing was made evident when the patient presented herself on

* *International Clinics*, Volume 1, Eleventh Series.

the ninth day with the nose perfectly free and the wound healed. In a few cases the edges of the wound were not perfectly coapted. In these cases there were small areas of granulation between the sutures which took a few days longer to heal, the longest being 14 days. Yet even in these cases, the amount of secretion after the third day was so small that it is not perceived by the patient, and caused no discomfort or inconvenience. Nearly all of the patients could be discharged before the expiration of one week; and when we compare this with the slow and troublesome after treatment following the ordinary turbinectomy we are forced to the conclusion that the older methods are crude and primitive, but that the careful excision of the diseased part, followed by suture of the wound and primary union, is a precise, exact and scientific method of operating, which is in strict accord with the best principles of modern surgical technic. When I have seen these patients return on the fifth, sixth or seventh day, without complications, without blood, crusts or secretion, with the wound entirely healed and the scar almost invisible, with the turbinate covered with normal mucous membrane, and apparently functioning in a normal manner, these results appeared to be so eminently satisfactory that I have hastened to make this preliminary communication, in order that I might demonstrate the instruments and the technic which I have devised for the purpose of intranasal suturing, hoping not only that I may be able in the near future to give a more detailed account of a better technic in the first stage of the operation as the result of a larger experience, but also that the experience of others may the sooner be of benefit to us all.

The instruments necessary to pass and tie an intranasal suture are three in number. A needle, to thrust the thread through the mucous membrane, a hook to grasp and withdraw the thread, and the suture closer. To these may be added a fourth, the crotch-forceps, to steady the mucous membrane during the passage of the needle.

In order to suture a wound in whatever position it may occupy in the nose, it is necessary to have needles which will pass a suture in any desired direction. For a horizontal wound the suture must be passed vertically; for a vertical wound, horizontally; for oblique wounds, at right angles to the wound. The needles are shown in Plate 1, Figs. 1 to 7. Fig. 7 shows a straight needle, Fig. 6 a needle bent backwards, similar to the needle used by Killian to suture the wound after the submucous resection of the septum. These needles pass the suture in a horizontal direction, i. e., they suture a vertical

wound. Figs. 1 and 2 show curved or half round needles placed at right angles to the shank. They pass the suture in a vertical direction and are used for horizontal wounds. Figs. 3 and 4 show half round needles placed at an angle of 45 degrees to the shank; they are used to pass an oblique suture. Fig. 5 shows a straight needle placed at right angles to the shank; it is particularly useful for what will presently be described as the indirect suture. All the needles have the eye close to the point. The curved needles have a deep groove on the convex side, the concave side being smooth; this arrangement is intended to keep the threads separated. In the operation under consideration at the present time, the wound is horizontal; hence only the half-round needles placed at right angles to the shank are used. The other needles are useful in other procedures in which suturing may be employed. I have performed similar operations upon the middle turbinated body and the ethmoid cells. I have also operated upon three cases of perforation of the septum, by making a flap of one mucous membrane, bringing it down and suturing it in place over the perforation in the other. One of these cases was only partially successful, the other two perforations were completely closed. These operations will be described in detail in a subsequent article.

The hook, Plate 1, Fig. 8, was the subject of special study. The requirements of an ideal hook are: It must grasp the thread as it comes from the eye of the needle quickly, but must not grasp both threads nor cut into the thread. The thread must not slip down along the shank of the hook, nor escape its grasp. The hook must rotate in its handle, so as to be placed in any desired position, to correspond to the needle. It was practically impossible to reconcile these requirements. The various forms of hooks experimented with are shown in Figs. 8 to 14, but the one finally selected as the best is the double crochet hook, Fig. 8.

The suture closer consists of a ring placed on the end of a long slender shank, Fig. 15. Where the shank joins the handle, there is a half sharp ridge of metal at right angles to the shank; just behind the ridge is a notch, the bottom of which is at the level of the center of the ridge. The use of these parts will be described later.

The crotch-forceps, Fig. 17, is a slender forceps, the blades of which end in a U-shaped crotch. With this forceps the mucous membrane is grasped, and the needle passed through it between the prongs of the crotch.

PLATE - I

To facilitate the study of the technic, the tying of the knots, etc., I have devised a small manikin, Fig. 18. This consists of a wooden frame in which a piece of gauze can be stretched. In front of this frame a circular plate of cardboard is fastened, which is perforated by an opening intended to correspond with the opening made by the self-retaining speculum. The whole is fastened to a table by means of a clamp with a ball and socket joint. The outline of the nasal interior may be drawn upon the gauze, or vertically or horizontally striped cloth may be used to study the various motions, the effects of perspective and foreshortening in the deeper parts of the nose, and to exercise the eye in the judgment of horizontal distances by the use of the accommodation, as is necessary in monocular vision.

The introduction of the suture. The needle is threaded with a suture about 18 inches in length. Just before using, it is held for a moment in sterilized water or carbolic solution, to soften the catgut. Whether the suture is passed from above downward or from below upwards, depends upon the condition of the flaps. It is generally best to pass the needle first through that flap which is the more movable, then bring the needle holding the mucous membrane up to the other flap, and then penetrate this flap. In this way the suture can be passed without the use of the crotch forceps. If, however, the flap through which the needle is first passed is bound down to the underlying tissues, it may be necessary to seize the other flap in the crotch forceps and bring it over the point of the needle. It is only in the last stitch or two that both flaps can be penetrated with one motion of the needle.

Grasping the thread. When the needle has been properly passed, the eye will project about $1/16$ to $1/8$ inch from the mucous membrane. If the two threads as they come from the eye of the needle are well separated, so that each can be distinctly seen, one of them can be seized with the hook without difficulty. Plate 2, Fig. 1. If one of the threads, however, has slipped out of the groove on the back of the needle, the two threads may lie side by side, and, owing to the blood or secretions, may stick to each other. To separate them, they are seized together in the hook and drawn down so as to make a double loop. If the assistant now draws gently upon one of the ends outside of the nose, one of these loops will straighten out, leaving the other distinct and separate. If the thread sticks to the side of the needle, it is best seized by using the side of the hook, which is specially designed for this purpose. The hook may be rotated

into the proper position by moving the pilot wheel at the end of its shank with the index finger of the hand holding the instrument.

Withdrawing the needle. As soon as the thread has been properly seized in the hook, the needle is withdrawn by rotating it backwards until it is free from the mucous membrane and withdrawing it from the nose. The hook during this time is kept close to the needle-puncture, to prevent the suture from tearing out. Fig. 2. If the assistant has kept the threads from becoming entangled, this is accomplished easily. These manipulations must be made continuously and the hook carefully watched during this part of the procedure, to avoid losing the loop.

Withdrawing the hook. As soon as the needle has been removed from the thread, the hook is withdrawn from the nose, bringing the loop of thread with it. One side of the loop is now drawn upon, so as to bring an end of the suture out of the nose. If the sutures are placed well back from the edge of the wound, and the mucous membrane is strong, the procedure may be facilitated by holding one end of the thread and allowing the other to run over the hook as it is withdrawn from the nose.

Making the slip-knot. When the suture has been successfully passed so that the thread passes through both edges of the wound and its two ends lie outside of the nose, without entanglement, a slip-knot is made as follows: The thread is adjusted so that about one-half of its length is outside of the nose on one side, the other end being correspondingly shorter. A simple overhand knot is now made near the middle of the thread and the short end threaded through the bight of this knot as shown in Fig. 3. The overhand knot is then closed until it binds the thread. We now have two ends coming from the slip-knot: one end may be distinguished as the knot-end, the other as the slip-end. When the overhand knot is drawn tight its bight will be seen as in Fig. 4 to stand crosswise, i. e., at right angles to the slip-end, and slip-end and knot-end come out of the knot on opposite sides of the cross piece, thus making a true slip-knot. If the end *a* Fig. 3 were passed through the overhand knot in the opposite direction, the two ends would come from the knot on the same side of the cross piece, and a granny slip-knot would have been made. A true slip-knot will bind tight when it closes down upon the tissues.

Closing the slip-knot. Having adjusted the slip-knot as shown in Fig. 4, it is brought up until it is near the nostril. The *knot-end* is now passed through the ring of the suture closer from the

left to right, as shown in Fig. 5; it is laid across the ridge and into the notch, and, with the finger of the right hand (which holds the suture closer) pressing lightly upon the thread, the instrument is moved along the thread until the ring is within an eighth of an inch from the knot. The finger is now pressed firmly upon the thread as it crosses the ridge; the left hand holds the slip-end, *a*, and, in this position, the suture closer is advanced into the nose and the knot closed. As the slip-knot closes upon the tissues, the ring of the instrument passes the stitch-hole, Fig. 6, and the knot is closed as tightly as necessary.

The safety knots. In order to prevent the slip-knot from becoming loose, it is advisable to make a true surgical knot, consisting of two overhand knots, above the slip-knot. When the slip-knot has been tightened, the end *a*, which has been held in the left hand, is allowed to lie across the palmar surface of the left and from left to right; as the suture closer is withdrawn from the nose, the end *b* is laid across the left hand from right to left, on top of *a*, as shown in Fig. 7. The first overhand turn of the surgical knot is then made as in Fig. 8, and it is brought up near the nostril, care being taken not to confuse the two ends. The end *a*, which is now in the right hand, is threaded through the ring of the suture closer from left to right, the instrument brought up near the knot, and both ends allowed to hang free. By a dexterous motion of the left hand, which can be acquired after a little practice, both ends are caught in the left hand in the manner shown in Fig. 9. By making slight tension upon the end *b*, and allowing the end *a* to be just loose enough, the overhand turn falls into the position shown in Fig. 9, the ring of the suture closer being about $\frac{1}{2}$ inch from the taut thread *b*. In this position the knot can be readily run up the taut thread. As the suture closer passes the slip-knot in the wound in the nose, this overhand turn lays itself neatly upon the slip-knot, and, by making tension upon both ends with the left hand, and with the suture closer, the knot is made as tight as is necessary. As the suture closer is withdrawn from the nose, the second overhand turn of the surgical knot is made by bringing the end *a* under the end *b*, making the turn in a manner the reverse of that shown in Figs. 7 and 8, bringing the end *b* to the right and through the suture closer. This turn is then tightened in the same manner as the first turn. In this way a true surgical knot is tied on the top of the slip-knot. The ends of the catgut are cut off close to the knot by means of any suitable pair of scissors.

The indirect suture. It occasionally happens that the suture cuts through one lip of the wound, or that the edges of the wound cannot be readily punctured with the needle at the same time, so that the suture is passed through one edge of the wound only. In such cases both ends of the thread are allowed to hang down from the nostril. The companion needle to the one used for this suture is now threaded with No. 1 braided silk, making a loop 18 inches long, and tying its ends together. This silk loop is passed through the other edge of the wound, and one end of the catgut is threaded through it, care being taken to select the proper end. The procedure is illustrated in Fig. 10. The silk thread is now withdrawn, carrying the catgut with it through the edge of the wound. If the mucous membrane is delicate, the crotch forceps is held against the needle-puncture, to act as a pulley over which the silk is drawn. The slip-knot and safety knots are now tied in the usual manner.

It is always difficult to describe the handling of cordage, and tedious to follow the descriptions; but if these knots are tied upon the little manikin above described, it will be found that the manipulations follow each other in a natural and easy manner. The sensation imparted to the finger which holds the thread by pressing it against the ridge on the suture closer is very similar to the sensation imparted by the thread in tying ordinary knots, and the whole procedure requires no greater adaptability or skill than any other surgical manipulation.

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PLATE - II

The dotted circle denotes the opening of the nostril.