A PLASTIC OPERATION FOR THE CLOSURE OF SEPTAL PERFORATIONS.

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Perforation of the nasal septum is a condition the importance of which is variously estimated. In the past it has been considered by most rhinologists as negligible and even in some instances as a desirable condition. There are text-books still in use which advise the making of perforations in some forms of nasal stenosis.

This wilful substitution of two deformities for one could probably find no advocates today, but current writers seem to agree that in correcting septal deformities by any method a certain percentage of subsequent perforations is to be expected. Cases are even exhibited as successful in which such accidents have occurred. This is a mistaken attitude destined soon to become as archaic as the plan of deliberate puncture. A post-operative perforation marks the surgical tyro and is no more excusable than any other evidence of bungling.

If discredit to the surgeon were the only unpleasant result of this condition it would be of little consequence; but such is not the case. In almost every instance, chronic ulceration takes place along the margins of the opening with crusting, bleeding and foul odor, requiring constant attention from the patient and subjecting him to great annoyance. As the erosion progresses the opening increases in size and in time comes to resemble that due primarily to ulcerative processes.

It is a question whether non-luetic disease of the septum can go to the extent of changing the external conformation of the nose; but it is my belief that in neglected cases this can occur. Certainly such deformities do exist where no luetic signs can be discovered, and the theory that spontaneous perforation necessarily means syphilis is no longer tenable.

Without attempting to magnify the seriousness of a small defect, it must be conceded that septal perforations are undesirable and if a suitable method for their permanent closure can be devised it will deserve a place among recognized surgical procedures. Heretofore this seems to have been universally regarded as impossible, but recent improvements in intra-nasal surgery have suggested to several men its feasibility. Goldstein of St. Louis was probably the first

publicly to suggest a plan. At the June, 1906, meeting of the American Laryngological, Rhinological and Otological Society, at Chicago (Middle Section), he described his clever device for covering the denuded edges of perforations and made a preliminary report of some experiments looking toward their closure. Yankauer of New York in the *Laryngoscope* for February, 1907, describes his ingenious method of sewing the mucosa and mentions two septal perforations successfully closed. This, I believe, is thus far the only published report of a case. Andrews of Chicago, in a personal interview recently, told me of having closed a small opening by a mucous flap and no doubt others are experimenting along this line.

All attempts heretofore reported have been by the making of a single mucous flap. This plan is necessarily limited to the closure of small perforations and even in these offers no great certainty of success. As the method which I have devised is radically different from those tried by others I will report my experience in some detail.

Up to the present time I have made six operations for the closure of septal perforations. One was a total failure, one a partial success and four were entirely successful. My first attempt was in the autumn of 1905 and was a failure. The patient had a narrow opening about ten millimeters long near the nasal floor, evidently due to the saw cut of an operation by the Gleason method. I resected the deformed cartilage and closed the opening by a flap from above brought downward and stitched along its inferior border. This was not a difficult procedure, as the opening was so placed as to be readily accessible and there was plenty of tissue to cover it. This flap was attached only at its posterior end, but with excellent approximation supported above by cartilage and with no tension, I expected a good result. I was, therefore, disappointed in a few days to find the flap sloughing and all the membrane edges curling away. The final result was an opening larger than before.

A result so different from those achieved by similar operations elsewhere led me to look for the peculiar conditions that produced it and these I found without much difficulty. First, I considered the blood supply and saw at once that I had violated the first rule of plastic surgery. The chief arterial supply of the anterior septum is the septal branch of the superior coronary and from this my flap was wholly separated. Its second supply is the superior palatine through the foramen of Stenson and this, too, was cut off. Its third and only remaining supply is from the nasopalatine branch of the

internal maxillary, running forward and downward near the upper margin of the vomer, and for this I had shown little regard.

I next studied the histology of reparative processes and learned that the septal flap is almost wholly devoid of the necessary connective tissue element. This explains why unsupported mucous membranes, however carefully approximated, will utterly refuse to unite. It also explains the inability of the septum to fill the smallest perforation by a granulating process. A small hole at the close of an operation means a larger one later, which is only increased by any effort at "stimulation."

I recognized, too, that septal cartilage is worse than useless in any effort at repair. A non-vascular tissue nourished by its coverings, it dies when exposed and instead of a support becomes a burden. Lastly, septal flaps are delicate, holding stitches poorly, and are incapable of bearing more than the slightest tension. The mere drawing of sutures through the membranes will often lacerate them seriously.

An operation to have any wide application must overcome all these difficulties. The following, therefore, are imperative requirements:

- I. To conserve the bloody supply.
- II. To provide a double flap for the aperture with an intact membrane under every seam.
- III. To leave no denuded cartilage. Denuded areas must be of bone or vascular tissue.
- IV. To require few stitches which must be easily inserted and produce no tension.

The operation to be described seems to meet all these requirements and has given me complete success in four cases. In one other it was almost equally successful, but a tiny opening at the upper apex resulted from too early removal of support.

The first successful operation was made in July, 1906, and shows a perfect result after fifteen months. It was a perforation very similar to the one above described, due to a sawing operation made by myself three years before. The second was made in October, 1906, and was equally successful. This was a post-operative aperture six millimeters in diameter.

Encouraged by these results, in December, 1906, I operated for the closure of an idiopathic perforation which was large enough to admit the end of my index finger as far as the first joint. There was a suspicion of syphilis in this patient, but no clear history could be obtained. Iodides were given three weeks before the operation

and for several months afterward, or as long as the patient could be kept under observation. When last seen the septum was in perfect condition with no ulceration or odor.

In my last case, the operation was subjected to the severest test and the result seems to positively establish its value. The patient, a man of forty-two, had a perforation which included almost the entire cartilaginous septum. Its posterior and inferior margins were bony and only narrow strips remained of the anterior and superior

cartilage borders. The opening was irregularly oval with a long diameter of one and one-half centimeters. A hard rubber tube, one centimeter in diameter, was passed through and did not fill it. A photograph showing such a tube in this position is reproduced herewith. No definite etiology could be determined in this case, but a luetic origin was suspected and the patient was so treated both before and after operation.

The patient was referred to me by Dr. Carlton A. Harkness of Chicago, at whose request I undertook the manifestly difficult task of restoring this septum. This was done on August 26th before several visiting rhinologists, to whom I am indebted for helpful suggestions and for the patience shown in witnessing a most prolonged and tedious operation. It was found to be impossible to use even the ordinary sutures in this case, as number three braided silk would cut through in forming a knot. A single suture was left at the highest point on one side and elsewhere the flaps were simply

smoothed out with the spatula and held in place with delicate lint pads. Moderate pressure was made from either side with Bernays sponges. This was lessened daily until the fourth day, when both sides were uncovered and examined. There was absolute closure at every point with no sign of retraction or of slough. The denuded areas were covering rapidly, the one in front having almost disappeared. The septum was supported by dressings in one side changed daily for three weeks, after which it received no attention except cleansing. The result is an imperforate septum quite normal in appearance.

Fig. A. General schema of the operation. b b, The incision anterior to the perforation. c c, The freshened edges of the perforation. c c, Posterior incision upon the opposite side of the septum. The sutures are shown in position.

TECHNIQUE OF THE OPERATION.

(1) The edges of the opening are carefully pared and V-shaped sections are removed above and below to allow approximation of the vertical margins without wrinkling. This is done with scalpel or with the Ballenger single-tine swivel knife.

(2) A vertical incision is made in the *septum mobile* and a flap is lifted backward to, and entirely around the perforation. This incision is placed far forward to make the widest possible flap anterior to the opening. It should extend upward to the nasal roof and downward into the floor, and it is well to include in the flap some of the underlying cellular tissue. The elevation should be car-

ried along the nasal floor to a point as far backward as the posterior border of the aperture.

(3) The muco-perichondrium of the opposite side is elevated entirely around the perforation and the bone or cartilage of its immediate border is removed. The swivel knife, bone forceps and chisel may all be useful here. The muco-periosteum of the distal side back of the opening is now elevated as for an extensive bony resection. This elevation must extend to the roof and into the nasal floor.

(4) A vertical curved incision with its concavity forward is made through the distal membrane far enough behind the aperture

Fig. B. a, The denuded cartilage after the anterior flap is sutured to the mucous membrane of the posterior margin of the perforation. f f, The suture.

to produce a flap wider than its antero-posterior diameter. This flap must be loosened until it can be drawn forward and sutured to the anterior margin on the same side, or better still, overlapped without sutures.

(5) The proximal flap is slid backward to meet the posterior margin if possible, but not far enough to uncover the juncture of the opposite membranes. Special care must be directed to the upper apex where the sliding of the flaps upon each other is necessarily slight. The flaps are held in position and gently pressed together

by delicate pads and suitable packing, my preference being for the Bernays'-Simpson tampon.

Each seam now rests upon a connective tissue support and is nowhere intersected by another. Each flap has blood supply from two sources and in the general direction of arterial flow. All denuded areas are in vascular mesoblastic tissues where repair is rapid and complete. Few sutures are needed and these are so placed that their insertion is easy. Indeed, my last case seems to prove that none is necessary, and, this being true, the most tedious part of the

Fig. C. a, The denuded cartilage left after the plastic flap is sutured to the anterior margin of the perforation. d d, The suture. The denuded area a heals by granulation. From Dr. W. L. Ballenger's forthcoming Text Book on The Surgical and Other Diseases of the Nose, Throat and Ear.

operation is eliminated. With a little practice I believe the operation can be made as easily and quickly as the ordinary submucous resection.

Dr. W. L. Ballenger has done me the honor of describing this operation in his forthcoming text book and has kindly loaned me the three drawings made by him to accompany his description. These are herewith presented and they will aid greatly in understanding a somewhat complicated technique.

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