THE TREATMENT OF FRACTURES AND DEPRESSED DEFORMITIES OF THE NOSE BY A NEW METHOD WITH THE USE OF A COMBINED BRIDGE AND INTRA-NASAL SPLINTS.*

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It is not due to lack of appreciation on the part of the writer for the excellent operations devised by several men for the correction of deformed noses, that a review of their work is not attempted, but rather to a lack of space in this short paper, which is intended chiefly to bring to your attention a practical method for retaining the parts of the nose in their proper position until union has occurred after fractures, both accidental and operative, the chief object being to prevent depression of the bridge, and to preserve the integrity of the nasal passages. It is intended, therefore, to be complementary to the various operations involving the fracture and mobilization of the nose for old deformities, as well as recent accidental fractures; and it presumes to fill a long felt want; namely, that of a splint that will exert pressure in such a manner that the nasal tissues, once placed in proper position, will be held so until union has occurred.

In looking over the text-books dealing with this subject, I have been impressed by the lack of confidence which the writers show in the methods they advise for immobilizing the nose after fractures, and in correcting depressed deformities. The devices in use for this purpose may, for convenience, be classified as: (1) Extra-nasal. (2) Interstitial. (3) Intra-nasal.

Of *Extra-nasal* appliances, those most frequently advised are plaster strips drawn across the nose and attached to the cheeks, a small roller bandage being placed on either side of the nose. This method, or some slight modification, is recommended in almost every text-book on surgery. Some of these authors, however, admit its inefficiency and the uncertainty in results attending its use. The chief objections are: (1) It is impossible to immobilize the part by attaching adhesive plaster to the skin, which is movable. (2) The plaster presses down upon the nose and tends to produce or increase any tendency to depression. (3) This method of treatment

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takes no account of intra-nasal conditions. (4) The results obtained are very uncertain.

Practically the same objections may be raised against the various forms of splints or moulds attached to bands to be worn around the head. It is impossible to adjust them so that they will not slip, when they may do more harm than good.

Interstitial measures include such expedients as Martin's bridge, bridges made of celluloid, hard rubber, silver, etc., introduced under the skin. The disadvantages of a foreign body under the skin are unquestioned. It is the common experience that they slough out.

On the other hand, in moderate degrees of depressed deformity, and especially where the nose is not too broad, the subcutaneous injection of paraffin is very satisfactory. It is also useful as a supplementary procedure to operative measures. It is reasonably certain that hard paraffin is neither absorbed nor organized, but is encapsulated, and remains permanently in situ if properly injected. Ulceration and expulsion of the mass has occurred in rare instances, but never to the writer's knowledge when injected into the tissues of the nose. On general principles, however, it is far preferable to correct a deformity by rearranging the natural tissues than by filling in the irregularities by the introduction of a foreign substance.

Intra-nasal appliances for the support of the bridge in the treatment of depressed deformities, and as a preventive of impending depression, are the most common of all methods of treatment. A brief consideration of the architectural structure of the nose will show how ill adapted are such means to the mechanical conditions to be overcome. The nasal cavity may be compared to a truncated cone, with apex pointing forward. The roof of the nose, if prolonged forward, would meet the level of the floor at an angle of about 70 degrees, therefore any object, such as a splint that could be passed through the anterior naris, the vertical diameter of which is only three-eighths of the distance from the middle of the nasal bone to the floor of the nose, could not possibly exert any lifting force upon the dorsum, but on the other hand would, by its horizontal pressure, drag the dorsum downward, thus increasing the tendency to flattening. This applies especially to compressed cotton splints, the horizontal pressure of which is considerable. An additional disadvantage is that the patient is forced to breathe through the mouth.

In regard to the operative treatment for old depressed deformities, those cases present the most favorable operative possibilities where there has been little or no loss of tissue, as in those resulting from trauma. Old syphilitic cases are inoperable, and atrophic rhinitis cases are difficult, and the results uncertain on account of defects in the development of the nasal bones, the extensive absorption of all the tissues and the increased dangers of infection from the purulent secretions.

In operating there must be thorough mobilization of all the nasal tissues. This can be accomplished with the Adams forceps, and by using the chisel either from within or from the outside of the nose. Where the nose is particularly broad and flat, a portion of the nasal processes of the superior maxillae may be chipped off and used in building up the arch. Normally this process forms about one-half of the nasal arch, and according to Berens the grain runs

upward and forward, so that there is no danger of the split running into the orbit. The nasal duct must be thought of, but according to the observations of the writer upon a large number of skulls, this duct, which runs downward and backward corresponding to a line drawn from the inner canthus to the first molar tooth, is placed five-eighths of an inch behind the anterior border of the nasal process of the superior maxilla. It is, therefore, safe in the ordinary operation.

In most flat-nose cases the dorsum is held down by the shortened septum. To overcome this difficulty, I have devised a plastic and sliding flap operation that will permit of the septum being lengthened without leaving a perforation. This will be described in connection with one of my cases.

The special instrument to which I wish to call your attention consists of a bridge made of steel, and as light as is compatible with strength. The bridge is formed by two curved, fenestrated wings two and one-half centimeters wide, and joined by a hinge. The

distance that these wings can be separated is regulated by a thumb-screw. The edges of the wings diverge to correspond to the shape of the nose, they are padded with rubber, and near the margins are small holes which permit of additional padding of gauze being stitched on. The second part of the apparatus consists of two narrow hard rubber splints, perforated by four small holes.

All the precautions necessary for an aseptic operation are observed, and the patient is placed under the influence of a general anaesthetic. Assuming that the nasal tissues have been thoroughly mobilized, the application of the apparatus is as follows: No. 14 iron-dyed silk is passed through one of the perforations in the splint and knotted, (the hole is selected according to the distribution of the lifting force desired), the other end is threaded into a

large curved needle, this is passed from within the nose through the dorsum; we should endeavor to perforate the fibrous, triangular interval between the upper lateral cartilage, the lower lateral cartilage and the septum, and near the latter. The roof of the nose is thin and very easily perforated. The splint is now drawn into the nose and adjusted to the roof. This process is repeated on the other side. The bridge is then applied and the wings adjusted with the thumb-screw to give the proper support to the base of the nasal triangle. The sutures are now run through the fenestrae of the bridge immediately above their exit from the nose and drawn tight enough to lift the dorsum into its proper position and reduce the deformity (a slight over-correction is to be preferred), the sutures are then tied together over the hinge of the bridge, using only sufficient tension to support the dorsum. The apparatus is automatically held in position, and there is no tendency to displacement;

it should be worn for a week or ten days, or even longer; during this time the patient should remain in bed. In fractures of the nose, union occurs more quickly than in any other part of the body, in uncomplicated cases there is fixation in eight days and bony union in a fortnight. Since practically all fractures of the nose are com-

pound fractures, in my opinion the patient is subjected to no additional risks from infection by the introduction of a sterilized silk suture through the dorsum. This view is borne out in the only two cases that I have had the opportunity to operate upon by this method.

The mechanics of the apparatus may be illustrated diagrammatically:

The line (A) vertical to the base of the nasal triangle represents the downward pressure of the bridge, produced by the tension of the sutures on the dorsum. The horizontal line (C) represents the pressure exerted horizontally by the wings and controlled by the thumb screw. The mean direction of pressure (B), therefore, that is actually applied to the base of the nasal triangle bisects the angle

formed by the vertical and horizontal lines, and gives us the proper support at the base, while the lifting force is applied to the apex through the sutures attached to the intra-nasal splints. The combined action of these forces, therefore, would tend to construct a symmetrical nose.

The instrument was developed after thorough experimentation on the cadaver, and has been used with satisfaction on the following cases from Drs. Knight and Smith's clinic at the Manhattan Eye, Ear and Throat Hospital.

Case 1. The first patient is a pugilist, 21 years of age, of good family and personal history.

Three years ago, while jockeying in a race, he was thrown from his horse; falling on his nose, he fractured it. Following the injury his nose was flat and he was unable to get the slightest amount of air through it.

Examination showed a broad, flat nose. Both nares were completely obstructed by the thickest septum I have ever seen.

On January 23d, I did a submucous resection of the septum and found an unusual condition: the septum was double, consisting of two irregularly parallel layers of cartilage and bone, separated by an interval filled with connective tissue. On account of synechia the elevation of the mucous membrane was difficult; I succeeded, however, in removing the obstructing cartilage and bone with my punch forceps, giving a clear nasal passage without perforation of the septum. The nasal cavities were packed with sterilized vaseline gauze, and the case progressed satisfactorily.

On January 28th, five days after the first operation, the patient, having been properly prepared, was etherized, and the following operation performed: By using the padded handle of a mastoid curette and mallet externally, and the chisel and Adams forceps internally, the nasal bones, which were separated and overriding the nasal processes of the superior maxillae, were thoroughly mobilized, and the ridge of the septum, left after the submucous operation, was separated from its connection with the vertical plate of the ethmoid; this process is homogeneous in structure, and should not be fractured, as the split is as apt as not to run into the cribriform plate. The septum, following the submucous operation, was found lax enough to permit of the dorsum being raised. There was some backward displacement of the lateral cartilages at their junction with the lower edges of the nasal bones, so I introduced

a Miles rectangular septal knife, and cut through the connective tissue at this point, enabling me to lift the cartilages into their proper place.

For bringing the parts into their normal relations and retaining them there until union had occurred, I used the apparatus previously described.

The nose was irrigated twice a day with Dobell's solution, and was kept lightly packed with vaseline gauze.

The bridge was removed on the eighth day, the suture holes closed promptly and without a noticeable scar.

The result was very satisfactory both from a functional and aesthetic point of view.

Case 2. The second patient is a man, of good family history, and no history of venereal disease. He has suffered with atrophic

rhinitis since early childhood. The crust formations have always been abundant.

The nose was broad and flat, almost on a level with the face. The nostrils were broad and shallow, the alae being very widely separated. The nasal cavities were very roomy and covered with crusts. The inferior turbinates had disappeared and the middle turbinates were very small. On palpation no nasal bones could be discovered, and the slight elevation of the nose was due almost entirely to the nasal processes of the superior maxillae, which were widely separated. Altogether the case presented about as hopeless an aspect as I have ever seen. The local and general conditions at this time precluded the possibility of an operation.

He was put upon tonic treatment, was instructed to irrigate the nose three times a day with salt and soda solution, and three times a week the mucous membranes of his nose were thoroughly rubbed with 25 per cent argyrol solution. At the end of four months the crust formation had ceased, and the nasal conditions were as nearly normal as I could hope to get them; so I decided to do the following operation on April 3rd. The face and nose were aseptically prepared, and the patient etherized.

The septum, which was entirely too short to admit of raising the dorsum, was first subjected to the following procedure. Through a button-hole slit I elevated the mucous membrane on the left side of the septum. With a sharp-pointed bistoury, beginning at the anterior edge of the vertical plate of the ethmoid, I divided the cartilage and the *mucous membrane* of the other side at a high level, and the *mucous membrane* of the left side at a much lower level, this leaving a long flap of mucous membrane attached to the upper segment of the septum, which was intended to fall into the interval between the segments of the septum and prevent a perforation when the dorsum was raised.

The fore-part of the septum was lengthened in the following manner: Downward from the center of the septum, an inverted Y-shaped incision was made, separating the columnar cartilages and continued under the floor of either nostril, making two flaps which were brought together in the median line and sutured with fine silk, thus doubling the length of the septum and raising the tip of the nose. The incision in the floor of either nostril was then extended under the alae, liberating them so that they could be brought toward the median line and sutured, thus narrowing the nostril and producing a shapely nasal orifice.

An effort was then made to reconstruct the bony framework of the nose. A small incision was made on either side of the nose over the nasal processes of the superior maxillae; by using a chisel and moving the tissues up and down, I succeeded in chipping off quite a strip of bone on either side, to be used in building up the

nasal arch. The nasal bones had completely disappeared from atrophy. With the Adams forceps, one blade of which was covered with rubber to protect the skin, I worked these pieces into position and thoroughly mobilized the dorsum of the nose. The nasal bridge and splints were then applied. The nose was irrigated twice a day with Dobell's solution, and lightly packed with vaseline gauze.

As I feared, on account of the attenuation and low vitality of the mucous membrane of the septal flap, it partially sloughed, leaving a perforation.

When the bridge was removed on the seventh day, the improvement in the contour of the nose was marked, and the result much

better than we had expected. The intra-nasal conditions were equally improved, as the cavities are far less roomy; this, no doubt, will exert a beneficial influence on his atrophic rhinitis.

The permanency of the improvement in this case depends upon the arch constructed from the nasal processes of the superior maxillae, the dorsal segment of the septum, and the lengthened anterior portion of the septum.

In conclusion, I will say that the instrument has the great advantage of restoring the function of the nose as well as its contour by a re-arrangement of its parts without the introduction of foreign substances into its tissues.

Its efficiency depends upon the principle that the best way to correct a deformity is to reverse the direction of the force that produced it.

NOTE.—The improvement in both cases has remained to date, August 25, 1908.

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