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Septoplasty

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THE purpose of this paper is to review the literature on septal surgery, to examine critically the present status of the submucous resection operation, and finally to describe a method we can commend of septoplasty employed by us in over 200 cases, which has proved its worth both as a simple method to teach and in its satisfactory results.

Progress of septal surgery

A review of the literature falls naturally into the four main periods of development of septal surgery, namely:

(*a*) Subtotal removal of septum
(*b*) Classical submucous resection
(*c*) Submucous resection+technique for replacment of cartilage
(*d*) Repositioning of septal cartilage as a compound flap.

(a) *Subtotal removals*

The first mention of septal deflections seems to have been made by Quelmalz (1757) who indited the pressure of parturition and habitual nose-picking as probable causes; he recommended treatment by pushing the cartilage back into its original position by daily pressure.

The first operative procedures involved shaving down the convexities and even creating (or ignoring) perforations after removal of acute angulations (Langenbeck, 1843; Dieffenbach, 1845; Chassaignac, 1851). Punch forceps were even fashioned to accomplish a through-and-through removal (Ruprecht, 1868) as was a saw for excision of septal spurs (Bosworth, 1887).

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Around the time that Reverdin and Wolfe were describing free skin grafts, Krieg (1889) suggested that if cartilage and mucosa were removed, provided an intact mucosa was retained on the other side of the septum, new cartilage would regenerate. He mentioned that Hartman and Peters in 1882 had replaced the excised cartilage and mucosa in a better position and it had taken as a free graft.

(b) *The submucous resection*

The first suggestion that this technique might be possible came from Burkhardt (1887), but the twentieth-century had begun before it became popularly accepted. The credit for the first description of the submucous resection is usually given to Freer (1902) but he claimed little originality for the idea and mentioned Roc, Ingals, Krieg and Boeinninghaus as the originators of the operation. He stated that the external nose did not need the support of the septal cartilage and that it could be totally removed without producing 'saddling'. The operation he described merely fractured it back into position after weakening it by chisel cuts.

Killian (1904) published his views on the subject. His main disagreement with Freer was that he considered the septal cartilage to be essential for the support of the external nose. Killian, in effect, developed the present day submucous resection by suggesting that dorsal and caudal buttresses of septal cartilage should be preserved.

A year later Freer added a description of removal of the bony septum by chisel and punch forceps. At the same time he repeated his claim that it was unnecessary to preserve either a dorsal or caudal buttress of cartilage. He maintained that any 'saddling' was due to rough surgery and to partial removal of the upper lateral cartilages.

(c) *Modifications of the submucous resection*

A series of modifications developed because surgeons were unhappy with the results of the classical submucous resection and felt that the normal rigidity of the septum should be preserved. The main problem was, of course, concerned with the anterior dislocation of the septum. Over thirty submucous resection modifications have been described, the following being a few representative examples.

Metzenbaum (1929) suggested replacing an anterior dislocation to its normal position as part of a compound flap. This was not possible, however, in a caudal end which was fractured, scarred or bowed.

Freer (1937) completely removed the dislocated caudal end and replaced it in a columellar tunnel extending from the tip of the nose to the nasal spine. If the graft in this situation slipped to either side of the spine then the tip became deviated again.

Galloway (1946) suggested that saddling was not due to excessive

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removal of septal cartilage but to subsequent scarring. He thought that the potential saddling, the retraction of the columella and the drooping of the tip could be avoided by replacing a segment of cartilage between the septal flaps and drawing it down into the columellar tunnel by guide sutures; once in place it could be held by two transfixion sutures.

One of the problems of this procedure was that the columella became immobile so that the nasal tip had a peculiar appearance when the person smiled. Fomon (1948) attempted to rectify this by replacing the cartilage in two segments—one in the columella and one between the septal flaps.

(d) *Septal repositioning* (*septoplasty*, *septal reconstruction*)

As well as producing a rigid tip, free cartilage grafts carried the added complication of late resorption and subsequent saddling. This led surgeons to devise operations in which the cartilage was left attached to at least one septal flap and shifted to the midline as part of a compound flap.

Again, the precursor of this work published his thoughts in the nineteenth-century. Adams (1875) described moving the septum to the midline by fracturing it, the fractured segments being splinted and held in the desired position until firm healing occurred. Asch (1891) also wrote about cutting, fracturing and repositioning the septum.

It is only in the last twenty years that compound flap septoplasty has become firmly established. While many features are common to all operations described, minor variations exist between different authors. The main proponents of septoplasty have been Converse (1950), Becker (1951), Goldman (1956), Huffman and Lierle (1957), and Cottle *et al.* (1958). Both Huffman and Becker incised cartilage to break the elasticity and excised vertical overlapping strips once the septum was straightened; Goldman's procedure consisted of cutting the cartilage and fracturing the bony septum; Cottle described the maxilla and pre-maxilla approach and Converse described a swinging door operation.

Choice of septal operation

Any surgical technique that survives in its original form for seventy years must have considerable merit, and the submucous resection has certainly been a safe, satisfactory and successful method of treating septal deformities causing nasal obstruction. Its continued popularity is shown by the fact that in Scotland, with a population of $5\frac{1}{2}$ million, somewhere around 1800 submucous resections are performed each year. Even its strongest advocates, however, would not claim that it can handle every septal problem.

Early collapse of the nose after a submucous resection suggests bad surgery with excessive cartilage removal. On the other hand even the most skilful submucous resection cannot prevent changes in the shape of the

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nose over a period of 1 to 1½ years as the scar tissue matures. The scarring of the septal area now devoid of cartilage pulls down the upper lateral cartilages which in turn depresses the dorsum and broadens the frontal view of the nose. Scarring following removal of the maxillary spine causes retraction of the base of the columella and a sharpening of the nasolabial angle. The depression of the dorsum and the retraction of the columella result in a drooping of the tip.

The classical submucous resection also fails to straighten a nose which is externally deviated in its cartilaginous portion—the nasal obstruction may be helped but not the appearance. It is also impossible to correct an anterior dislocation of the septal cartilage without resorting to the insertion of free grafts.

Another situation impossible to correct with the submucous resection without running the risk of immediate collapse of the nose is the high septal deflection.

If a patient has a saddle nose from previous trauma and complains of nasal obstruction it is inviting disaster to perform a submucous resection both from a functional and cosmetic point of view. Such a patient needs as much tissue preserved as possible.

In some centres in this country it is customary for E.N.T. surgeons to perform a submucous resection prior to the plastic surgeon doing a rhinoplasty. This is to be deplored for a number of reasons.

Firstly there is no doubt that the septum is the key to the nose both functionally and cosmetically: thus any surgeon dealing with the shape of the nose ought to be able to handle all septal problems.

Secondly, the employment of two surgeons to perform an operation as simple as a septorhinoplasty is, to say the least, uneconomic—as is the fact that the patient is in hospital twice and off work twice.

Thirdly, it is basically unsound to perform a submucous resection and a rhinoplasty within a short time. Since scar tissue takes at least a year to maturate, a previous submucous resection militates against a good rhinoplasty result because as the scar tissue matures it will alter the setting of the rhinoplasty.

According to Goldman (1956) any septal operation should fulfil the following criteria:

1. It should restore function
2. It should prevent saddling
3. It should prevent drooping of the nasal tip
4. It should prevent retraction of the columella
5. It should prevent flaccidity of the septum
6. It should avoid the need for a free graft to be inserted to add to the support
7. It should lessen the vulnerability to subsequent trauma.

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All of these criteria are fulfilled by the septoplasty described in the next section. This is the septal operation of choice in a one-stage septo-rhinoplasty; it is ideal for cartilaginous deviations and also for anterior distortions of the septum.

Technique of septoplasty

This is not a simple operation—a beginner will have to convert a number of his early cases to submucous resection. Once mastered, however, it totally replaces submucous resection in the surgeon's repertoire.

The principle of the operation is to divide every attachment of the cartilaginous septum except for a mucosal flap on one side which is enough to give it a blood supply. One should aim for maximum mobility and minimal removal of tissue.

Pre-operatively all the vibrissae should be trimmed and any rhinitis or sinusitis should be dealt with prior to surgery.

The operation may be done under local or general anaesthesia but in either case 6–8 ml. of 2 per cent lignocaine and 1:80,000 adrenaline are infiltrated into the septum and on to the dorsum of the nose.

Step one—Ventral separation

An intercartilaginous incision is made on each side with a number 15 blade. The skin over the dorsum of the nose is elevated with at first a straight and then a curved Joseph knife (Fig. 1). This is an important step in a deviated nose because it allows the skin to redrape once the septum has been replaced in the midline. If the skin is not detached from the upper lateral cartilages then there will be tension on the replaced septal cartilage.

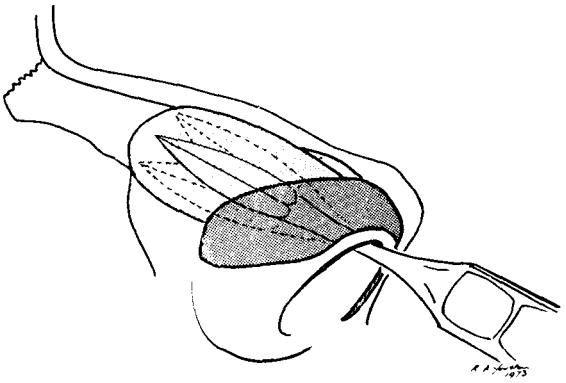


FIG. 1.
Step one.—Skin of nose elevated with a Joseph knife in order to allow it to redrape.

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Step two—Caudal separation

A button-ended knife is placed in the right intercartilaginous incision, the ventral separation completed and the button end brought out through the left intercartilaginous incision (Fig. 2). The knife is now turned downwards and a complete transfixion incision made through the membranous septum. This should be made immediately in front of the cartilaginous septum in order to ease later dissection of septal flaps. The transfixion incision is continued to the floor but there is another 1 cm. to the maxillary spine. The incision is therefore completed by standing behind the patient and cutting down with straight Mayo scissors.

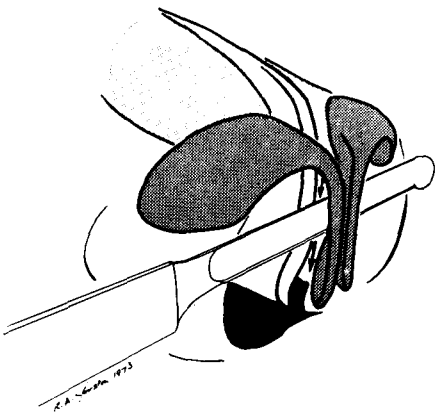


FIG. 2.
Step two.—A transfixion incision is made through the membranous septum with a button-ended knife.

Step three—Mucoperichondrial flaps

A mucoperichondrial flap is raised on the convex side of the septum with small sharp pointed scissors. The flaps must be dissected right up to the attachment of the upper lateral cartilage and well back on to the ethmoid and vomer. The final elevation is done with a Freer elevator. In order to make certain that the dissection has been done to the necessary height palpate the elevator with a finger placed on the dorsum of the nose.

On the concave side a similar flap is raised to only one-third of the height of the septum (the hemiflap). At the chondroethmoid junction the flap is raised to the full height (Figs. 3 and 4).

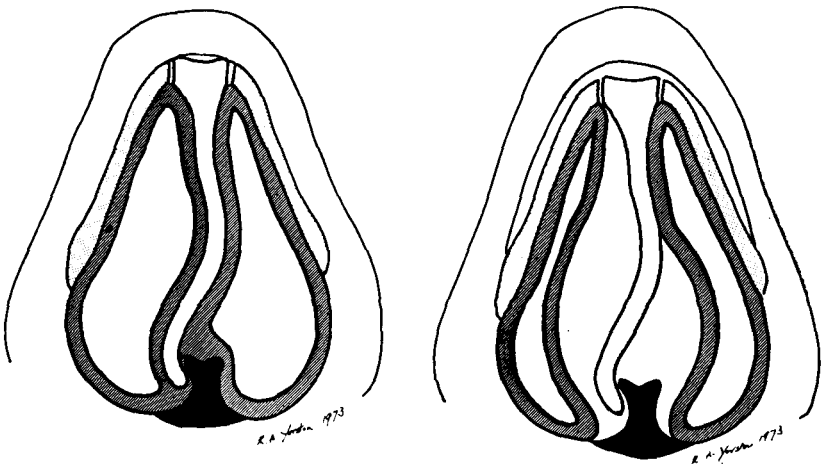
Step four—Chondro-vomerine separation

Either a medium-size Killian or a Cottle speculum is inserted with a blade on either side of the cartilage, under the mucoperichondrial flaps. From above downwards the flaps are dissected from the bony cartilaginous junction on to the floor of the nose.

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Septoplasty

Bony cartilaginous deformities are too numerous and varied to make any classification useful or worthwhile. Basically any of the following may occur singly or in combination; straight dislocation of the cartilage; cartilaginous reduplication; cartilaginous bowing; and bony deformity.



FIGS. 3 AND 4.
Step three.—Showing the development of the whole flap and the hemiflap.

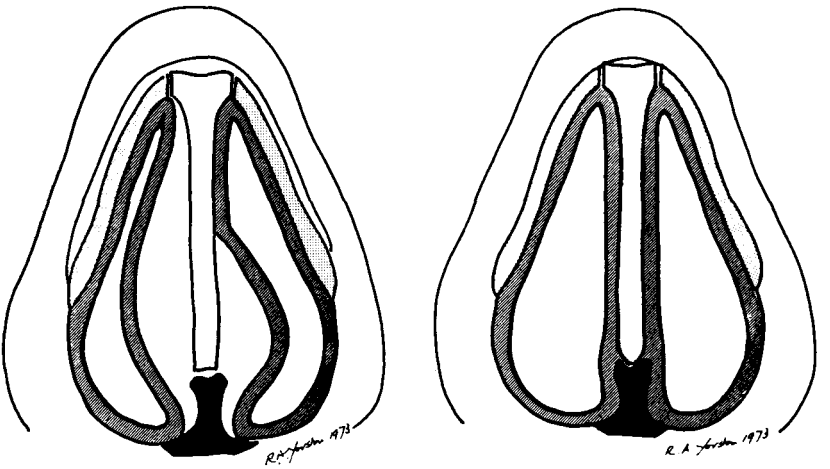
Whatever the anatomy, the basic principles for this part of the operation remain the same. The cartilage must be separated carefully from the bone so that the problem can be identified. If the cartilage is dislocated, approach the dissection from the undisclocated side placing both blades of the speculum on the same side. Sharp dissection should be used for any scar tissue at this point and it should also be used if there is any reduplication. If the cartilage is bowed approach it from the convex side.

When the cartilage is freed from the bone then the relationship should be adjusted so that the cartilage sits exactly on the vomerine ridge. It may be possible to replace the dislocated or reduplicated cartilage once freed with minimal trimming; if a bowed cartilage is sufficiently freed from scar tissue it may straighten spontaneously but usually will require minimal trimming.

If there is bony deformity then the crest will have to be chiselled to straighten it and to make a suitable grooved bed for the cartilage (Figs. 5 and 6).

Under no circumstances should the maxillary spine be removed. It is an important and difficult area to separate the cartilage from because of the periostial and supporting connective tissue fibres—sharp dissection is required.

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FIGS. 5 AND 6.
Step four.—The deflected cartilage is trimmed and replaced on the maxillary crest and the flaps replaced.

Step five—Chondro-ethmoidal separation

At this point the septal cartilage is attached only to one half muco-perichondrial flap and the perpendicular plate of the ethmoid. To accomplish the last separation place both blades of a Killian speculum on one side of the cartilage (i.e. between cartilage and the large mucoperichondrial flap). Opening the blades will expose the chondro-ethmoidal junction. With a Freer elevator inserted in the already dissected chondro-vomerine junction run it upwards and separate the chondro-ethmoidal junction. It is vital that this dissection be continued up to the junction of the ethmoid and nasal bones. If there is a bony deviation then the necessary amount of bone is removed but even with a straight bony septum at least half an inch of the ethmoid and vomer should be removed for the full height in order to allow free movement for the cartilage posteriorly (Fig. 7).

Step six—Fixation

At this point, if the operation has been performed correctly the septum should sit unadjusted in the midline and should show no evidence of drifting.

In my earlier series I made use of various buckling sutures to keep the septum in the midline but this technique does not stand the test of time—if the septum is out of position, without support, at the end of the operation it will resume that position within six months no matter how many special stitches or packs are used.

The two commonest fault areas are:

(1) High in the chondro-ethmoidal junction—it is worthwhile repeating

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that this must be dissected under direct vision up to the attachment of the ethmoid to the nasal bones.

(2) Inadequate chondro-vomerine trimming—the cartilage, or more rarely the bone, must be trimmed to the exact height. If there is too much overlap then the cartilage may slip off the bony shelf and lock the septum to one side.

Once the septum is in the midline the transfixion incision is closed by two transfixion sutures of 3/0 chromic catgut. A small Terracortril pack (about 4 inches long) is placed on each side of the nose in order to re-appose the edges of the intercartilaginous incision. The external dressing is firstly of overlapping $\frac{1}{2}$-inch adhesive tapes; a plaster of paris splint is finally applied.

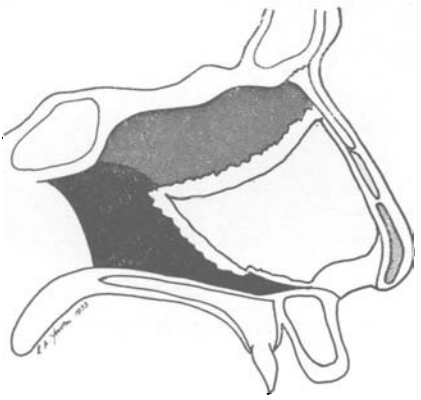


FIG. 7.
Step five.—Removal of ethmoid and vomer to free the cartilage completely posteriorly.

Post-operative care

All patients are started in the immediate post-operative period on penicillin, Chymar (later, Chymoral), and Betnesol eye drops.

The external dressing is changed after a week if the operation was performed under a local anaesthetic and four days if under general anaesthesia because in the latter group the initial swelling is greater and the plaster loosens. The packs are removed at the same time as are the transfixion sutures.

The patient uses Otrivine nasal drops and takes Actifed from this point onwards for another two weeks.

The dressing is removed at the end of the second week, the patient thereafter wearing the plaster splint in bed for three months.

Complications

The number of cases in this series is now 220 (consisting of septoplasty alone or as a part of a rhinoplasty) over a period of six years (Figs. 8, 9, and 10).

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FIG. 8.

a b

Pre- and post-operative views of septoplasty patients.

1. *Failed objective:* The commonest complication when starting this procedure is failure to accomplish the full septoplasty. Any compromise to give the patient a reasonable functional result however merely results in a partial S.M.R. In my series this happened in eighteen out of the first fifty cases, four of the second fifty cases and not at all in the last 120.

2. *Re-displacement:* In the first fifty successfully completed septoplasties, ten were out of position within six months, but in the second fifty cases only two became displaced. In the last 120 cases, one has proved unsatisfactory because of displacement.

3. *Post-operative bleeding:* In spite of much less packing than is usual in an S.M.R. being used there were only two cases of septal haematoma. No case required removal of the dressing or reinforcing of the packs for post-operative bleeding.

4. *Septal perforation:* Since most of the septal cartilage is left intact it is not surprising that the incidence of septal perforation is low; in this series it was 2 : 220.

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FIG. 9.

a b

5. *Cosmetic deformity:* Over the six-year period no case has had depression of the dorsum, broadening of the nose, retraction of the columella or drooping of the tip.

Summary

The main literature relating to the progress of septal surgery over the past 200 years is reviewed. The S.M.R. operation is critically examined with respect to its failure to deal with external cartilaginous deviations of the nose, anterior septal dislocations or high septal deflections. It has little place to play as a preliminary to rhinoplasty and is potentially damaging in a saddle nose. A method of septoplasty is described in detail and it is argued that this procedure should replace the S.M.R. Its main advantage is that it is competent to deal with any septal problem either functional or cosmetic and it is also the key to a successful rhinoplasty. The septoplasty described has been broken down into definable steps, each with a specific aim, and the method has proved useful and successful in teaching many registrars how to perform it. It carries none of the cosmetic deformities which may occur not uncommonly with the S.M.R.

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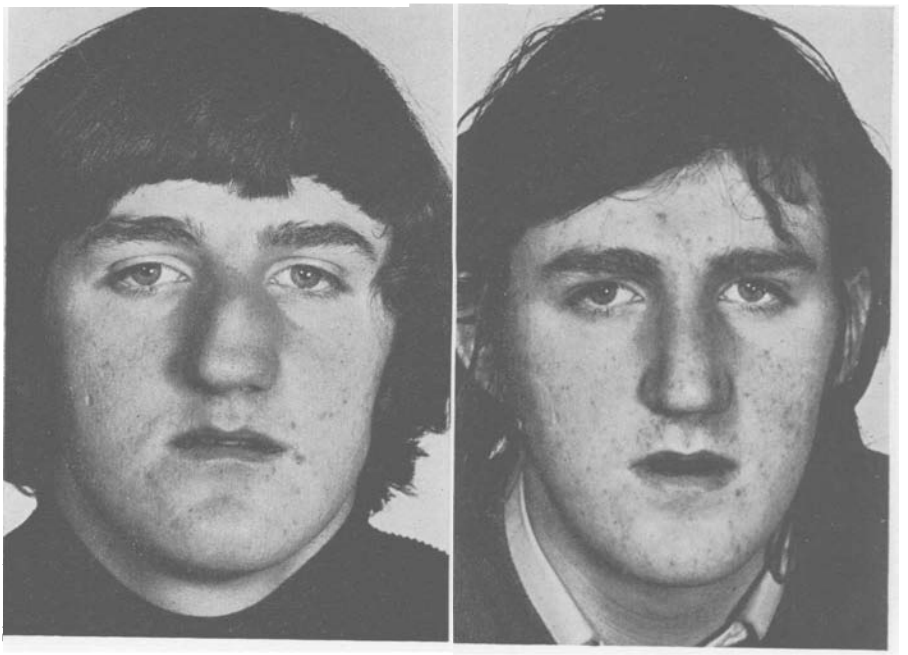


FIG. 10.

a b

REFERENCES

ADAMS, G. (1875) *British Medical Journal*, **2**, 421.

ASCH, M. J. (1891) *Transactions of the American Laryngological Association.* (13th Meeting) p. 104.

BECKER, O. J. (1951) *Archives of Otolaryngology*, **53**, 622.

BOSWORTH, F. (1887) *Medical Record*, **31**, 115.

BURKHARDT, M. *Bericht uber die chirurgische Abtheilung der Ludwigs hospitals*—Charlottenhiefe warend der Jahre, 1885–87.

CHASSAIGNAC, C. (1851) *Gazette des Hopitaux*, Paris, 419.

CONVERSE, J. M. (1950) *Archives of Otolaryngology*, **52**, 671.

COTTLE, M. H., LORING, R. M., FISCHER, G. G., and GAYNON, I. E. (1958) *Archives of Otolaryngology*, **68**, 301.

DIEFFENBACH, J. (1845) *Die operative chirurgie*, s. 366, Liepzig, p. 366.

FOMON, S., GILBERT, J. G., SILVER, A. G., and SYRACUSE, V. R. (1948) *Archives of Otolaryngology*, **47**, 7.

FREER, O. (1902) *Journal of American Medical Association*, **38**, 636.

GALLOWAY, T., referred to by FOMON, S., SYRACUSE, V. R., BOLOTOW, N., and PULLEN, M. (1946) *Archives of Otolaryngology*, **44**, 141.

GOLDMAN, I. B. (1956) *Archives of Otolaryngology*, **64**, 183.

HUFFMAN, W. C., and LIERLE, D. M. (1957) *Plastic and Reconstructive Surgery*, **20**, 185.

KILLIAN, G. (1904) *Archiv für Laryngologie und Rhinologie*, **16**, 362.

KREIG, L. (1889) *Berliner klinische Wochenschrift*, **26**, 699.

LANGENBECK, B. (1843) *Handbuch der Anatomie*, Gottingen.

METZENBAUM, M. (1929) *Archives of Otolaryngology*, **9**, 282.

https://doi.org/10.1017/S0022215100078865 Published online by Cambridge University Press

PEER, L. A. (1937) *Archives of Otolaryngology*, **25**, 475.
QUELMALZ, E. (1757) Haller's *Disputat. ad Morborum Historiam*, Paris.
RUPRECHT, W. (1868) *Wiener Med. Wochenschrift*, **18**, 1157.

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