Submucous excision of deviations and spurs of the nasal septum : with a report of the first 30 operations / by StClair Thomson M.D., F.R.C.P., F.R.C.S., physician for diseases of the throat in King's College Hospital; surgeon for diseases of the nose, throat, and ear, in the Seamen's Hospital, Greenwich.

SUBMUCOUS EXCISION OF DEVIATIONS AND SPURS OF THE NASAL SEPTUM

WITH A REPORT OF THE FIRST 30 OPERATIONS

BY

StCLAIR THOMSON, M.D., F.R.C.P., F.R.C.S.

PHYSICIAN FOR DISEASES OF THE THROAT IN KING'S COLLEGE HOSPITAL; SURGEON FOR DISEASES OF THE NOSE, THROAT, AND EAR, IN THE SEAMEN'S HOSPITAL, GREENWICH

CASSELL & COMPANY, LIMITED

LONDON, PARIS, NEW YORK, AND MELBOURNE

1906.

PRICE ONE SHILLING Net.

SUBMUCOUS EXCISION OF DEVIATIONS AND SPURS OF THE NASAL SEPTUM

WITH A REPORT OF THE FIRST 30 OPERATIONS

BY

StCLAIR THOMSON, M.D., F.R.C.P., F.R.C.S.

PHYSICIAN FOR DISEASES OF THE THROAT IN KING'S COLLEGE HOSPITAL; SURGEON FOR DISEASES OF THE NOSE, THROAT, AND EAR, IN THE SEAMEN'S HOSPITAL, GREENWICH

CASSELL & COMPANY, LIMITED

LONDON, PARIS, NEW YORK, AND MELBOURNE

1906.

SUBMUCOUS EXCISION OF DEVIATIONS AND SPURS OF THE NASAL SEPTUM,

WITH A REPORT OF 30 OPERATIONS

BY

STCLAIR THOMSON, M.D., F.R.C.P., F.R.C.S.

IT is generally agreed that operations on the nasal septum have not been amongst the most satisfactory in rhinology.[1]

Occasionally a limited spur may be chiselled or sawn through, or a ledge on an undeviated septum may be shaved off, and symptoms are thus relieved. A deviation, limited entirely to the cartilaginous septum, is sometimes met with, with no concomitant spur on it. Then a crucial incision at the most convex point, or a U-shaped incision made around it, will allow of the parts being moulded into the middle line, so as to free the obstructed nostril.

[1] "That many spurs have been removed unreservedly and without benefit to the patient is apparent to any careful observer connected with a large clinic where such results come to his knowledge. Not only am I warranted in saying that in many instances no good has obtained from their removal, but would further affirm that absolute harm has been done by creating a dry, 'scabby' condition of the septum, which is a constant source of irritation to the patient." (Harmon Smith, 'The International Journal of Surgery,' December, 1904.)

But the cases suitable for these operations form a minority amongst the abnormalities of the septum which require treatment.

Deviations of the septum are only too frequently sigmoid in shape—either in the vertical or horizontal plane—so as to cause some obstruction in both nostrils, and in the majority of cases part of the bony septum has to be removed (Krieg 52·3 per cent., Boenninghaus 68 per cent.). The septum, in fact, is too large for the space available for it between the floor and the roof of the nose, and one of our greatest difficulties has been its resiliency, which even the operations of Asch and Moure have only partly overcome. A simple deviation of the cartilage, or an uncomplicated spur, is much less frequently met with than various combinations of the two. These cases have proved a *bête noire* to rhinologists, and in the most marked forms (*i. e.* with more or less complete obstruction of one nostril) we have hitherto had no operation which could satisfactorily correct them.

Design of the Operation.

I do not at present intend to discuss the varieties of septal deformities, nor the indications for operative treatment, but propose to describe an operation which can be warmly recommended as entirely satisfactory for even the most marked deformities. The design of this operation is to excise all obstructing cartilage and bone, with any projecting spurs or ledges, while preserving intact the mucous membrane on each side. The results, both immediate and remote, are all that could be desired; for the resiliency of the deformity is entirely overcome, the obstructing outgrowth can never re-form, the patency secured exceeds that obtainable by any other proceeding, scabbing or crusting of discharge is avoided, and the preservation of the mucosa on each side secures rapid return to a normal condition.

Preparation.

The patient should be prepared by avoiding alcohol and any excess of diet or tobacco for three days beforehand. The operation is done under local anæsthesia, but an aperient should be given the evening beforehand. These precautions greatly help to avoid any bleeding during the delicate operation to be described. The patient can have an ordinary meal (breakfast or lunch) just beforehand. The vestibules—the only really septic parts of the nasal chambers[1]—are cleansed with spirit soap, and if a moustache is present, it should be thoroughly washed.

Anæsthesia.

Inch wide strips of sterilised ribbon gauze are soaked in adrenalin chloride containing 10 per cent. of cocaine and applied along the septum on each side, tucking them well up towards the roof of the nose in front and down to the floor. It may be impossible to get the gauze far in on the obstructed side at first, but after a few minutes the anæsthetic and vaso-constrictor action of the mixture will generally allow of a fresh piece being introduced more deeply. It is important to wait at least fifteen or twenty minutes to secure complete analgesia and full hæmostatic effect. If, then, the anterior end of the septum is still found to be sensitive, a pledget of cotton-wool soaked in 20 per cent. cocaine should be inserted for another five minutes, or some powdered hydrochlorate of cocaine may be applied on a minute damp swab. When the septum is found to be blanched and insensitive a fresh piece of soaked gauze is left along the concave side, while a small portion of dry gauze is packed along the floor of the opposite nostril to collect any drops of

[1] StClair Thomson and R. T. Hewlett, "The Fate of Micro-Organisms in Inspired Air," 'Lancet,' January 11th, 1896; "Micro-Organisms in the Healthy Nose," 'Med.-Chir. Trans.,' vol. lxxviii.

blood which may run backwards. Small pledgets of gauze or cotton-wool should be at hand for mopping the wound, and a couple of retractors may be useful in holding open the nostril.

Position.

The operation is best done with the patient horizontal on a couch or operating table, with the head and shoulders well raised. The surgeon is armed with a Kirstein electric head-lamp or a frontal searchlight, although he can also operate successfully with an ordinary forehead reflector.

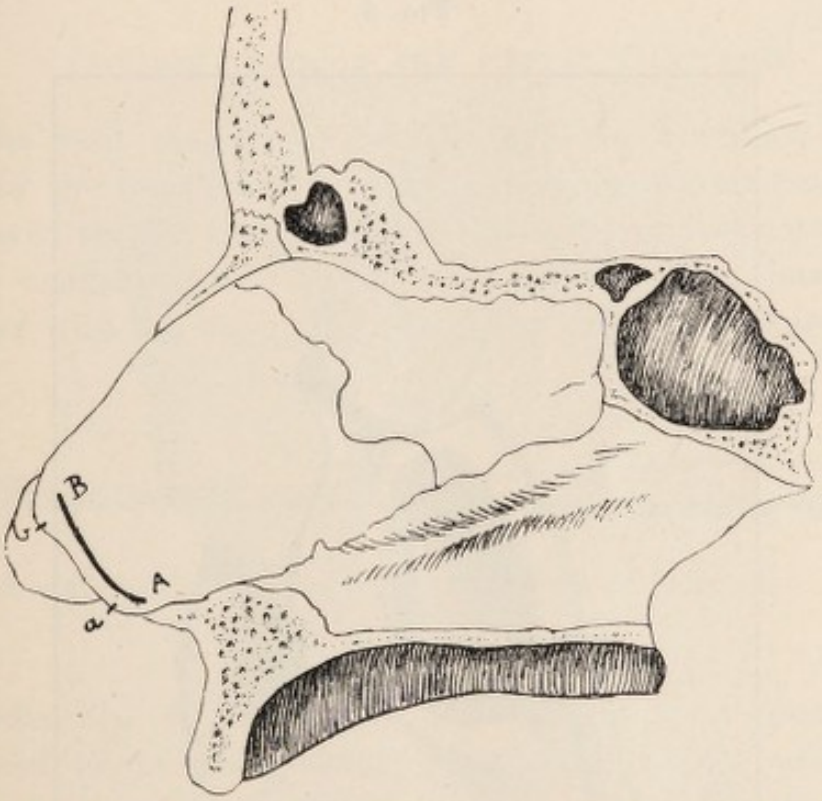
Fig. 1.

First Incision.

Tilting up the end of the nose with the thumb of the left hand, and inserting the left forefinger into the patent nostril, an incision is made through the mucous membrane of the septum on the convex (the obstructed) side. It may be made with an ordinary bistoury, but a much shorter instrument mounted on a bayonet handle and cutting all round the point will be found more satisfactory (Fig. 1). The incision lies half a centimetre behind the junction of the skin and mucous membrane, and mainly parallel to the septum cutaneum, but it may have to curve away from it at each extremity (Fig. 2). It should be started near the floor and then be carried high up, well into the attic of the nose. This incision, in its whole extent, does not only cut through the mucous membrane and perichondrium, but should go deep enough to cut into the cartilage. With practice this incision can be carried

through the muco-perichondrium and the entire thickness of the quadrilateral cartilage at one cut, but without puncturing or wounding the mucosa of the opposite (concave) side. During the proceeding the operator's left forefinger serves as a useful guide and check, by feeling the rounded tip of the knife as soon as it has traversed

FIG. 2.



The incision is made, on the convex side, through muco-perichondrium and cartilage, from *A* to *B*. If the free end of the quadrilateral cartilage is displaced from behind the septum cutaneum, and presents in one nostril, then the incision is made from *a* to *b*.

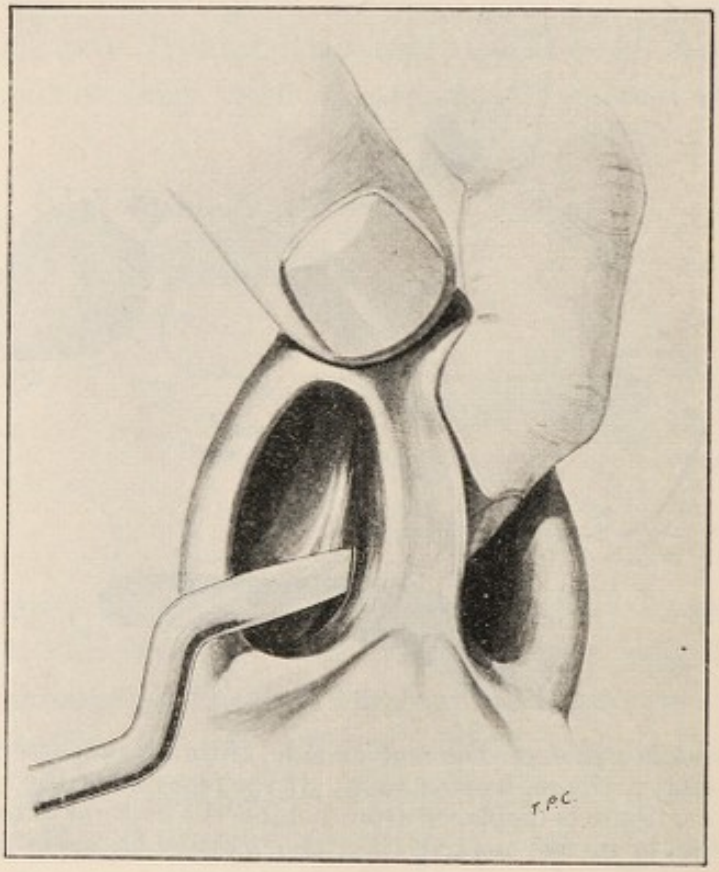
the cartilage (Fig. 3). In those cases where the lower end of the quadrilateral cartilage is displaced from behind the septum cutaneum into one of the nostrils—which it more or less blocks—the incision is made directly over the exposed extremity (Fig. 2). If this extremity presents in the open (concave) nostril, the septum cutaneum is first tilted across it so that the cut can still be made from the convex surface. If this is impossible, the projecting

cartilage must be dealt with through a separate incision from the concave side (Cases 28 and 30). Afterwards the procedure is the same.

Raising the Convex Flap.

With a sharp elevator the muco-perichondrium is carefully separated and raised along the posterior edge of the

Fig. 3.



Making the incision from the convex side, while the forefinger of the left hand acts as a guard in the opposite nostril.

incision. Difficulty arises if the raspatory passes in between the mucous membrane and the perichondrium, instead of completely underneath the latter. Once freed along its whole length, a dull-edged detacher is used (Fig. 4), and if a good start has been made it is very easy to separate the muco-perichondrium clearly away from the cartilage. The dead white, slightly roughened surface of the latter

should be distinctly visible, and should not be coated with any soft, smooth, or pinkish perichondrium. The stripping up of the convex surface is carried upwards and backwards—where it is easily reflected—as well as downwards, where progress is apt to be arrested by its close adhesion to a cartilaginous spine or bony ledge. If possible, the limits of the convexity should be well passed.

Incision through the Septal Cartilage.

The next step is to cut through the cartilage at the site of the incision, but without incising the mucous membrane of the concave side. If the cartilage has not already been completely cut through, it will, at least, have been scored with the bayonet-knife in the original incision. The

Fig. 4.

Dull-edged perichondrium detacher. The blade is thin and slightly curved.

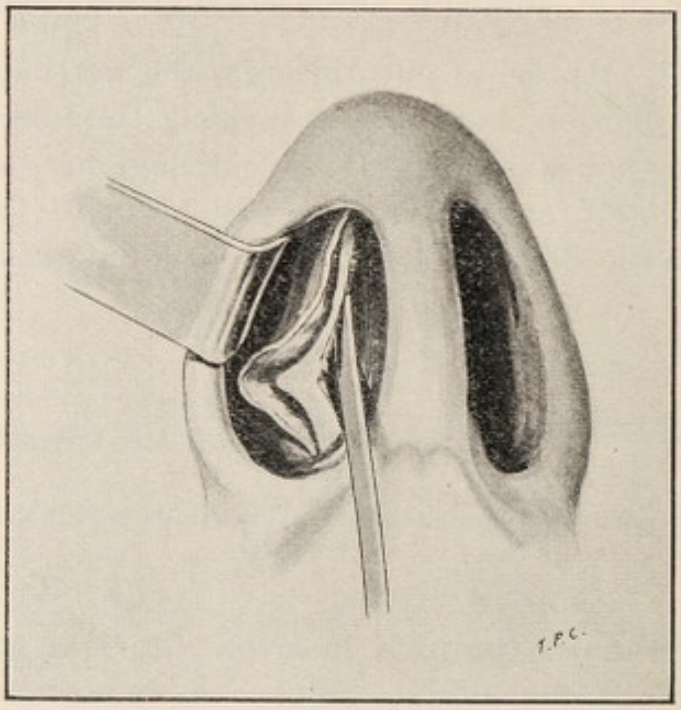
rounded tip of the knife is inserted into this groove and worked to and fro, taking great care not to button-hole the mucous membrane on the concave side. The tip of the left forefinger in the opposite nostril assists by feeling the end of the knife as soon as it has traversed the cartilage. The latter is thus cut through in the same extent as the first incision (Fig. 2).

Raising the Concave Flap.

The sharp elevator is now introduced from the convex side, through the incision in the cartilage, and insinuated between it and the muco-perichondrium lining the concavity. Once started, the operator takes the dull-edged separator, and by carefully hugging the septum all the

time, and observing the same precautions as in raising the convex flap, the membrane lining the concavity can be completely undermined (Fig. 5). But the most troublesome moment is when we reach the depth of the concavity, especially in those cases where a sudden hollow with steep edges is encountered, a condition which I can best describe by comparing it to the inside of a saddle (Fig. 19 *c*). To

FIG. 5.



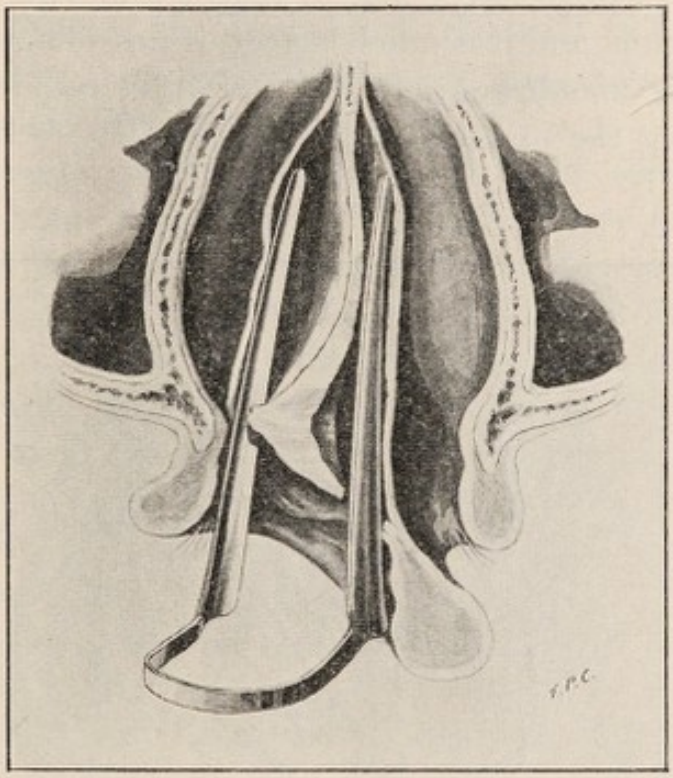
The muco-perichondrium has been raised from the convex side of the septum, and the cartilage has been cut through (from *A* to *B* in Fig. 2). The dull-edged detacher is shown separating the mucous membrane from the concavity of the deflection.

avoid a button-hole at this point a good plan is first to free the mucous membrane well above and below it. If a puncture does occur, it is better not to go on working at that spot, but to leave it until separation has taken place all round it. The point of the instrument can be watched as it manœuvres below the mucosa in the concavity. The separation is carried on until the membrane has been stripped up all over the concavity, and also over any secondary convexity, if the deviation is sigmoid-shaped.

Excision of the Septal Cartilage.

The deviated and denuded septum is now exposed in a pocket whose walls are formed by the detached mucous membrane on each side, and whose mouth opens into the obstructed nostril. The next step is to excise the deviated portion through this opening. The field of operation can

Fig. 6.



Semi-diagrammatic drawing of a transverse section of the nose, viewed from above. The deviated septum has been divided in front, and its muco-perichondrium has been stripped up on each side. The nasal speculum is introduced through the convex nostril, and a blade is inserted on each side of the septum, between it and its mucous covering.

be well exposed by the help of Killian's long nasal speculum. We are so accustomed in this country to Thudichum's speculum that I have had one made with blades two inches long to serve the same purpose. Used through the obstructed nostril, a blade is inserted on each side of the denuded septum, between it and the separated muco-perichondrium (Fig. 6). With a good electric searchlight it is

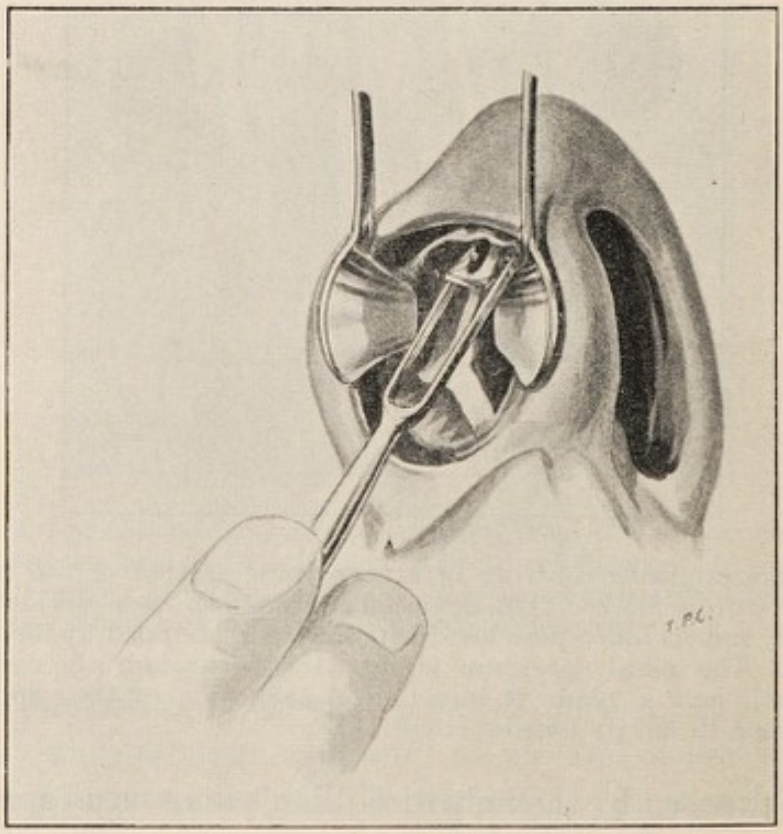
easy to see if the mucous membrane on each side has been sufficiently stripped off. If not, we must return to the

FIG. 7.

Ballenger's swivel septum knife.

raspatory. I have never had to regret removing too much of the septum, and it is much better, if possible, to separate the mucous membrane as far as will be required before commencing the excision of the septum.

FIG. 8.



The method of employing Ballenger's swivel septum knife for cutting out the cartilaginous deviation.

This can be done with a stout pair of narrow scissors, such as Heymann's, supplemented by punch forceps. But this part of the operation is quickly, safely, and completely

carried out by using Ballenger's swivel septum knife[1] (Fig. 7). This is placed astride the anterior, cut surface of the cartilage, pushed upwards and backwards below the roof of the nose, until it comes in contact with the ethmoid; then the cutting surface is directed downwards and backwards to the angle between the perpendicular plate of the ethmoid and the vomer; and, finally, it is pulled forwards along the upper margin of the vomer (Fig. 8). The excised cartilage is lifted out. In this way the main part of the deviation is removed *en bloc*. Some of the pieces thus removed measure one inch by one and a half inches (Fig. 19 *b*).

The empty pocket between the two separated and flaccid mucous membranes is now wiped free of any blood in it, and the two sides allowed to fall together—mucous membrane with mucous membrane. This should hang perfectly plumb in the middle line, and on looking into the formerly obstructed nostril one can see the previously invisible middle turbinal, the whole length of the inferior turbinal (often ill developed from pressure), the anterior wall of the sphenoidal sinus, the levator palati muscle, and the posterior wall of the naso-pharynx.

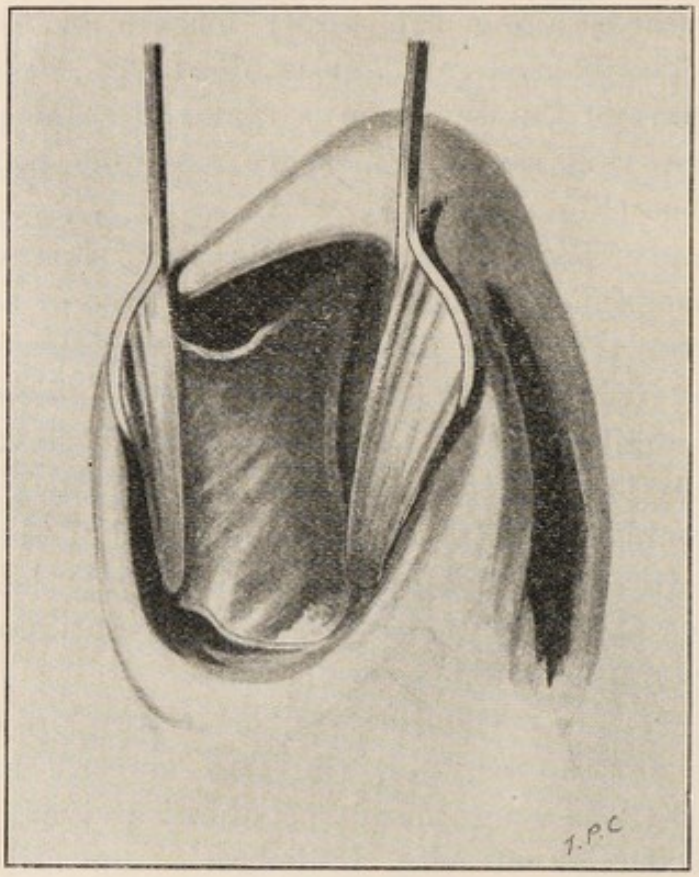
If this view is not quite free, or if any projection is still seen on the septum, the two mucosæ are again separated by the long nasal speculum, and more of the septum is shaved off with Ballenger's septum knife or Ingals' cartilage knife, or clipped away with punch forceps. In doing this portions of the vomer and of the perpendicular plate of the ethmoid are removed. A specimen is shown in which more than forty bits were thus clipped away, even after a bony spur and a large piece of cartilage had been excised. It is well to remember that the fleshy curtain will hang between the upper and lower margins of the gap left in the septum. These margins, therefore, must both be in the middle line, otherwise the membranous septum stretched between them will be oblique or to one side (Fig. 12).

[1] 'The Laryngoscope,' vol. xv, June, 1905, No. 5, p. 417.

Excision of Bony Spurs and Deviations.

If, as is only too often the case, the deviation is accompanied by a bony spur or ledge, the operation is started as already described. Much difficulty is encountered in

Fig. 9.



The deviated septum has been removed. The two flaps of mucoperichondrium are held apart by the blades of the nasal speculum. In the pocket between them are seen the lower edge of the remaining portion of quadrilateral cartilage, and the free edge of the perpendicular plate of the ethmoid passing downwards to the angle where it meets the vomer. Below, and in front of this, is seen the nasal spine of the superior maxilla.

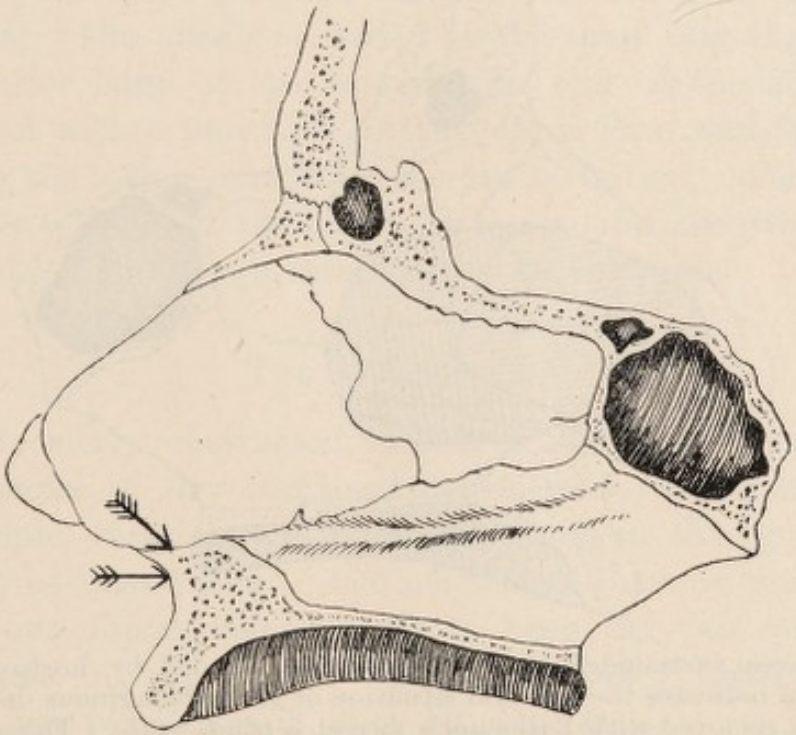
raising the mucosa from an acute, prominent spine, especially if it presses into the opposite inferior turbinal. Killian says that "whoever attempts to separate the mucosa around these corners will perforate as a rule."

It is also frequently a very tedious matter to lay bare any thickening or deviation of the nasal process of the

superior maxilla, or the chondro-vomerine articulation—the usual sites of bony obstructions. Here the periosteum is not only intimately adherent, but also coats over the bone, between it and the nasal quadrilateral cartilage. In such cases freer access is obtained after the removal of the cartilaginous deviation (Fig. 9).

Once well exposed, the maxillary spine is attacked with strong punch forceps or chisel, and as pieces of it are prised up they are twisted off with forceps (Fig. 10). A

FIG. 10.



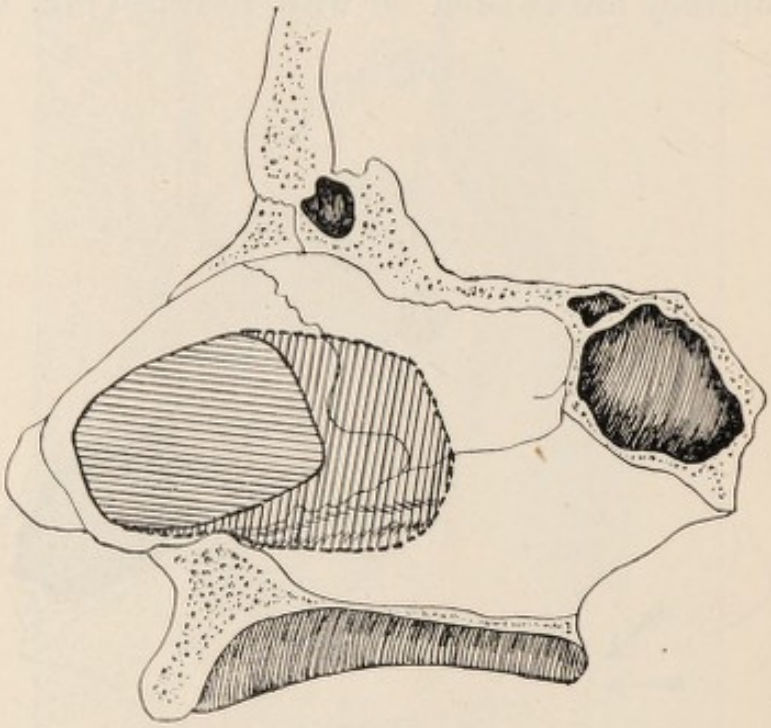
The arrows indicate the points where the chisel may be applied when exostosis of the nasal maxillary spine requires removal.

bony spur on the vomer has sometimes to be followed back nearly to the posterior choana (Case 21), and the vomer is often so curved over into the obstructed nostril that it lies parallel and close to the floor of the nose. A great deal of the success of an operation depends on the complete removal of these spurs and ledges of bone, and this part of the operation, in many instances, is both the most necessary and the most difficult. Not infrequently the removal of part of the quadrilateral cartilage is little

more than the preliminary step to the main object in view.

Success depends on carefully separating the muco-periosteum from the maxillary spine (if prominent), and then removing the latter so as to bring any vomerine deformity into view. The perichondrium must be separated from each side of the vomer right down to the floor of the

FIG. 11.



The area surrounded by a dark line and shaded by horizontal lines indicates the size and situation of the cartilaginous deviation removed with Ballenger's swivel septum knife. The area shaded with vertical lines, and surrounded with a dotted line, consists of cartilage and bone, which are removed with punch forceps and chisel.

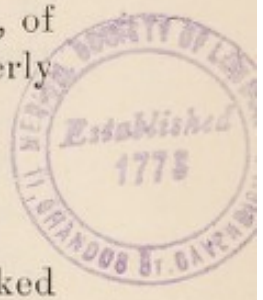
nose. Deformities of the vomer ascend as the deeper regions of the nasal cavity are reached, and, fortunately, the vomer is apt to be thinner just below any exostosis. Hence, if the bone is chiselled or punched just below a projection, it is at once freed and can be lifted or twisted out.

When a completely vertical and smooth fleshy septum has been thus secured, and the formerly obstructed nostril is seen to be quite free, the pocket is carefully wiped out

with sterile gauze, and care is taken that no chips of bone or cartilage are left in between the two flaccid mucosæ (Fig. 11).

Stitching the Wound.

The original wound is now closed with one or two stitches. A very small Trélat needle is armed with finest cleft-palate silk (No. 000), and while an assistant holds the nostril open with a retractor the edge of the posterior flap is seized with a small pair of dissecting or toothed forceps, and then traversed with the threaded needle from behind forwards. The needle is carried in the same way through the anterior edge of the wound, one end of the silk is pulled out with a fine hook, the needle is then withdrawn, carrying the other end, and the stitch is tied. Care, of course, is taken that the edges of the wound are properly affronted. One or two stitches may be required.



The Dressing.

The formerly obstructed nostril is now lightly packed with pencils of dry sterilised cotton-wool, well smeared with simple vaseline. One or two plugs in the opposite side may be introduced. The nose should not be plugged tightly, our object being simply to keep the two mucous membranes in apposition. In some cases I have done without any plug (Nos. 3, 4, 9, 10, 11, 14).

After-Treatment.

The patient rests quietly for the remainder of the day, sips some iced drink, and keeps an iced cloth across the bridge of the nose. A little blood-stained oozing is best met by ice-water ablution to the face and neck. I have never had any secondary bleeding requiring attention. Cotton-wool, dipped in cold boracic lotion, is used for wiping out the blood which dries in the vibrissæ and causes discomfort to the patient.

Next day the plugs are partly or entirely removed, and a smaller one may be left for another twenty-four hours. The patient can go out or resume his work. The septum may look somewhat swollen and the nose be more or less obstructed for a few days. During this time he must not blow his nose, but should suck any blood-stained mucus backwards into the naso-pharynx and then hawk it up. Relief from the obstruction can be obtained by spraying the nose with liquid vaseline, or introducing a piece of menthol and boric ointment into each nostril morning and evening.

At the end of three or four days the swelling of the fleshy septum subsides, and the stitches are removed. In seven to ten days the patient begins to enjoy the benefit of the operation, but it is often only after three weeks that the full advantage of it is established.

After-Condition.

It is frequently asked if cartilage is re-formed between the two mucous flaps. Two of my cases (Nos. 2 and 3), which were operated on two and a half years ago, have recently been examined, and although some solidification has taken place in the fleshy septum, it is still seen to quiver like the sail of a boat when the patient sniffs quickly through one nostril.

K. M. Menzel was able to submit a piece of the fleshy septum to histological examination two and a half months after the quadrilateral cartilage had been resected.[1] Both flaps of mucous membrane were intact and united together by connective tissue, but there was no trace of re-formation of cartilage. This is what we would expect from the researches of Paget on the processes of repair.[2] He pointed out that there are no instances in which a lost portion of cartilage has been restored, or a wounded portion repaired, with new and well-formed permanent

[1] 'Archiv f. Laryngologie,' Bd. xv, 1904, S. 54.

[2] 'Lectures on Surgical Pathology,' London, 1863, p. 195.

cartilage. Even the preservation of the perichondrium does not secure the re-formation of cartilage, as is shown by a case of wounded thyroid cartilage which Paget examined several years after complete healing. A layer of tough fibrous tissue united the gap, but there was no appearance of a renewed growth of cartilage. Similar results were arrived at by Redfern in incised wounds of the articular cartilages of dogs.[1] Paget points out that in membraniform cartilages that have a perichondrium the healing process is probably in some measure modified, a reparative material being furnished, at least in part, from the perichondrial vessels. Hence the importance, in this operation, of carefully preserving the perichondrium, not only in facilitating the technique, but also in contributing to a firmer, fibrous, fleshy septum.

Occasionally, while delighted with the free air-way through the formerly obstructed nostril, the patient complains that the side which used to be his best is no longer so free. This is due to the fact that compensatory hypertrophy of the inferior turbinal had taken place in the only acting nostril. When the formerly concave septum is rendered vertical, the passage is proportionately narrowed (Fig. 12). This can be corrected subsequently by removing some of the redundant turbinal.

Some of the difficulties apt to be met with may be briefly referred to :

Insufficient illumination is one that can be provided against.

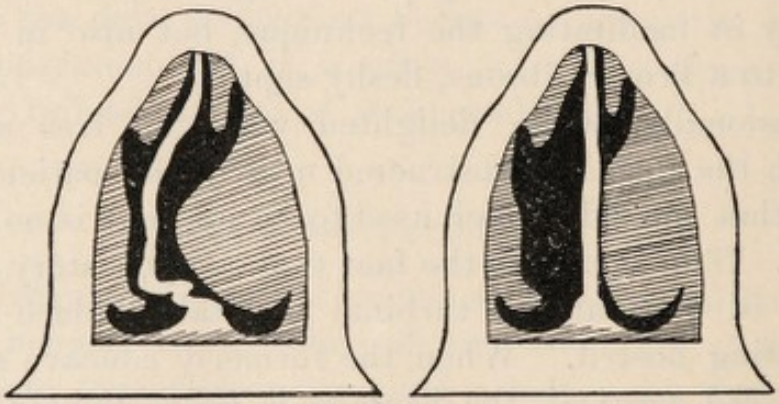
Anæsthesia.—Many operators advise a submucous injection of cocaine and adrenalin. Killian employs four drops of adrenalin in 2 c.c. of a ½ per cent. solution of cocaine. One c.c. of this is used on each side, and fifteen minutes are allowed to elapse to secure its full effect.[2] I have found that the making of this injection is apt to

[1] 'Abnormal Nutrition in Articular Cartilages,' Edinburgh, 1850. And "On the Healing of Wounds in Articular Cartilages," in the Monthly Journal of Medical Science,' Sept., 1851.

[2] 'Archiv f. Laryngologie,' Bd. xvi, S. 362.

unnerve the patient; it gives rise to palpitations and uncomfortable sensations; and it often starts a little troublesome bleeding at the point of injection. If the cocaine and adrenalin are applied to the surface, as I have described, the operation is remarkably painless. Athough the procedure is naturally uncomfortable, it is not more so than a prolonged dental treatment, and most patients have expressed more sympathy for the strain on the operator than complaint for themselves. In an uncomplicated deviation there is no pain. The disagreeable cases are those in which a bony ledge has to be chiselled

FIG. 12.



Diagrammatic transverse section of the nose. Shows the compensatory hypertrophy of the inferior turbinal in the unobstructed nostril. Part of this frequently requires removal after the septum has been straightened.

out a long way backwards; the pain of clipping and twisting out pieces of bone cannot be quite deadened with cocaine. Only two patients complained of the pain; they were very nervous subjects. All the others agree that it was trifling or entirely absent, and that they only regretted their unnecessary fears of anticipation. Five cases were operated on under chloroform. Four of these were the first I performed, before I had sufficient confidence in the effect of local anæsthesia. The fifth case (No. 18) insisted on chloroform.

Hæmorrhage presents no difficulty. In some cases only a few drops of blood are lost, and in none did any run backwards into the pharynx during the operation.

The incision.—In one case I tried the incision from the concave side, but found it so much more difficult that I abandoned it. The one incision is sufficient. In a few cases, with very sharp, low-lying spurs, I have found that I had, involuntarily, carried the lower extremity horizontally backwards, so as to resemble an "L" facing backwards.

Raising the perichondrium.—The importance of this has been referred to. In two cases (Nos. 25 and 29), as will be seen from the specimens, I found I had separated the mucous membrane, but left the thin white perichondrium attached. No puncture was made, and no harm resulted, but it is important to avoid this difficulty.

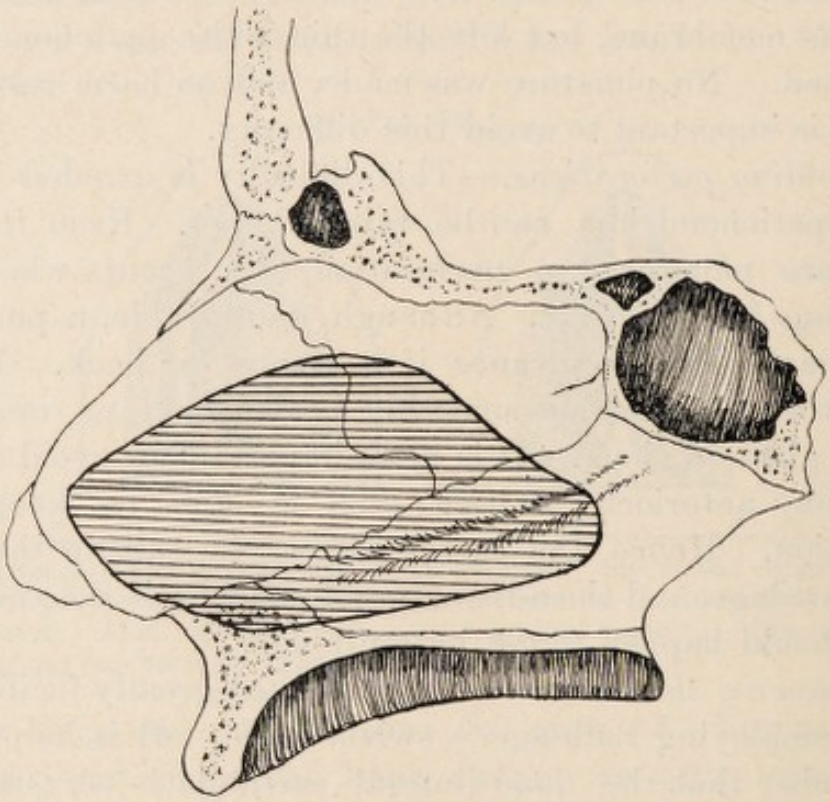
Avoiding perforations.—This difficulty is avoided if one muco-perichondrium can be raised intact. Even if both flaps are punctured, a perforation only occurs when the openings are *vis-à-vis*. Although undesirable, a perforation causes no annoyance if it occurs far back. I find that the margins are smoothly healed, and no crusting takes place in them. It is more important to avoid a perforation anteriorly, where dust is apt to keep up irritation. Hence the care requisite in cutting through the cartilage, and the advantage of stitches, if the concave flap should happen to get button-holed.

Removing the septum.—This has been greatly facilitated since employing Ballenger's swivel knife. It is helpful to remember that the quadrilateral cartilage is very thin in front, but that it may be as much as 5 mm. in thickness far back. The perpendicular plate of the ethmoid is as thin as paper, and very brittle. The vomer is apt to be thickest at its junction with the quadrilateral cartilage. The nasal maxillary spine is not only very stout, but it bleeds readily.

Previous operations.—These may greatly increase the difficulties. In one case (No. 16) an adhesion between the convexity and the inferior turbinal, left by treatment, had first to be separated; and then, in undermining the flap on that side, I found that the cartilage had been

quite cut through in one point by a previous operation (Fig. 19, *a*). Although the mucous membranes of the opposite sides of the septum were stuck together in this area, I succeeded in separating them. In another case (No. 19), where the same complication had been left, the mucous membrane of the convexity was torn in separating it from that of the concavity (the intervening cartilage having been "shaved off" in previous treatment). No

FIG. 13.



The shaded area indicates the extent of bony and cartilaginous septum usually requiring removal.

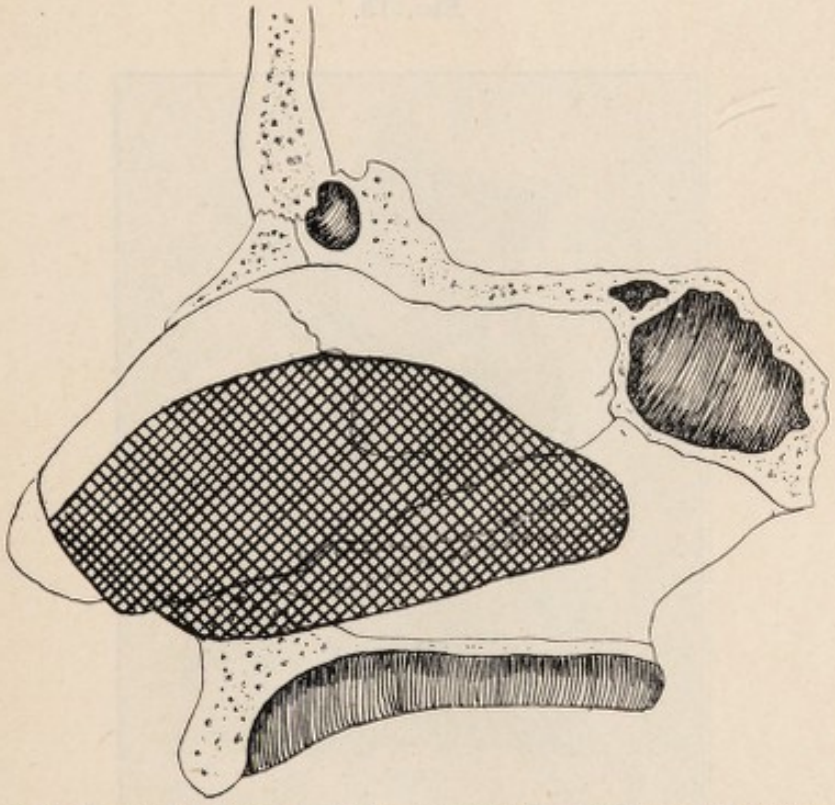
perforation was left, but the healing was delayed by scab-formation.

Stitches.—In my earlier cases much time was spent over the stitches, and I experimented with various needles and needle-holders before adopting the one recommended. Some operators have abandoned stitches owing to the time and trouble entailed, the tendency to tear the flaps, and because a plug is sufficient to keep them in place. I find that the stitches described can be readily inserted, allow

of lighter packing, and secure healing by first intention. I have tried some cases (Nos. 2, 19, 20) without any, and found that granulations were apt to spring up between the edges. Finally, if the concave flap is punctured anteriorly, stitching is most important to avoid a button-hole.

The objections which may be raised against this operation can be stated and answered as follows:

FIG. 14.

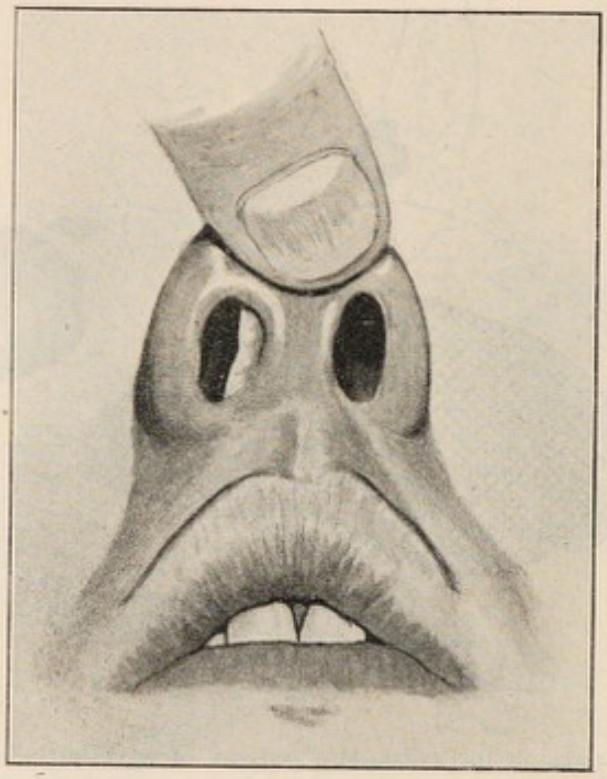


The shaded portion indicates the extent of cartilage and bone removed in marked deformity, with deflection of the free end of the quadrilateral cartilage into one nostril, as in Case 21.

(1) *That the excision of a large part of the septum may lead to flattening or deformity of the nose.*—This objection is groundless. We know that the end of the nose does not fall in, even when a large perforation has been made in the septum. Saddle-nose deformity is usually brought about by the retraction of inflammatory scar-tissue (generally syphilitic or after external traumatism), or when the whole septum is destroyed. In the above operation a strip of the septal cartilage is always left

above, beneath the crest of the nose, and generally another strip below behind the septum cutaneum. It is because of this that the method is called in Germany the *Fensterresektion.* A "window" is taken out of the cartilaginous and bony septum, but the window-frame all round is left intact. Even this is not necessary, for the cartilaginous septum was removed in several of my cases (Nos. 8, 17, 18, 20, 21, 28, 30) right down to its free

FIG. 15.



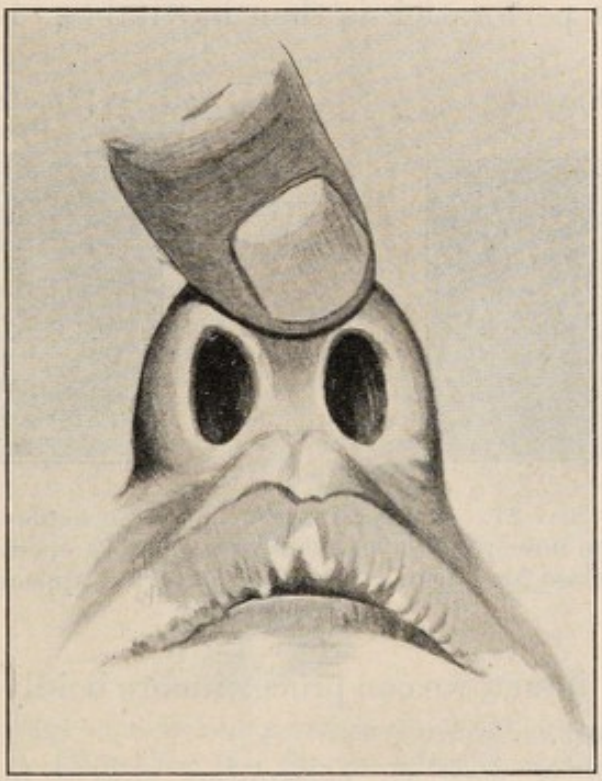
From Case 8. Displacement of the free end of the quadrilateral cartilage into one nostril.

border, and yet the tip of the nose has not collapsed (Fig. 14). Indeed, this operation is quite the best for the deformity known as "displacement of the septum into one nostril." Fig. 15 shows this condition in a girl aged 15, in whom the operation was done in December, 1904, and there is now no external disfigurement (Fig. 16). On the contrary, the external appearance of the nose is always improved by the operation. It is difficult to show this

in photographs, as an improvement in appearance often depends on very slight alterations, but all my patients are satisfied that the appearance of the nose has been altered for the better (Figs. 17 and 18). Finally, there is the convincing proof that in none of my thirty cases has there been any falling-in or disfigurement, although two of them were operated on two and a half years ago.

(2) *That the operation entails greater risks from any*

Fig. 16.



Case 8, after operation.

subsequent blow on the nose.—This objection has been met by the experience of Otto T. Freer in four of his cases where severe blows, causing epistaxis and occurring even within a week of operation, did not result in any damage to the fleshy septum, nor to the external appearance of the nose.[1]

(3) *That the operation is long and tedious.*—In cases limited to the cartilage, the deviation can be excised and

[1] 'Annals of Otology, Rhinology, and Laryngology,' June, 1905.

the operation completed in twenty minutes. But when bony spurs and ledges are met with, most writers agree that we require an hour, and many of them vaguely add "and even more." [1]

In my earlier cases I have spent three hours over the operation, but now less than half that time is sufficient. Time is often taken up in waiting for fresh applications of cocaine and adrenalin to act, and the operation is prolonged if one flap happens to be button-holed. It is highly important not to get two button-holes *vis-à-vis*, as a permanent perforation is then inevitable. If one mucosa

FIG. 17. FIG. 18.

FIG. 17.—Case 21. A pencil mark has been made on the skin of the nose to show the deformity before operation.
FIG. 18.—Case 21. Shows improved external appearance after operation.

is separated intact, we can proceed more boldly and quickly with the other.

Besides, it is well to remember that "les opérations succédent d'autant mieux qu'elles sont moins nécessaires."

[1] "The average time for my operation is at least three quarters of an hour to an hour." Otto T. Freer, 'Annals of Otology,' June, 1905.

"The one and one half hours required." Leon E. White, 'Boston Medical and Surgical Journal,' April 21st, 1904.

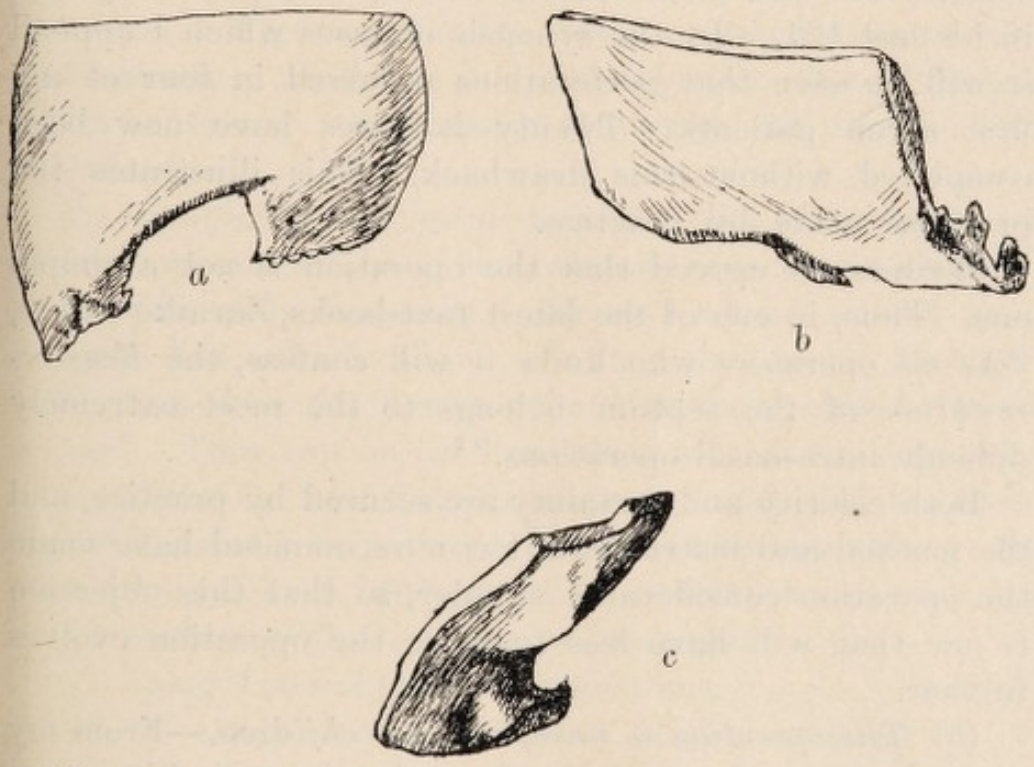
"When bone needs removal, the operation is long, from one to two hours." A. Coolidge, Jun., 'Boston Medical and Surgical Journal,' February 2nd, 1905.

"The operation may take as long as two and a half hours." Felix Cohn, 'The Laryngoscope,' xiv, July, 1904, p. 556.

"The operation lasts from one to three and a half hours." Stepanov, 'Revue hebd. de Laryngologie,' xxv, 1904, ii, No. 31, p. 143.

This operation is especially suitable for forms of septal deformity which are the most severe, and therefore the most in want of operation. Some surgeons may snatch a fleeting reputation for celerity by treating the slight cases only. I began by reserving this operation for very bad cases, and in view of the satisfactory results have lately extended it to the milder ones. Beginners are also apt to

FIG. 19.



Life-size drawings of removed portions of deviated quadrilateral cartilage. *a*. From Case 16. Shows defect in cartilage from a previous operation, in which the prominent portion had been shaved off. *b*. From Case 13. Shows the thickness of a large deviation. *c*. From Case 21. Shows the saddle-shaped deformity of a very irregular deviation.

be content with an incomplete operation, one which simply frees the obstructed nostril. But when the shrinkage of the soft parts induced by the cocaine has passed off, it will be found that the patency is never so good as at the time of operation; and the results are unsatisfactory unless all obstructions are completely removed so as to leave a straight passage, open right back to the naso-pharynx and from the olfactory cleft above to the floor of the nose

below. Incompleteness of removal must not be sacrificed to rapidity, particularly in this operation, for it would be extremely difficult, and in some cases quite impossible, to separate the two mucous membranes at a later period for further treatment. (Compare Cases 16 and 19.)

(4) *That the operation requires special skill.*—The technique is a little difficult to acquire.[1] Perforations appear to be inevitable in the earlier cases of every one. Thus, Freer had six in his first fifteen cases, but only five in his last 101. In the synopsis of cases which I append it will be seen that perforations occurred in four of my first seven patients. Twenty-six cases have now been completed without this drawback. This illustrates the progress made by practice.

Writers are agreed that the operation is not a simple one. Thus, in one of the latest text-books, Zarniko writes, "As all operators who know it will confess, the *Fenster-resektion* of the septum belongs to the most extremely difficult intra-nasal operations."[2]

Both celerity and certainty are secured by practice, and the method and instruments I now recommend have made the operation considerably simpler, so that this objection is one that will have less force as the operation evolves further.

(5) *The operation is unsuitable for children.*—From my own experience I would say that it is not a suitable operation for children or young people much under seventeen years. Before that age the nasal chambers are so small that the technical difficulties are greatly increased, and it is possible, though not very likely, that it might prevent the full development of the nose. Besides, it would have to be carried out under a general anæsthetic. Killian advises that, as a general rule, children younger than twelve

[1] "In submucous resection . . . *a great deal more technical skill and dexterity* are demanded which many who treat the nose will probably never have the patience to acquire." L. H. Pegler, 'Brit. Med. Journ.,' November 4th, 1905, p. 1202.

[2] 'Die Krankheiten der Nase,' 1905, p. 300.

are not fit subjects for this operation. Otto T. Freer, however, is of opinion that the operation is proper for children at all ages, although with them the deformity tends to recur unless every vestige of it has been removed. E. Mueller has performed the operation successfully in three children under ten; one of them, indeed, was only six years old.[1]

(6) *The armamentarium is large and expensive.*—This was an undeniable objection when I first practised this operation. Freer's complete outfit contains over twenty instruments. Killian's has the objection that different instruments are required for the right and for the left nostril.

By combining the good points in the instruments of various operators I have been able to reduce and simplify those absolutely necessary. Those I advise all act in a straight line, which allows of finer and more accurate work than those fitted with a shank at the so-called "nasal angle." They can be used on either side of the septum.

Doubtless in time further improvements will be made and will greatly help in popularising the operation. At present my list of instruments is as follows:

(1) Ordinary Thudichum nasal speculum.

(2) Long Thudichum nasal speculum.

(3) A sharp bayonet-handled knife, cutting for a quarter of an inch all round the point, for dividing the mucous membrane and quadrilateral cartilage.

(4 and 5) Sharp and dull-edged separators. I agree with Freer that these should be thin-edged and narrow, so as to work round sharp angles and into deep concavities.

(6) Ballinger's swivel cartilage knife.

(7) Hartmann's punch forceps with solid male blade.

(8 and 9) Hammer and chisel.

(10 and 11) Needle and a fine hook.

(12) Freer's or Jansen-Middelton forceps.

The **advantages** of this operation may be summarised as follows:

[1] 'Archiv f. Laryngologie,' Bd. xv, 1904, s. 312.

(1) No general anæsthetic required.

(2) No hæmorrhage.

(3) Absence of pain and shock.

(4) No reaction. The post-operative temperature seldom rises above 99° F.

(5) Absence of sepsis, with its possible extension to ears, sinuses, or cranial cavity.

(6) No splints required and no plugs after forty-eight hours.

(7) Rapid-healing, without crust formation.

(8) No risk of troublesome adhesions.

(9) Short after-treatment.

(10) Speedy establishment of nasal respiration.

(11) Suitability for all deformities of cartilage or bone in the septum requiring treatment.

(12) The space gained is not only that resulting from a vertical septum, but the extra room secured by removal of the cartilage, which is sometimes one eighth of an inch in thickness.

(13) No ciliated epithelium is sacrificed.

(14) Accuracy of result can be depended on, and the prognosis is, therefore, the more definite.

(15) Improved appearance of the nose externally.

The **contra-indications** of submucous resections:

(1) Elderly people are so accustomed to their nasal obstruction, and its secondary consequences are generally so fully established, that the benefits would be much less marked than earlier in life.

(2) The question of its indication for children has been considered under the section of "Objections" (page 26).

(3) Serious or progressive organic disease. This does not apply to healed tuberculosis. In Case No. 11 the patient had been advised to consult me after leaving a sanatorium. The operation was performed ten months ago; the result was entirely satisfactory, and lately the patient reported that he was keeping well and free from symptoms.

(4) Active syphilis.

(5) Lupus. A case of healed lupus of the larynx had a marked deviation into one nostril and displacement of the lower end of the cartilage into the opposite. I put her name on my waiting-list of patients, but when admitted a few months later apple-jelly infiltration had commenced on each side of the septum. The operation was therefore cancelled.

(6) The operation should be postponed if the patient shows any symptoms of influenza or acute or infectious catarrh.

The **special indications** of this operation would appear to be :

(1) Cases where it is desirable to establish normal nasal respiration and remove mouth-breathing, with its numerous consequences.

(2) Correction of the disfigurement caused by the lower end of the quadrilateral cartilage projecting into one nostril.

(3) Cure of reflex neuroses of nasal organ.

(4) Relief of Eustachian catarrh.

(5) Facility of treating nasal polypi and affections of the accessory sinuses. In two cases (Nos. 2 and 3) the polypi could not be attacked until the septum had been straightened, and in one of these the ethmoidal labyrinth required free removal. As with this operation a deviation can be followed high into the roof of the nose, it is particularly indicated when drainage or treatment of the frontal or anterior ethmoidal cavities is required (Case 25).

History of the operation.—It is difficult to settle the paternity of this operation. An entire article on this point has recently beon contributed by Suckstorff, who traces the principles of it back to Heylen in 1847.[1]

For those who wish to refer to the matter, I have added in an appendix some of the bibliography. As at first designed the mucous membrane on one side was removed together with the septal deformity, leaving only the mucosa of the opposite side to act as a septum. This entailed a

[1] 'Archiv für Laryngologie,' Band xvi, 1904, S. 355.

long convalescence, during which crusts formed and required careful attention. When healed, the surface did not leave the even, moist, slippery surface secured by the present method.

As I have described it, the operation is in most respects similar to the one carried out by Professor Killian.[1]

Conclusion.

The increasing satisfaction with this operation, which has come with extended practice, has encouraged me to prefer it in the majority of septal deformities calling for interference. It is possible in some cases to avoid operation on the septum by directing attention to other points in the nose. For spurs and ledges in a more or less vertical septum—a rare condition—this operation is unnecessary. Deviations, if limited to the cartilaginous septum, may be partially corrected by the more easily executed operations of Asch and Moure.[2]

But for all other forms of deviation, and for combinations of spurs with deviations, the operation above described will be found the most satisfactory.

Epitome of first Thirty Cases.

Case 1.—Captain I. C—, aged 35. Complained of obstruction of both sides of the nose for ten years; some anosmia. Has an attack of bad earache on right side, followed by discharge, about twice a year. Nasal voice. Large deviation occluding right nostril, with tip of nose tilted to left. Weight, 8 st. 9 lb.

October 5th, 1903.—Operation. Submucous injection of cocaine and adrenalin. Chloroform. A button-hole

[1] 'Archiv für Laryngologie,' Band xvi, 1904, S. 362.

[2] "Few, if any, of the Asch operations result in a perfectly smooth outline of the septal surface, and in quite a number of instances subsequent operation for the removal of spurs or spines is necessary." Harmon Smith, 'The International Journal of Surgery,' December, 1904.

was made on concave side. Gauze plugs. Duration of operation, one hour and twenty minutes.

The button-hole for the first week appeared to be filled up by mucous membrane of opposite side, but at the end of that time it was seen that a small puncture must also have occurred on the convex side, and as these openings were *vis-à-vis* the perforation was permanent.

November 13th.—Septum in middle line; margin of perforation healed, and as it is far back in nose it causes no symptoms. Free respiration through both nostrils. Friends notice his nose is straighter. Sense of smell "distinctly better." Weight 9 st., which it has not been for some years.

Case 2.—Mr. F. D. B—, aged 29, sent by Dr. Sangster for nasal obstruction, snoring, and disturbed sleep for ten years. No ear trouble.

Voice thick and nasal. Deviation and spur in right nostril, which is so occluded that no air passes through it during inspiration or expiration. He can only get a little air in by sniffing hard and expel it by raising the right ala nasi with his finger. Sense of smell very slight, no cacosmia.

Some polypi were first removed on the right side.

Operation.—November 4th, 1903. Chloroform. Submucous injection of cocaine and adrenalin. No perforation, though the right flap was somewhat damaged as the bony spur lay so close to floor of nose. After removal of obstruction more polypi came into view on right side and were removed. Attempts to stitch wound failed; plugs of iodoform gauze both sides.

Duration of operation, two hours.

May 6th, 1904.—Patient shown at Laryngological Society of London (*vide* 'Proceedings') with fleshy septum quite vertical in middle line and the result pronounced to be "ideal."

March 1st, 1906.—The patient sleeps quietly through the night with his mouth closed; the voice and sense of

smell are improved. The external nose is, if anything, slightly improved in appearance. The patient states that it feels "quite firm," but though the septum is vertical and looks firm, it still quivers on sniffing.

Case 3.—Mr. A. C. S—. aged 26. Complained of always being blocked in the nose, although his adenoids had been removed at the age of sixteen, and he had recently had his nose cauterised.

Deviation and spur in left nostril, buried in the inferior turbinal, and occluding all view of the middle turbinal. Nasal maxillary spine very marked in right nostril. Patient can never blow his left nostril, which he, therefore, has to clear by hawking out through his mouth. Mouth-breather at night and on any exertion. Chronic pharyngitis and laryngitis.

Operation.—December 5th, 1903. Chloroform. Submucous injection of cocaine and adrenalin. Spur had to be followed far back along vomer, and much time and labour were required to remove the right maxillary nasal process. A puncture occurred in the deepest point of the concavity, but was quite filled up by the intact convex flap. Three silk stitches, no plugs.

Duration of operation, three hours.

Subsequently, as patient complained of obstruction in the right (the formerly most patent) nostril, the lower border of the hypertrophied inferior turbinal was removed. After removal of the obstruction on the left side some pus and polypi came into view and a carious condition of the ethmoid had to be attended to.

May 6th, 1904.—Patient was shown at the Laryngological Society (*vide* 'Proceedings').

March 1st, 1906.—The fleshy septum still quivers on inspiring quickly, but is quite straight in the middle line. Free nasal respiration. Sleeps with mouth closed. No pharyngitis. Friends notice improved appearance of nose.

Case 4.—N. K—, referred to me by Dr. Percy Lewis,

was a boy, aged 13, on whom I should have preferred to defer operation, had it not been that his admission to the Royal Navy was threatened by his being a mouth-breather. This was due to complete blockage of the right nostril by a deviation with a sharp spur on it.

Operation. December 31st, 1903. Chloroform by Dr. Bousfield. No plugs. Two stitches. A perforation the size of a small bean was left, but a perfectly clear air-way was secured.

Case 5.—Norman H—, aged 19. Very crumpled septum, from a blow which had depressed the cartilaginous part of the bridge of the nose.

April 19th, 1904.—Operation under cocaine and adrenalin applied on surface. Perforation.

March, 1905.—Free nasal respiration. Perforation far back, with smooth edges, quite free from crusts and causing no inconvenience.

Case 6.—Mr. H. S. D—, aged 20, a student in King's College. Injury to nose seven years previously. Constant mouth-breather. Snorer. Short-winded when running or dancing. Left nostril entirely occluded by large deviation and spur, so that no part of the inferior or middle turbinal is visible.

Attempt to operate from concave side, under chloroform, was not successful, owing to difficulty of working round such a deep depression.

August 30th, 1904.—Operation after application of cocaine and adrenalin. One puncture in concave flap was filled up by integrity of convex. One stitch. Light packing of cotton-wool and vaseline in left nostril.

September 5th.—Septum plumb in the middle line and verified by Dr. Bryan, of Washington.

March 10th, 1906.—Patient writes: "I do not snore now. I believe I sleep with my mouth closed. My wind is greatly improved. I believe the appearance of the nose is improved—*i. e.* it is much straighter."

Case 7.—Miss L. C—, aged 28, referred to me by Mr. W. Rose. Complete obstruction of left nostril by deviation and sharp spur.

October 19th, 1904.—Operation under cocaine and adrenalin, applied to surface only. On the right side the concavity was so deep that a perforation took place, which, unfortunately, was opposite a puncture over the prominent spur. Free respiration, and no annoyance caused by perforation.

Case 8.—Miss L. D—, aged 15 and 3 months. Complained of mouth-breathing and tenderness of "bone in right nostril." Mouth-breather, day and night. Free end of quadrilateral cartilage displaced into right nostril (Fig. 15).

October 7th, 1904.—Some adenoids removed.

December, 1904.—Resection under cocaine applied locally.

March, 1905.—Free respiration (Fig. 16).

Case 9.—E. W—, aged 25, a lay clerk in the cathedral, was sent by Mr. C. Wace, of Winchester. He complained of nasal obstruction and its interference with his singing. He had been treated elsewhere with "hot wires" and the removal of "pieces of bone" from his nose.

An antero-posterior sigmoid deviation rendered both nasal chambers very narrow. High-arched palate, chronic pharyngitis, and laryngitis. Some pus-secreting adenoids were first removed.

July 16th, 1904.—Operation. Superficial application of adrenalin and cocaine. Duration, one and a half hours. Two stitches. No plug. Removed septum found to be one eighth of an inch thick.

July 19th.—Returned home.

October 8th.—Mr. C. Wace reports "his nose is a great success, and he is most pleased. He has excellent breathing space."

March 4th, 1906.—Patient writes, "I have very little trouble in the way of catarrh, and the improvement in my voice is quite noticeable."

Case 10.—Mr. N. P—, aged 19, a medical student, referred to me by Dr. G. A. Hamerton. Always blocked in the nose, and a constant mouth-breather. Diffuse deviation to the left, through which he inspired a very little with much difficulty; no view of inferior or middle turbinal on that side.

November 26th, 1904.—Application of cocaine and adrenalin. Concave flap punctured, but no perforation left, as the convex flap was intact. Two stitches; no plugs.

October 17th, 1905.—Clear view through left nostril to posterior pharyngeal wall. Can run a mile with mouth closed, and formerly could not do it even with mouth open. Sleeps with mouth closed. Volunteered statement that he feels increased capacity for mental as well as physical activity. The septum no longer flaps, and between the fingers it feels thickened.

Case 11.—Mr. R. B—, aged 26, was sent to me by Dr. A. Bousfield in May, 1904, for nasal obstruction on both sides. I applied the cautery to the right inferior turbinal and removed the anterior end of the left.

In August, 1904, patient had hæmoptysis, and tubercle bacilli were found in sputum. He went to a sanatorium for five months; bacilli and temperature disappeared, and he then carried out an after-cure. As he was still a mouth-breather at night, and was subject to "sniffing catarrhs," he was advised to have his nasal obstruction more completely removed.

May 22nd, 1905.—Cocaine and adrenalin on surface. Duration of operation one hour and twenty minutes, chiefly occupied with nasal process of superior maxilla. Two stitches, no plug. The removed septum was very thick. No perforation. Restoration of free nasal respiration.

Case 12.—J. M—, a male, aged 17, stated he could breathe freely through nose before receiving a blow on it five years previously. Is an engineer, and much exposed to dust.

Mouth-breather at night. Could not inspire at all through right nostril, owing to a large deviation with a long ascending spur on it. Complains of bad taste in mouth every morning.

June 3rd, 1905.—Cocaine and adrenalin on surface. The depths of the concavity were very acute-angled, and examination of the removed cartilage shows that part of the perichondrium was left on it at this point. No perforation; two stitches; plug twenty-four hours.

October 27th, 1905.—Patient shown to Clinical Society.

March 6th, 1906.—Sleeps quietly. No bad taste in morning. Free nasal respiration.

Case 13.—Mr. A. E. W—, aged 32, complained of winter cough and expectoration, and mouth-breathing at night. Typical facies of neglected adenoids, high narrow nose, high arched palate, and crowded teeth. A small amount of adenoids was removed.

June 21st, 1905.—Cocaine and adrenalin applied superficially. A small puncture was made in furrow-like hollow of concave side, but no perforation occurred, as the convex flap had been peeled off intact. Large cartilage removed in one piece (Fig. 19 *b*). Deviated and thin ethmoid and vomer clipped away. Naso-maxillary crest chiselled off. Three sutures. Cotton-wool and vaseline plugs. Duration of operation, one hour and ten minutes.

October 27th, 1905.—Patient shown to Clinical Society.

March, 1906.—The septum is intact and plumb in the middle line; it still quivers when he inspires quickly. Free nasal respiration. Sleeps with mouth closed. No winter cough.

Case 14.—Mr. F. W—, aged 25, referred by Dr. G. A. Hamerton. Complained of bleeding and crusting in right nostril, obstruction in left, inability to lie on right side,

and mouth-breathing at night. Could only inhale a trifling amount of air through left nostril, owing to large deviation and long, low spur. Large concavity on right side of septum, nearly all occupied by an abraded, bleeding ulcer. Above this concavity the septum is convex into the upper part of right nostril, and below there is a marked naso-maxillary process.

June 26th, 1905.—Cocaine and adrenalin applied to surface. A puncture occurred in the deepest part of concave flap. After clearing spur on left side a second limited spur was found far back on left side, imbedded in the inferior turbinal. An attempt to resect this submucously led to an oval puncture about half an inch long. But as these two punctures were not *vis-à-vis*, no perforation was left. The cartilaginous septum was easily removed, but the vomer was so hard that it required chisel and hammer, the ordinary bone forceps making no impression on it. Two stitches; no plugs. Duration of operation one and a half hours.

July 25th, 1905.—No epistaxis or crusting; can sleep on either side. Sleeps and cycles with mouth closed. Free nasal respiration, but it is now seen that more of the deviated vertical plate of the ethmoid above and of the nasal maxillary spine below might have been removed.

October 27th, 1905.—Patient shown to Clinical Society.

Case 15.—Mr. A. E. B—, aged 18, complained of nasal obstruction and his "dead voice," which threatened to interfere with his career as a student interpreter. Adenoids had been removed four years previously, and two years ago an operation had been performed on his nose, in both instances without relief. Trifling respiration through left nostril owing to deviation and ascending spur imbedded in inferior turbinal.

September 21st, 1905. — Cocaine and adrenalin to surface. No perforation. Very thick cartilage, and spur more marked as it went deeper. Two stitches. Vaseline plugs. Some blood-stained oozing for three days.

October 10th, 1905.—Quite free nasal respiration on both sides. Patient returned to Continent three weeks after operation.

Case 16.—Mr. A. C—, an actor, aged 23, complained of nasal obstruction for at least ten years. Mouth-breather at night; throat parched in morning; dead voice. Had attended the Throat Hospital five years previously and something was cut out of right nostril—without relief.

There was almost entire obstruction of right nostril, owing to a large deviation, with the lower edge of the quadrilateral cartilage overhanging the junction with vomer. A fleshy adhesion to outer wall concealed all view of the turbinals. On the left side the middle and inferior turbinals were hypertrophied, and there were some adenoid remains.

September 27th, 1905.—Under chloroform the lower margin of the inferior turbinal and the anterior end of the middle turbinal were removed on the left side, the adenoids were curetted, the adhesion on the right side was divided, and a celluloid plate inserted.

October 11th, 1905.—Operation under cocaine and adrenalin. In raising convex flap found that a portion of septal cartilage must have been completely cut out at time of his operation five years previously. When removed, the cartilage showed this to be the case (Fig. 19 *a*). Consequently, much difficulty in separating the two mucosæ, which were here adherent together. Maxillary nasal spine chiselled away. No perforation. Two stitches. Vaseline plugs on right side only.

October 25th, 1905.—Respiration free, and patient out of treatment, fourteen days after operation.

January 15th, 1906.—External appearance of nose much improved, being straighter in the middle line. Voice is more ringing and is never tired. Sleeps with mouth closed. Free respiration through right nostril, allowing inspection of inferior turbinal, front of middle turbinal, the whole length of the septum, the front of sphenoid, and

the posterior wall of naso-pharynx. The septum is vertical in the middle line, but still quivers on sniffing.

Case 17.—E. H—, male, aged 17, had been rejected for the Royal Navy on account of mouth-breathing and complete obstruction of left nostril.

Constant mouth-breather. Sinuous deflection of septum, with anterior free border of quadrilateral cartilage projecting into left nostril.

October 12th, 1905.—Operation under cocaine and adrenalin. No perforation.

November 9th, 1905.—When written for to come up for inspection his mother replied, "Since the operation my son has passed into the Navy and is now on H.M.S. *Boscawen.*"

Case 18.—Mr. W. P—, aged 20, was sent to me by Sir William Broadbent for post-nasal catarrh, obstruction in nose, and noisy, heavy breathing even when awake.

Has had three operations for adenoids, at ages of seven, fourteen, and fifteen. The pharynx was very scarred, with adhesions of posterior faucial pillars to posterior wall of pharynx; the uvula had been removed, and the soft palate pulled to one side by traumatic adhesions. There were still some slight adenoid remains. Both nasal chambers narrowed, and liable to block completely when he had a cold. The anterior free end of quadrilateral cartilage projected into left naris, while the right nostril was almost completely obstructed by deviation and spur.

November 10th, 1905.—Patient insisted on operation under chloroform, which greatly increased difficulty of operation owing to cough and much frothy mucus. Ballenger's swivel knife used for first time. Puncture of concave flap, but closed by integrity of right. Two stitches. Vaseline cotton plugs in each nostril.

November 28th, 1905.—No perforation. Free and noiseless breathing. Fleshy septum still flaps when sniffing.

Case 19.—G. K—, male, aged 25, had been unable to breath through right nostril for five years, consequent on a blow.

Had been operated on at Throat Hospital for septum, with removal of greater portion of both inferior turbinals. Experienced no relief, and was told that nothing more could be done for him.

Mouth-breather at night. Large deviation into right nasal chamber, extending high up, and allowing merest trace of respiration. Prominent maxillary nasal process in left nostril.

November 16th, 1905.—Operation under cocaine and adrenalin. In reflecting convex flap it was found, as in Case 16, that the central part of cartilage must have been cut out in previous operation, leaving the mucosa of one side of septum adherent to that of the other. It was found impossible to separate them, and consequently a large defect was left in the convex flap. No perforation resulted, as the concave flap was intact. No stitches; vaseline plug in each nostril. Duration of operation, one hour.

November 30th, 1905.—Up to this date some crusting took place in right nostril.

February, 1906.—Free nasal respiration; no crusting; no perforation.

Case 20.—Miss E. F—, aged 30, was sent to me by Dr. C. Vise, of Tunbridge Wells, as she always slept with mouth open, and it was apt to fall open during the day. She got tired when reading or talking, and as she had been told that her right lung was not well expanded was anxious to get freer nasal air-way.

The nose externally was twisted, with end directed to the left. Anterior free end of quadrilateral cartilage projected into left naris. Right side almost entirely occluded by deviated and low-lying, sharp spur, entirely preventing any view of the inferior or middle turbinal.

November 20th, 1905.—Operation under cocaine and

adrenalin. The patient was very nervous, and was the first who complained of pain, especially during the use of the chisel and hammer. Convex flap torn in front, so that no stitches could be inserted, but flaps kept in place with vaseline plugs.

January 15th, 1906.—No perforation; respiration free and equal on both sides; nose much straighter in middle line.

Case 21.—Dr. L. W—, a London physician, was a mouth-breather at night and when exercising.

The anterior end of quadrilateral cartilage lay behind the septum cutaneum above, but then it appeared in the left nostril, and the lower extremity, instead of resting on the maxillary spine, lay alongside it, projecting into floor of left vestibule. Behind this the septum showed a large concavity, with a smaller, deeper one in centre ("inside of saddle" type). On right side, merest trace of respiration owing to large deviation being closely applied to outer wall, and obliterating any view of turbinals. It extended high up towards dorsum of nose. Below, it ended in a bony spur overhanging floor of nasal chamber. With posterior rhinoscopy the end of this spur could be seen extending nearly to the posterior free border of the septum.

November 25th, 1905.—Operation under cocaine and adrenalin. No puncture, although very difficult to work round the deep concavity (*vide* Fig. 19 *c*). Anterior free border of quadrilateral cartilage removed, as well as maxillary crest, part of vertical plate of ethmoid, and of vomer close back to posterior choana (Fig. 14). Two stitches; one vaseline plug in the left and two in the right side. When completed, the right nasal chamber was absolutely free right back to the naso-pharynx, and from the olfactory cleft above to the floor of the nose below. The left side looked a little narrowed by the mucosa which had been peeled out of the deep concavity and was now superabundant on a vertical septum.

November 27th, 1905.—No reaction; the patient resumed his professional duties.

February 10th, 1906.—Septum quite plumb in middle line. Patient delighted with restoration of free nasal respiration. Sleeps with mouth closed. The right side is much the freest, owing to redundancy of mucosa on left side and the compensatory hypertrophy which had taken place in left inferior turbinal (Fig. 12). Part of this was therefore removed. Improved appearance of nose externally (Figs. 17 and 18).

Case 22.—W. S—, male, aged 21.

December 7th, 1905.—Usual operation under cocaine.

The notes and specimen of this case were lost.

Case 23.—Mr. T. McN—, aged 25, was sent to me by Dr. Bousfield for nasal obstruction. Three years previously had an operation on nose (? adenoids and turbinectomy), without much relief.

Mouth-breather at night, with dry throat, and coughing in the morning. Nose slewed over to the right. No respiration through left side, owing to large deviation and spur, entirely obstructing any view of turbinals.

January 18th, 1906.—Operation. Submucous injection of cocaine, which did not act well, and caused distressing palpitation. No puncture. One stitch; vaseline plugs in left side only. Duration of operation one hour.

January 19th, 1906.—Plugs removed and not renewed.

January 30th, 1906.—Free nasal respiration, and patient much pleased with improved straightness of nose.

March 12th, 1906.—Writes, "quite free from morning cough and dryness in throat. First time for four or five years he has not his usual 'relaxed throat' at this season."

Case 24.—Mr. F. M—, aged 18, a midshipman in the Royal Navy, was referred to me by Dr. Bruce Porter, for nasal obstruction. Two years ago was kicked on the nose

at football, and afterwards found that the left nostril was becoming increasingly obstructed. A short time ago an attempt had been made to straighten the septum under chloroform, but without any benefit.

A large deviation of the septum could be seen, without the aid of a speculum, projecting into the left nostril and entirely obstructing any view of the turbinals. Cannot walk or sleep without mouth-breathing.

January 26th, 1906.—Operation. Submucous injection of cocaine did not act well, causing local bleeding and palpitation. After removal of deviated cartilage and ethmoid, a long, bony spur had to be followed far back to where it was imbedded in inferior turbinal. No perforation. One stitch; vaseline plugs.

February 3rd, 1906.—Patient rejoins his ship—*i.e.* eight days after operation. Free nasal respiration; now sleeps with mouth closed.

Case 25.—Major C—, aged 35, was brought to me by Dr. Alfred Clarke for nasal obstruction, causing "severe colds," and associated with hay-fever in summer. There was a large convexity in the left nostril, ending below in a spur, and concealing from view the inferior turbinal. In the posterior choana on that side some pus was seen. Transillumination showed both maxillary antra to be clear.

February 1st, 1906.—Operation under superficial application of cocaine and adrenalin. No perforation. Two stitches. Vaseline plugs in left and one in right.

The operation was followed by some neuralgia round the left eye, with much discharge and crusting in the left nostril. This was difficult to explain at first, as the wound healed by first intention, and the septum was smooth and plumb in the middle line, allowing of free nasal respiration. The pus was then traced to the left ethmoid and frontal sinus, and doubtless much of the patient's catarrh and "severe colds" had been due to this latent empyema in these cavities, which could only escape backwards. Now there is a free discharge forwards, no pus runs into

the post-nasal space, and the sinusitis is improving under treatment.[1]

Case 26.—Miss A. A—, aged 18, complained of deafness in left ear and obstruction of the nose. Mouth-breather; snores at night. The right nostril was completely obstructed by deviation and spur. Moderate amount of adenoids.

November 24th, 1905.—Adenoids removed.

March 5th, 1906.—Operation under cocaine. No perforation. Two stitches. Plugs on each side for twenty-four hours.

March 16th, 1906.—Free nasal respiration.

Case 27.—H. H—, male, aged 22, was thrown off bicycle four years ago, and was picked up unconscious, with bleeding from nose and ears. Since then his nose has become more and more blocked, and now he always sleeps with mouth open. Sense of smell not so good. Nose broadened and dented. Septum sigmoid, with a high, sharp projection of cartilage in left nostril, deviation to right, with prominent maxillary spine and large bony spur. Complains of some difficulty in speech; "when he cannot get breath, he cannot get certain words out, especially when two 'g's' come together."

March 8th, 1906.—Operation. Application of cocaine and adrenalin acted well; no pain. Puncture over sharp angle in left and spur in right. Bony spur very thick. One stitch. Carefully plugged each side to avoid perforation. Duration, one hour.

March 16th, 1906.—No perforation. Free nasal respiration.

April 3rd, 1906.—No difficulty with speech, which has lost its nasal tone. Sleeps with mouth closed.

Case 28.—Mr. A. C—, aged 29. Blow on nose at age of ten. Mouth-breather day and night. Very little respiration through right, owing to a large, high, and irregular

[1] June 19th, 1906.—Patient quite free of nasal suppuration.

deviation obstructing all view of turbinals. Below, it ends in a bony spur. The free end of the quadrilateral cartilage projects into the left nostril. The nose is twisted to the left, and the bulge of the deviation pushes out the right side of the nose externally. Patient is anxious for relief, as he has been getting deaf for seven months.

March 15th, 1906.—Operation under cocaine. The projecting quadrilateral cartilage had to be operated on from the left side, and a second incision was made on the right (convex) side so as to deal with the deviation. This flap was punctured. The bony spur was very thick. One stitch. Plugs both sides; part removed in twenty-four hours and the rest at the end of forty-eight hours. Duration, fifty-five minutes.

March 27th, 1906.—No perforation. Septum perpendicular in middle line. Free air-way. Nose much straighter. No longer a mouth-breather. Hears better.

Case 29.—Mr. J. H—, aged 23, complained of headaches and obstruction in the nose. After two years' service in the Army, he had been discharged from it two years ago because of his headaches. Says he has to use great force to clear his nose, and that this makes his headaches worse.

No cause other than the nasal obstruction could be found to explain his frontal headaches.

Free end of the quadrilateral cartilage projected into left vestibule. Septum sigmoid, so that both nasal chambers were obstructed.

March 15th, 1906.—Operation under local application of cocaine. Septum removed from free end of quadrilateral cartilage. One puncture in right flap; none in left, large maxillary nasal spine chiselled. One stitch. Plugs. Duration, one hour. (The operation was carried out by my Clinical Assistant, Dr. R. Lee.)

March 23rd.—No perforation. Clear air-way.[1]

[1] June 22nd, 1906.—Free air-way. Since the operation has had no headaches.

Case 30.—Mr. W. H—, aged 22, mouth-breather at night, and difficulty of breathing through right side of nose for five or six years. Free end of quadrilateral cartilage in left vestibule; large deviation of septum into right side, occluding all view of turbinals, and preventing least trace of inspiration.

March 19th, 1906.—Operation under local application of cocaine. Incision over free end of cartilage in left vestibule. Second incision in front of convexity in right side. Nasal spine chiselled. One stitch through left wound. Plugs. Duration, one hour.

March 30th, 1906.—Septum quite plumb in the middle line, and free respiration through each nostril. Sleeps with mouth closed.

Bibliography.

Heylen.—Gazette Médicale de Paris, 1847, No. 41, October 9th, p. 810.

Chassaignac.—Gazette des Hôpitaux, 1851, No. 104, September 9th, p. 419.

Demarquay.—Gazette des Hôpitaux, 1859.

Linhart.—Kompendium der Chirurgischen Operationslehre, 1862.

Hartmann.—Deutsche med. Wochenschrift, 1882, No. 51.

Petersen.—Berliner klin. Wochenschrift, 1883, No. 22.

Trendelenburg.—Deutsche Chirurgie, Bd. 33, H. I. S. 159, 1886.

Roux.—Revue Médicale, 1886.

Heymann.—Berliner klin. Wochenschrift, 1886.

Hubert.—Münchener med. Wochenschrift, 1886.

Greville MacDonald.—Brit. Med. Journ., September 15th, 1888.

Stan.—Przeglad Lekarski, 1888; Ref. in Centralblatt f. Laryngologie, Bd. v, 1888, 1889, S. 151.

Krieg.—Berliner klin. Wochenschrift, 1889, No. 31.

Rethi.—Wiener klin. Wochenschrift, 1890, No. 31, S. 599.

ROBERTS.—College and Clinical Record, June, 1890; Ref. in Centralblatt f. Laryngologie, 1890, 1891, S. 246.

JURASZ.—Krankheiten der Oberen Luftwege, 1891, S. 68.

BOTEY.—Journ. of Laryngol., viii, 1894, p. 317.

NAVRATAIL.—Sitzungsberichte der Gesellschaft der ungar. Ohren und Kehlkopfärzte, October 15th, 1897; Ref. in Centralblatt f. Laryngologie, 1898, S. 353.

F. A. DE BLOIS.—New York Med. Journ., October 8th, 1898, p. 513.

G. KILLIAN.—Verhandl. der Gesellsch. deutscher Naturforscher und Aerzte, München, 1899.

MALHERBE.—Bulletin de Laryngologie, ii, 1899, p. 109.

KRIEG.—Archiv f. Laryngologie, Bd. x, 1900, S. 477.

L. H. PEGLER.—Journal of Laryngology, December, 1900.

OTTO FREER.—Journ. Amer. Med. Assoc., March 8th, 1902; December 5th, 1903.

WEIL.—Wiener klin. Wochenschrift, 1904.

WEIL.—Archiv f. Laryngologie, xv, 1904, S. 578.

ZARNIKO.—Archiv f. Laryngologie, xv, 1904, S. 248.

E. MÜLLER.—Archiv f. Laryngologie, xv, 1904, S. 312.

HONSELL.—Bruns' Beiträge f. klin. Chirurgie, Bd. xli, Heft 1, S. 36, 1904.

HAJEK.—Archiv f. Laryngologie, xv, 1904, S. 45.

MENZEL.—Archiv f. Laryngologie, xv, 1904, S. 48.

BOENNINGHAUS.—Archiv f. Laryngologie, Bd. ix; Bd. x, S. 163, 341.

LEON E. WHITE.—Boston Med. and Surg. Journ., April 21st, 1904.

CHARLES N. SPRATT.—American Medicine, May 7th, 1904.

LOMBARD and BOURGEOIS.—Annales des Maladies de l'Oreille, xxx, II, 1904, p. 356.

GEORGE H. POWERS, Junr.—Boston Med. and Surg. Journ., November 10th, 1904.

OTTO FREER.—Annals of Otol., Rhinol., and Laryngol., June, 1905.

H. SMURTHWAITE.—Brit. Med. Journ., November 4th, 1905, p. 1201.

J. Mouret.—Révue hebd. de Laryngologie, 1905, No. 24, p. 700 ; No. 43, p. 514.

L. M. Hurd.—Med. Record, November 25th, 1905.

Claoué.—Société Française d'Otologie et de Laryngologie, Mai, 1905.

F. Blanc.—Thèse de Lyon, 1905.

Baudier.—Révue Hebdomadaire de Laryngologie, xxvi, II, 1905, p. 436.