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Repair of nasal septal perforations using local mucosal flaps and a composite cartilage graft

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Abstract
The surgical closure of a nasal septal perforation is recognized as being particularly challenging. A series of 11 consecutive patients who underwent closure of a septal perforation using a mucosal flap/composite conchal cartilage graft technique are reviewed, and the surgical technique described. The size of the perforation repaired varied, with eight cases being 2 cm or more in diameter. There was no significant graft donor site morbidity and complete perforation closure was achieved in eight cases after a mean observation time of 19.8 months. These results suggest that this is a suitable technique for closing nasal septal perforation.

Key words: Nasal Septum; Fistula; Surgical Procedures, Operative

Introduction

The many and varied techniques described for the closure of nasal septal perforations bear testament to the fact that this is a particularly challenging operation. Once established, septal perforations do not heal spontaneously. Fortunately, many smaller perforations require no treatment, in particular perforations more than 1 cm behind the anterior end of the inferior turbinate are often asymptomatic. Whistling is the main indication for closure of a small (up to 1 cm) perforation, whilst in larger perforations bleeding and crusting are the main symptoms.

It is important that the cause of a septal perforation is established before reparative surgery is considered. In particular it is important to review why previous surgery was performed, and ensure that any other pathology such as chronic rhinosinusitis has been treated. It is also vital to exclude vasculitis or sarcoid, as repair in these patients is doomed to failure. In cases where conservative measures (i.e. douching, emollients) have failed to control symptoms to a satisfactory degree, the options consist of closure using an obturator, or surgical closure using flaps and grafts. Various materials have been used to make obturators and include acrylic[1] and Silastic®, either as the commonly used cut-to-size Silastic® button[2] or a Silastic® prosthesis made from an impression of the perforation.[3] Although obturators can be employed to close almost all perforations, in the experience of the authors they are rarely tolerated by patients over a long period and they are no longer routinely used as a first line in management.

Numerous surgical techniques for closing septal perforations have been described in recent years. These techniques employ local flaps or grafts, either alone or in combination. Essentially an attempt is made to close the perforation with a graft material (fascia or cartilage) with, or without, coverage from mucosal flaps. Here we describe a technique for the closure of septal perforations where a composite conchal cartilage graft is used to close the perforation and local intra-nasal flaps provide mucosal coverage.

Patients and Methods

Patients

Eleven patients underwent repair of a nasal septal perforation and were retrospectively reviewed. The patient details are presented in Table I.

TABLE I
DETAILS OF CASES OF REPAIR OF A NASAL SEPTAL PERFORATION

Case No.	Age	Sex	Aetiology	Size
1	38	F	Cautery	1.5 cm
2	40	M	Septal surgery	1 cm
3	30	M	Septal surgery	4 cm
4	35	M	Septal surgery	2 cm
5	19	F	Unknown	2 cm
6	26	F	Cautery	2 cm
7	33	M	Septal surgery	1 cm
8	18	M	Septal surgery	2 cm
9	40	M	Septal surgery	3 cm
10	29	M	Septal surgery	4 cm
11	43	M	Septal surgery	2 cm

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In two cases an attempt at surgical closure had failed using techniques that the authors no longer use including a buccal flap or local rotation flaps alone. Two cases were performed via an open rhinoplasty whilst the others were done through a closed technique.

Surgical technique

Surgery is performed under general anaesthetic. Following induction of anaesthesia the nasal cavity was prepared using 2 mls of a solution containing two per cent lignocaine and 1:200,000 adrenaline. The post-auricular skin is similarly infiltrated to reduce bleeding. An island of post-auricular skin is marked just larger than the size of the perforation and an incision made around this to leave it attached to the conchal bowl. An incision is made through the cartilage of the bowl to leave the convexity of the antihelix attached. The rest of the conchal bowl can be harvested going as medially as necessary to obtain a graft which is considerably larger than the size of the perforation. The skin is closed with 3–0 subcutaneous vicryl and a pressure dressing is applied to the conchal bowl with a 2–0 silk suture passed through to both secure and apply pressure.

The nasal mucosa is elevated via an incision over the most anterior aspect of the septum extending onto the floor of the nose. The two mucosal flaps are elevated (Figure 1) going both above, below and behind the site of the perforation. An inferior flap is raised first because bleeding from a superior flap may obscure the view. The inferior flap is important and great care is needed to avoid a tear. The inferior flap is raised onto the floor of the nasal cavity and then more laterally under the inferior turbinate. The flap is then dissected from the undersurface of the inferior turbinate. The superior flap is based posteriorly and is raised following an anterior incision that must start well anterior to the perforation. This incision turns superiorly and continues above the perforation at as high a level as possible on the septum to a point 2 cm or more posterior to the limit of the perforation. In order to facilitate rotation of this superior flap a further reverse incision can be made at 90° in the elevated mucosa posterior to the perforation. On the other side of the septum the process is repeated. The edges of the perforation on the side with flaps which have been elevated without a tear and with better mobility are then approximated (Figure 2). It is best to use 3–0 vicryl with a small curved needle and a small 'turning circle'. Each bite of each stitch should be done separately and it is important to use horizontal mattress sutures to reduce tears.

The composite cartilage graft is positioned in the perforation with cartilage overlapping the defect under the mucosa on the side where mucosal flaps have been approximated (Figure 3). Partial incisions in the cartilage may be needed to make it flatter. Every attempt should be made to achieve mucosal coverage on at least one side. It is often not possible to achieve complete closure on one side and here the skin side of the graft is placed under the rim of elevated mucosa. The cartilage graft is secured by 3–0 vicryl sutures. Soft silastic nasal splints are sutured in position without pressing on the inferior flap and loose vaseline gauze packs are inserted.

The packs are removed the following day and the patient discharged with a 10-day course of co-amoxiclav. Splints are removed 10 days post-operatively and patients are advised to sniff naseptin six times a day for six weeks.

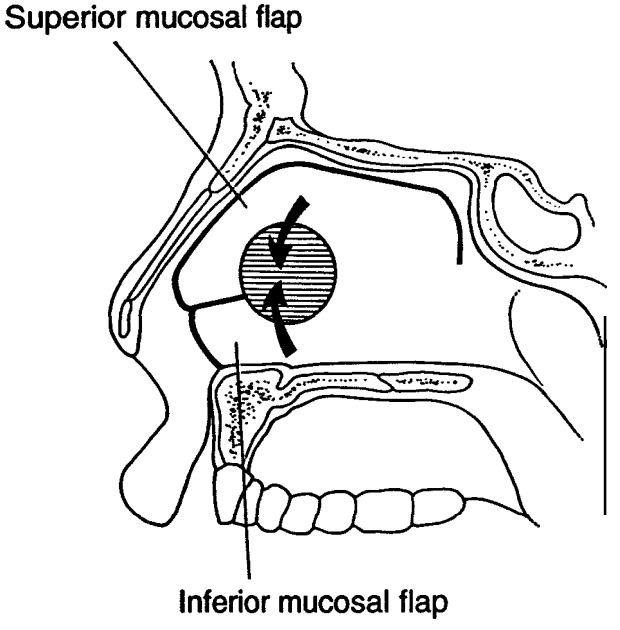

FIG. 1
Extensive mucosal flaps are elevated above and below the perforation.

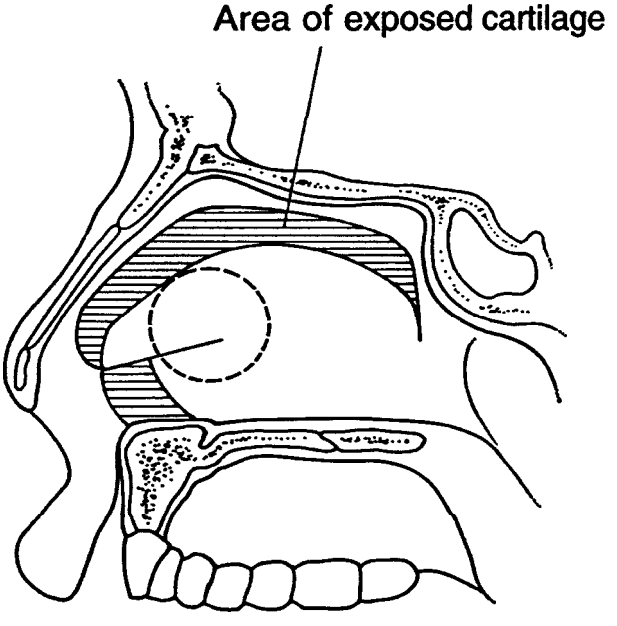

FIG. 2
Mucosal flaps are rotated to cover the graft.

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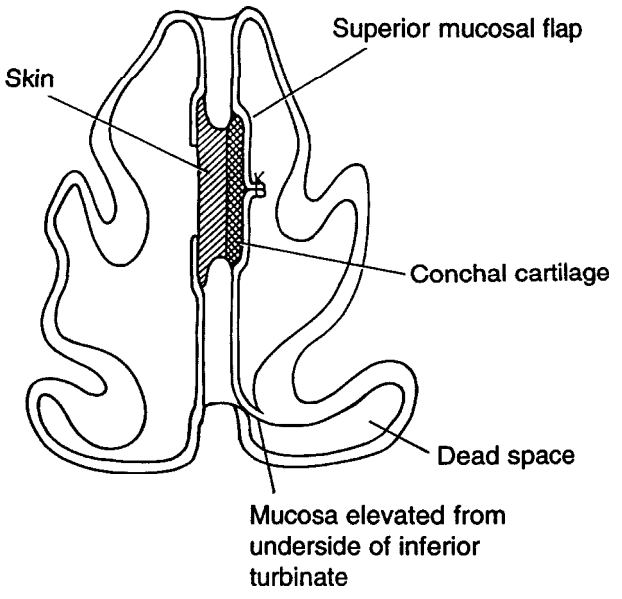

FIG. 3

The composite cartilage graft is placed to close the perforation with the cartilage side being covered by the mucosal flaps.

Results

The results of surgery and the length of follow-up are shown in Table II.

One case resulted in partial closure of the septal perforation with a 2 cm perforation being reduced to 0.5 cm at the posterior margin. The patient is now asymptomatic. In the cases of successful closure the patients became asymptomatic once healing had occurred, usually within two months. Persistent nasal obstruction was a problem in only one case who underwent limited septal surgery and has an improved airway, but some sensation of obstruction.

Discussion

The technique for the closure of nasal septal perforation described above is one of a number of related operations described where a cartilage or fascial graft is used to close the perforation. A technique using conchal cartilage and a buccal flap to close large septal perforations has been described.[4] Hussain and Kay[5] used a tragal cartilage- inferior turbinate mucoperiosteal sandwich graft technique. Surgeons using inferior turbinate flaps[6] have reported complications of crusting and adhesions causing nasal obstruction. Recently Hussain[7] has reported successful results using a modified technique. Again a tragal cartilage graft was used, but now this was sandwiched between temporoparietal and deep temporal fascia. A technique using a cartilage graft covered on one side by a mucosal rotation flap based on the anterior septal branches of the sphenopalatine artery has been successfully used by Yousef-Mian.[8]

TABLE II

THE RESULTS OF SEPTAL PERFORATION REPAIR SURGERY AND THE LENGTH OF POST-OPERATIVE FOLLOW UP

Case No	Size	Outcome	Follow-up (months)
1	3 cm	Closure	3
2	4 cm	Failure	
3	4 cm	Closure	37
4	2 cm	Closure	31
5	2 cm	Partial closure	
6	2 cm	Closure	17
7	1 cm	Closure	25
8	2 cm	Closure	21
9	3 cm	Failure	
10	4 cm	Closure	18
11	2 cm	Closure	4

In the modified procedure reported by Hussain no attempt was made to cover the fascia with mucosa because the author felt that attempts to use intranasal tissue in the repair of septal perforations resulted in excessive tension with flap ischaemia and ultimately re-perforation. In an attempt to overcome this problem and increase the amount of nasal mucosa available to close large septal perforations Romo *et al.*[9] used long-term intranasal tissue expanders. Fairbanks[10] described a technique using bilateral bipedicled nasal mucosal advancement flaps to cover a temporalis fascia graft. Brain[11] advocates a similar technique replacing temporalis fascia with fascia lata. Again the need to avoid tension in the closure technique is stressed.

In the technique we describe extensive mucosal mobilization is required in order to enable the cartilage to be covered on one side by vascularized mucosa. This is undoubtedly the most technically demanding part of the procedure, but complete mucosal coverage of the graft (or as complete as possible) on one side would appear to give the repair the best chance of viability, especially in larger perforations. Flap mobilization is performed unilaterally because the rotation of the flaps results in areas of septal cartilage adjacent to the perforation being exposed and bilateral extensive mobilization and rotation may be counter-productive in terms of vascularization although the authors have not attempted this. Whilst elevating the mucosa from the floor of the nose leads to marked nasal obstruction this is temporary and the mucosal lining eventually re-adheres to the nasal floor and turbinate. Cartilage is preferred to fascia as a graft as it provides greater solidity and support for the regenerating mucosa. Donor site morbidity is minimal in this technique, and sufficient cartilage can be harvested to close even the largest of perforations. The role of the skin in the composite graft is less clear, as sometimes it forms a loose yellow-looking covering that takes several weeks to re-epithelialize whilst on other occasions the graft takes immediately.

Conclusion

Closure of a septal perforation using the combination of a composite conchal cartilage graft and extensive mobilization of local mucosal flaps to obtain mucosal closure on at least one side gives good, but not perfect results in our hands. Nevertheless we should emphasize that the authors still try and manage the majority of patients' symptoms using conservative measures such as douching and lubricants before considering whether surgery is necessary.

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