

Nasal septal perforation repair using open septoplasty and unilateral bipediced flaps

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Abstract

The aim of this study was to assess the success of the technique of open septoplasty with bipediced flaps in achieving long-term closure and control of symptoms. Between 1993 and 2000, 32 patients underwent surgery for nasal septum perforation. Twenty patients with large perforations underwent posterior edge repair only. The remaining 12 patients (five female, and seven male) with perforations less than 20 mm in diameter underwent open septoplasty and a unilateral bipediced flap closure. A retrospective review involving a symptom scores assessment and follow-up examination was conducted. One patient died of unrelated illness, and was excluded. Results showed 10 of the remaining 11 patients achieved closure after a mean follow up of 10 months. The symptoms of crusting ($p<0.0001$), epistaxis ($p<0.02$), discharge ($p<0.012$), whistling ($p<0.011$), and overall discomfort ($p<0.02$), were all significantly improved. We conclude that by using this technique on patients with small perforations less than 20 mm, it is possible to achieve up to a 90 per cent perforation closure rate, and a significant improvement in patients' symptoms.

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

Introduction

Nasal septum perforations are anatomical defects caused most commonly by surgery.¹ Other less common causes include substance abuse,² and trauma such as nose picking.³ Perforations can also occur as a complication of procedures such as epistaxis cautery, cryosurgery, and naso-tracheal intubation. While around 62 per cent of patients with nasal septal perforation are asymptomatic,⁴ the remainder suffer irritating symptoms such as epistaxis, nasal obstruction, discharge, crusting, pain and whistling. The aim of surgery should be alleviation of symptoms and where possible restoration of the normal form and function of the nose.

Many methods have been attempted for repair of septal perforations. Lewis in 1915 recommended the transplantation of septal cartilage. Other techniques have included advancement and suture of the perforation border,⁵ the use of an oral mucosal flap,⁶ temporalis fascia grafting,⁷ using an inferior turbinate flap,⁸ grafting with tragal cartilage and temporalis fascia,² bone and temporalis fascia grafting,⁹ the use of an acellular human dermal-allograft, and two-stage expanded mucosal flap procedures. The surgical success rate overall has been less than satisfactory. Failure rates of between 30–70 per cent have been found in some series,¹⁰ although the advent of bipediced flaps in 1970,¹¹ may have improved this. The variable failure rate maybe

accounted for in some part by the variation in the size of the perforations, larger perforations being increasingly difficult to close. As a consequence, alternative procedures such as insertion of a Silastic™ button, or perforation enlargement,¹² which aim for symptom control rather than closure, remain popular treatment entities for patients with large perforations.

The aim of this study was to review the success rate of the technique of open septoplasty with a connective tissue 'sandwich' autograft and a unilateral bipediced mucosal flap closure.

Method

The study was a retrospective review of patients who had repair of nasal septal perforations, using open septoplasty with bipediced flaps, between April 1993 and April 2000. Our selection criteria stated that the vertical height of the perforation should not exceed 20 mm. Patients having alternative procedures for the management of perforations such as perforation enlargement and posterior edge repair were excluded. The cohort of patients was selected by examination of operating-theatre logbooks followed by detailed review of case notes. A single interviewer (surgical trainee JRN) then carried out a telephone questionnaire to assess subjective outcome. The subjective assessment involved the use of linear analogue symptom scores previously

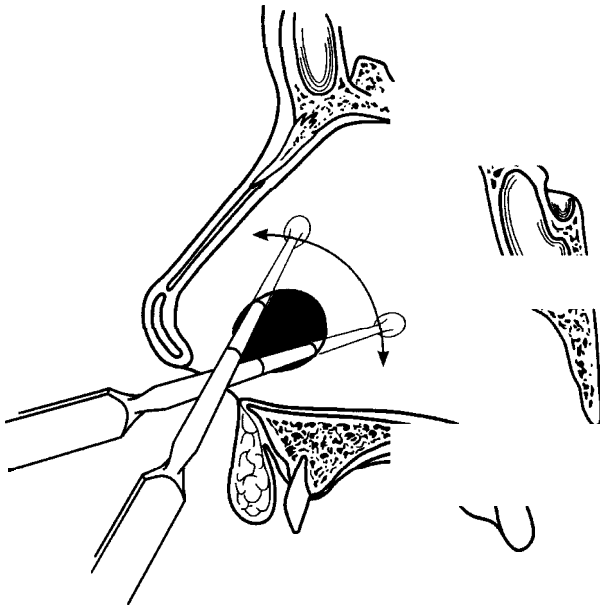


FIG. 1

Elevation of the sub-mucoperichondrial and sub-periosteal flaps using the Freer elevator.

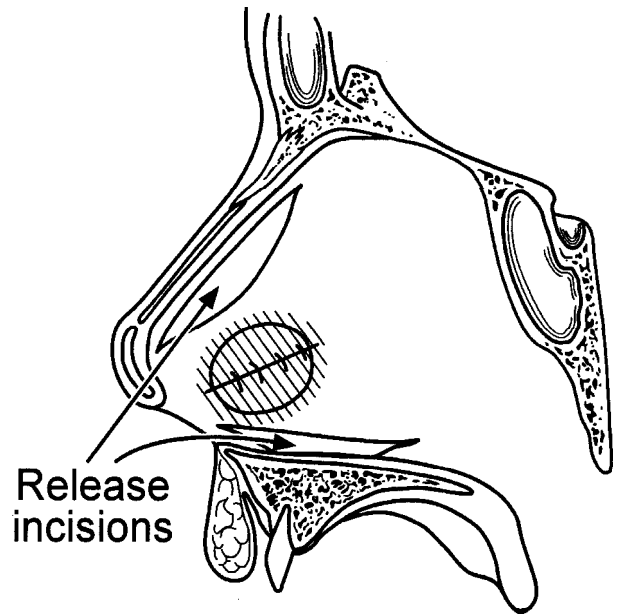


FIG. 2

Release incisions made in the nasal septal mucosa under the nasal dorsum and along the nasal floor on one side only.

described.¹² Objective assessment was based on whether the perforation had remained closed at out-patient follow up. Post-operative complications, length of hospital admission, duration of follow-up and further nasal operations were also documented.

Operative technique

The patient is positioned supine, with the head up tilted at 30 degrees. Anaesthesia is obtained using standard endotracheal general anaesthesia. The nasal septal mucosa is injected with two per cent xylocaine/1:80 000 adrenaline anteriorly, inferiorly, and posteriorly to the perforation in order to facilitate hydro-dissection and to lessen intra-operative bleeding. A 'W' shaped transcolumellar incision is made at the columella mid-point and the skin flap is elevated as for a standard open septoplasty approach. Sub-mucoperichondrial planes are developed on both sides of the septal cartilage. Elevations of the sub-mucoperichondrial planes are developed on both sides of the septal cartilage. Elevation of the sub-mucoperichondrial and sub-periosteal flaps is continued around the perforation using a Freer elevator (Figure 1), taking care not to damage the mucosa. Extensive inferior flap elevation is necessary with the inferior sub-periosteal plane being extended out along the floor of the nose up onto the lateral wall, inferior to the insertion of the inferior turbinate. At this stage it is possible to perform a formal submucous resection of remaining septal bone. Care should be taken to remove this bone as a large fragment so that it may be used later as a connective tissue in-lay graft to cover the cartilage defect created by the perforation. If there is not enough septal bone available, a graft of temporalis fascia is obtained. This should be approximately 4 cm × 5 cm in size, drying the graft, as one may do for a myringoplasty, will facilitate easy insertion.

Release incisions are then made in the septal mucosa under the nasal dorsum, and along the nasal floor on one side only (Figure 2). These are parallel to major vessels to ensure an adequate blood supply remains. The bipediced flaps created facilitate suturing of the mucosal edges of the perforation without tension. This repair is performed on one side only; the contralateral mucosal defect heals by secondary intention. This suturing of the perforation borders is carried out with utmost caution due to its fragility using 40 vicryl rapide®, preferably from posterior to anterior edges using interrupted sutures. The open approach allows excellent access for this. When the suturing is complete, the graft is inserted through the columellar incision between the opposing mucosal flaps (Figure 3), ideally to overlap the cartilaginous defect by 5–10 mm in circumference. Three of four mattress sutures using 40 vicryl rapide®, are then placed to stabilize the mucosal flaps and graft. If

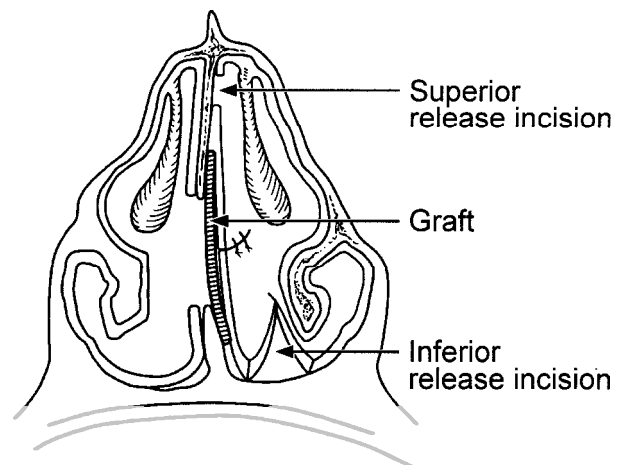


FIG. 3

Graft insertion between the columellar incision between the mucosal flaps.

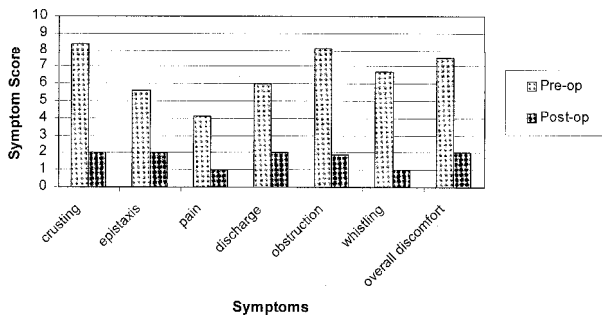


FIG. 4

Comparison between subjective pre-operative and post-operative scores (10 = most troublesome; 0 = asymptomatic).

temporalis fascia is used as the graft material, these sutures are placed through all layers, whereas if septal bone is used the quilting sutures have to be placed around the outer circumference of the bone graft. The columellar incision is then closed using 6.0 polypropylene monofilament sutures. Bilateral silastic splints are inserted and secured to the anterior nasal septum with 2.0 polypropylene monofilament sutures. These splints are left in place for two weeks.

Results

From April 1993 to April 1999, 32 patients underwent surgery for nasal septum perforation. Twelve had an open septoplasty using bipedicled flaps performed by, or supervised by, the same surgeon (PSW). Twenty patients had alternative procedures, the most common being perforation enlargement with posterior edge repair,¹² these were excluded. Of the 12 selected one of the cohort died of unrelated illness and was also excluded. The age range was 28–65 years, with a mean of 39 years. There were eight males and four females. Causes of the septal perforations were previous surgery in seven patients, trauma in two, septal cautery in one, and for the remaining two despite extensive investigation there was no cause established. The size of the perforation was less than 20 mm vertical height in all cases with the diameter ranging from 3–18 mm (mean 11 mm). All patients remained in hospital for one night post-operatively with the exception of one patient, who developed epistaxis and remained a further night.

Objective assessment

Follow-up examination was carried out at out-patient clinic, where assessment was made of closure at the perforation site by the operating surgeon. The mean length of follow up was 10 months with a range of six–22 months. Closure was successful in 10 of 11 patients (92 per cent). An attempt was made to find the case records of the deceased subject, but due to elapsed time this was unsuccessful. The patient whose procedure was unsuccessful, suffered a graft breakdown noted at two months post-operatively, and at 20 months post-operatively underwent a successful septal perforation enlargement and repair of the posterior edge.¹²

Symptom scores. Pre-operatively, the most troublesome symptoms were crusting (mean score = 8.4),

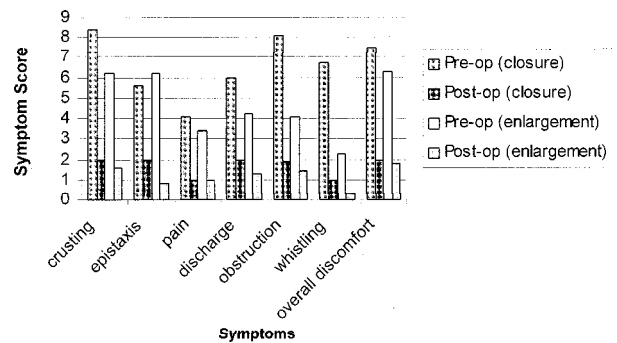


FIG. 5

Comparison between nasal septal perforation repair cohort and septal perforation enlargement cohort from previous study.¹²

obstruction (mean 8.1), and whistling (mean 6.7). All 11 patients contacted for interview had suffered severely from crusting, and obstruction. Nine of the group complained of discharge and whistling, whilst six and four respectively were affected by epistaxis and pain. Overall discomfort was rated from 5–9, with a mean of 7.5

A comparison between these scores and the post-operative scores is shown in Figure 4. Overall discomfort was improved in 10 of the 11 cases; the subject whose graft broke down at two months reported a similar score as pre-operatively.

The pre- and post-operative scores were compared using the mean score of each symptom and statistical significance was calculated using the Wilcoxon test for two non-parametric samples (due to the small number of subjects). Symptom improvement was statistically significant ($p < 0.05$) for the symptoms epistaxis, discharge, whistling and overall discomfort, and highly significant ($p < 0.01$) for crusting. These results were also compared with the remainder of our septal perforation cohort who had undergone septal perforation enlargement and posterior edge repair (Figure 5) and whose results have been described previously.¹²

Complications

Two of the patients in the group developed epistaxis in the immediate post-operative period. This led to one patient extending his elective admission to two nights, and a second patient being re-admitted 10 days post-operatively for a further two nights. Neither patient required a further general anaesthetic, in both cases the epistaxis was due to bleeding from the donor site areas and this settled with nasal packing.

Discussion

In this study, patients underwent nasal septal perforation repair by the open septoplasty technique using a unilateral bipedicled flap. The advantage of the unilateral flap technique is that it is less invasive and limits the septal donor areas to one side of the nose. The open approach technique facilitates the placement of a large connective tissue graft to replace the septal cartilage defect. It also ensures

that suture placement required for mucosal defect closure is technically less demanding when compared with the limited access offered by a closed technique. This later point is especially important when the technique is being taught to trainees.

Ten out of 11 patients achieved objective closure at follow-up, and there was significant symptom scores improvement ($p < 0.05$) post-operatively for whistling, discharge, epistaxis, crusting and overall discomfort. Lower success rates have been reported in previous studies^{8,10} particularly when the perforation size exceeded 2 cm.¹³ In these patients, a technique of perforation enlargement with posterior edge repair¹² has been shown to be beneficial in terms of improving patients' symptoms.

It was interesting to note that the symptom scores of pain and nasal obstruction showed no statistically significant change post-operatively; this may be explained in part by the small sample size, and the lack of a direct correlation between a nasal perforation and a nasal pain. In Table II, the symptom scores for closure are compared with those from the perforation enlargement cohort. Pre-operative symptom scores comparison was perhaps surprising in that the closure cohort (perforation size < 20 mm) had higher values than the enlargement cohort did (perforation size > 20 mm).

A recognized difficulty in this study was the small number of patients fitting the stringent criteria for operation and a further confounding factor was the death of one of the cohort. Further bias was minimized by one researcher carrying out all of the follow-up objective assessments, and the telephone questionnaires. The results show that by careful selection of patients with a perforation height of less than 20 mm using open septoplasty with bipedicled flaps, a 90 per cent technical success rate, and significant improvement in patients' symptoms can be achieved.

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