Surgical Considerations in the Open Rhinoplasty Approach to Closure of Septal Perforations

David P. Arnstein, MD, Gerald S. Berke, MD

- Repair of nasoseptal perforations is a difficult problem for the otolaryngologist. Recently, there has been an increased incidence among patients, particularly with the rise in cocaine abuse and trauma. The variety of proposed methods of repair points to the lack of a definitive solution for successful surgical treatment of nasoseptal perforations. Successful septal perforation repairs using an open rhinoplasty approach with bipedicled mucoperichondrial flaps and temporal fascia grafts were achieved in eight of nine patients in a series. Resident otolaryngologists in training were the primary surgeons in all nine patients. The open rhinoplasty approach affords better exposure to the septal perforation than does a closed technique, and it facilitates the elevation of mucoperichondrial flaps on all sides of the perforation. This method also allows the surgeon access to perform a limited concurrent rhinoplasty when indicated. The open rhinoplasty approach is ideally suited for teaching the technique of large septal perforation closure in surgical training programs. The surgical considerations in using this method are discussed.

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Nasoseptal perforations are being seen with increasing frequency by otolaryngologists. This increase is, in large part, related to soaring cocaine abuse and trauma in large metropolitan regions. Small or very posterior perforations are usually asymptomatic. Larger or more anterior perforations may present with crusting, whistling on respiration, epistaxis, nasal obstruction, postnasal drip, odor, or aberrations in smell. Patients with large perforations may lose so much support that a saddle nasal deformity with columellar retraction will result. The most common origin of septal perforations is reported to be trauma.

Surgical trauma during septoplasty is the usual cause. Other frequent causes include nasal packing, cauterization, nasotracheal intubation, and nose picking. Unfortunately, cocaine abuse as a factor in septal perforations is an all-too-familiar finding in today's society. Some unusual causes include infection, autoimmune diseases, granulomatous diseases, syphilis, and carcinoma. Workers exposed to industrial chemicals, such as those who handle salt, lime, cement, chrome, arsenic, and calcium nitrate, as well as glass blowers, have also been found to have a higher incidence of perforations.

The mainstays of conservative treatment have been frequent saline irrigation and moisturizing ointment to relieve the nasal crustling and recurrent epistaxis. Prosthetic obturators were first employed in the early 1950s. The first prostheses were made of nylon. Currently, they are made of Silastic. However, many patients find the prosthesis difficult to tolerate due to the foreign body sensation in the nasal cavity. Large perforations often make prosthetic insertion and maintenance in position exacting for the physician, as well as for the patient. A number of physicians have therefore advocated that nonoperative management be reserved for patients who are asymptomatic or who are considered poor operative risks. High-risk patients include those with long-term cocaine or substance abuse, active granulomatous disease or vasculitis, active infection (syphilis), or carcinoma. Even when repair of a septal perforation fails, the remaining perforation is typically smaller and more posteriorly located and is therefore less symptomatic.

That there is no widely accepted surgical technique for repair of septal perforations suggests that they are not easily treated. The first surgical treatment involved enlargement of the perforations to make them less symptomatic. Hopefully, this method is no longer in vogue. The first large series of repairs with good closure rates was reported by Fairbanks and Chen. They combined Gollum's local mucosal flap method with the insertion of a connective tissue graft between the sutured septal flaps. They reported a closure rate of 95% in 20 patients with one to seven years of follow-up. However, the ability to elevate intact mucosal flaps on all sides of a perforation was crucial to graft revascularization and viability.

Fundamental to the notion of using fascia or pericranial autografts...
between flaps was Wright’s observation that connective tissue grafts and the tympanic membrane became adherent within 24 hours and that revascularization followed shortly thereafter. This implied that mucosal flaps need not cover the connective tissue graft on both sides, because when the graft becomes vascularized from the covered side, the mucosa on the uncovered side will migrate across and epithelialize the vascularized surface. Also, epithelial migration probably occurs more readily on connective tissue grafts than on bone or cartilage autografts.

An important rule in repairing septal perforations is that mucosal flaps should be designed to preserve maximal blood supply. Understanding the anatomy of the blood supply to the nasal septum is thus essential to any method of repair (Fig 1). The anterior and posterior ethmoidal arteries and the sphenopalatine artery arise from the posterosuperior area of the septum. There are anastomoses between the palatine artery through the incisor foramen, the descending palatine artery, and the septal branch of the superior labial artery. Thus, incisions in the posterosuperior area of the septum should be avoided. Bipedicled advancement flaps based on the anterior floor of the nose and on the posterosuperior area of the septum as first described by Gollum maintain an intact blood supply.

Every surgeon who has tried to close a large septal perforation knows that using tissue autografts and designing appropriate flap incisions does not necessarily ensure a good result. The closure methods detailed by Fairbanks, while effective, are technically not facile. The transnasal approach to closure of large or posterior perforations can be a frustrating experience, even for a skilled surgeon. This is especially true for residents in training who may be in the early stages of nasal surgical adeptness. Open rhinoplasty as suggested by Goodman and Strezlow provides excellent exposure for these repairs. We report on a series of nine patients who underwent attempted repair of nasoseptal perforations using an open rhinoplasty approach with bipedicled mucoperichondrial flaps and fascia grafts. Resident physicians in otolaryngology—head and neck surgery were the primary surgeons in all nine cases.

**TECHNIQUE**

A general or long-acting local anesthesia was preferred, since the procedure can be lengthy (two to 2½ hours), depending on whether concurrent rhinoplasty was planned (Fig 2). The postauricular skin was injected for harvesting the graft material, and standard septrhinoplasty injections were performed.

The graft material was harvested initially so that it could be allowed to dry while the nasal dissection was being accomplished. A dried and stiffened graft was found to be easier to handle during placement. A superior postauricular incision was made, and the temporal fascia was harvested. It is important to harvest enough for placement on both sides of the perforation, with a generous overlapping area (approximately 20 cm²). If the temporal fascia was attenuated, harvesting of pericranium also yielded usable graft material.

The technique used standard external rhinoplasty incisions. A columellar skin incision was made with an inverted V (Fig 3). This was then connected to bilateral alar margin incisions. The columellar skin needs to be elevated with great care because it is very thin and easily torn. The nasal skin was then reflected back to expose the medial and lateral crura, the upper lateral cartilages, and the nasal bones (Fig 4). Following this, the medial crura and domes were separated, with sharp dissection providing exposure to the caudal end of the septum (Fig 5). Exposing the caudal end of the septum and getting into the correct plane between the mucosa and cartilage were frequently the most tedious and arduous parts of the procedure.

Mucoperichondrial flaps were then developed on both sides of the septum (Fig 6). The mucoperichondrium was left attached to the edges of the perforation until the flap was elevated, to lessen the chance of an inadvertent tear. One important detail is that the upper lateral cartilages often needed to be shaved from the septum to facilitate development of the mucoperichondrial flaps. However, adequate exposure was obtained in this series without having to resort to medial osteotomies. Because the surgical field was narrow and deep, adequate retraction could have presented a problem. A medium-length nasal speculum placed between the mucoperichondrial flaps provided a good, readily available retractor.

After elevation, a relaxing incision was created in at least one of the flaps (usually the flap that had been most completely elevated). An incision was made on the lateral nasal wall just beneath the inferior turbinate (Fig 7). This flap was then mobilized from the floor of the nose medially to the maxillary crest and then up onto the septum, in continuity with the mucosal flap. If there was insufficient tissue for primary closure, a second incision was...
Fig 2.—A 2.5-cm septal perforation (arrow) caused by cocaine abuse in 16-year-old girl.

Fig 3.—Columellar incision.

Fig 4.—Exposed nasal skeleton showing lower (small arrow) and upper (large arrow) lateral cartilage.

Fig 5.—Caudal septum (large, curved arrow) and mucoperichondrial flaps. Smaller arrow indicates right lower lateral cartilage and mucoperichondrial flap.

Fig 6.—Exposed septum (arrow).

Fig 7.—Elevation of floor of nose. Arrow indicates inferior turbinate.

Fig 8.—Suture closure of perforation in left mucoperichondrial flap (arrow).

Fig 9.—Placement of connective tissue graft. Arrow indicates temporal fascia graft.

Fig 10.—Reapproximation of lower lateral cartilage.
made in the superior septum at the junction of the septal mucosa and upper lateral cartilage, and this flap was rotated down. The bone that was exposed by elevating flaps from the nasal floor usually healed promptly. For most large perforations, primary closure could be achieved on one side only. Smaller perforations were optimally closed on both sides, requiring bilateral relaxing incisions. Closure was achieved with 5-0 absorbable interrupted sutures using a small needle (Fig 8). The graft material, which had been dried and stiffened, was cut and shaped to a minimum of 2.0 cm larger in diameter than the perforation. The graft was then placed on either side of the septal cartilage perforation (Fig 9). If enough material had been harvested, grafts were placed on both sides of the perforation beneath the mucoperichondrium. Two tacking sutures were placed through the septum, mucosal flaps, and grafts to prevent inadvertent migration. The first was placed caudally and the second cephalad.

The upper and lower lateral cartilages were reapproximated (Fig 10). Osteotomies, when indicated, were usually performed prior to graft placement. Dorsal or columellar rhinoplasty grafts were placed after the septal work was completed. The columella was closed with 6-0 nylon interrupted sutures. The marginal alar incisions were closed with 5-0 absorbable sutures.

Each side of the nose was packed with a folded sheet of nonadhering dressing (Telfa) soaked with antibiotic ointment. Petroleum jelly-impregnated gauze was then packed inside the folds of the dressing. If bony or dorsal work was performed, a standard splint or cast was placed. The gauze was removed in five days, leaving the dressing in place until two weeks after the surgery. It was not necessary to use Silastic or plastic septal splints.

### RESULTS

Nine patients underwent attempted closure of septal perforations using an open rhinoplasty approach (Table). Resident physicians in training were the primary surgeons in all nine patients. A variety of causes accounted for the perforations. Two patients had undergone previous septorhinoplasty surgery. One patient had a history of chronic nose picking. Three patients admitted to prior cocaine abuse. Two patients had sustained blunt trauma to the nose. In one patient, no cause was determined. The perforations ranged in size from 2.0 to 3.5 cm in diameter. Three of the nine patients had previously undergone unsuccessful attempts at closure, in which transposed sublabial mucosal flaps were used. Complete closure was achieved in all but one of the nine patients, with follow-up from one to three years. One patient had partial closure after the graft was displaced toward the end of the procedure (prior to the adoption of tacking sutures). In three of the nine patients, a limited concurrent rhinoplasty was performed. The procedure included dorsal and columellar autograft augmentation with osteotomies.

### COMMENT

A number of authors have reported good closure rates for septal perforations using a multiplicity of closed and open techniques.13 Their results were obtained, however, only after considerable experience was acquired on the part of each surgeon, using a specific technique. Although residents in training were the primary surgeons in all nine patients, the success closure rate in eight patients compares favorably with that reported in other series. The results obtained in this series indicate that the open rhinoplasty approach to large septal perforations is ideally suited to a resident surgical training program. With closed approaches, the elevation of the intact mucoperichondrium posterior to the perforation is often difficult to achieve. The open technique has the advantage of approaching the posterior area of the septum from an area of relatively easy access (superiorty). The ability to primarily close the perforation is also enhanced due to binocular vision and the use of both hands. The instruction of residents is made easier because both the teacher and apprentice can, at the same time, view and discuss the progress of the surgery. Open rhinoplasty also affords an opportunity for a limited concurrent rhinoplasty.

One disadvantage to the external approach is the columellar scar. However, it is only 5 mm long and out of the normal line of vision. None of our patients have found the scar objectionable. Compared with closed techniques, the open approach also holds the potential for more severe complications. However, no serious complications occurred in this series.

### CONCLUSIONS

Symptomatic septal perforations should be repaired. The method described has proved successful and reliable in the hands of surgical residents in training. The key to successful repairs are (1) proper patient selection; (2) developing the mucoperichondrial flaps with preservation of their blood supply; (3) placement of a connective tissue graft that quickly undergoes vascularization and facilitates the healing process; (4) use of the open rhinoplasty approach for better exposure and improved teaching; and (5) close patient follow-up. A limited concurrent rhinoplasty can be performed without the necessity of a second operation.

### References

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