The Role of Septal Surgery in Management of the Deviated Nose

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The deviated nose represents a complex cosmetic and functional problem. Septal surgery plays a central role in the successful management of the externally deviated nose. This study included 260 patients seeking rhinoplasty to correct external nasal deviations; 75 percent of them had various degrees of nasal obstruction. Septal surgery was necessary in 232 patients (89 percent), not only to improve breathing but also to achieve a straight, symmetrical, external nose as well. A graduated surgical approach was adopted to allow correction of the dorsal and caudal deviations of the nasal septum without weakening its structural support to the dorsum or nasal tip. The approach depended on full mobilization of deviated cartilage, followed by straightening of the cartilage and its fixation in the corrected position by using bony splinting grafts through an external rhinoplasty approach. (Plast. Reconstr. Surg. 115: 406, 2005.)

With the exception of the congenitally deviated nose, such as that associated with cleft lip, deviated noses are traumatic in origin, resulting from external trauma or failed rhinoplasty procedures. Because of the intimate relationship of the bony cartilaginous framework of the nose, the effects of fractured nasal bones may extend to involve the nasal septum, the upper lateral cartilages, and even the alar cartilages. For successful correction of the deviated nose, all anatomic components involved in the deformity should be adequately recognized and surgically realigned.

With the evolution of modern rhinoplasty, many pioneer surgeons\(^1\)–\(^9\) recognized that septal surgery played a pivotal role in the management of the deviated nose and hence combined septal and corrective rhinoplasty in one procedure. The one-stage septorhinoplasty has become the standard line of management for deviated noses.

In addition to the cosmetic sequelae of the deviated nose, most patients experience various degrees of nasal obstruction. Even in the absence of functional problems, septal surgery may still be indicated to correct minor septal deviations that may interfere with the proper alignment of the external nasal pyramid. In the current study we present a graduated surgical approach for the correction of septal deviations associated with the externally deviated nose.

**Patients and Methods**

**Patients**

The current study included 260 patients (male:female ratio, 3:2; mean age, 26.5 years; age range, 15 to 45 years) with external nasal deviations. Each patient was subjected to the following:

1. Full history taking, stressing history of nasal trauma, obstruction, and previous nasal operations.
2. External nasal evaluation; the deviations were classified according to the level of deformity into bony, cartilaginous, or mixed. Further evaluation included the level of na-
sal dorsum, the width of nasal bridge, and any tip or nostril asymmetry.

3. Internal nasal evaluation, including a thorough evaluation of the nasal septum, nasal valve areas, turbinates, and nasal mucosa.

All patients were operated on using the external rhinoplasty approach, and the intraoperative findings were carefully documented and correlated to the presenting deformity. The postoperative follow-up period ranged from 1 to 9 years (mean, 28 months), during which time periodic clinical examination and photographic documentation were performed to evaluate the aesthetic and functional outcomes of the performed procedure.

**Surgical Technique**

With the patient under general anesthesia, the nasal septum and the external nose are infiltrated with 1% Xylocaine with 1:100,000 units of epinephrine. Time is allowed for the vasoconstrictive effect of the infiltration solution to take place, after which a no. 15 blade is used to perform a left hemitransfixion incision placed directly on the caudal edge of the septal cartilage. A Cottle elevator is used to undermine the septal flap in a strict submucoperichondrial plane until reaching the posterior bony septum, where elevation is continued in the subperiosteal plane. Using sharp dissection the flap elevation is continued down the maxillary crest and the nasal floor. At this stage, the septal cartilage is fully mobilized, beginning along the floor by disarticulating it from the maxillary crest and the nasal floor. A Becker double-action scissors is used to take down any bony deviations of perpendicular plate of ethmoid or vomerine spurs that may interfere with the medialization of nasal bone after osteotomies. In cases in which the bony septum is found to be exceptionally thick secondary to compound fractures with overlap of fractured segments, a Caplan double-action scissors is used to excise the thickened portions of the bony septum.

Finally, the intact L-shaped strut of septal cartilage is allowed to swing back to the midline and the areas of resected bone and cartilage are reskeletonized using crushed septal cartilage. The hemitransfixion incision is closed using interrupted 5-0 plain gut sutures and the flaps are mattress together using 4-0 chromic catgut, in a running fashion, to stabilize the septal segments and to eliminate any dead space, thus preventing hematoma formation and minimizing the need for intranasal packing, which was limited to a light pack made of Telfa sheets soaked in gentamicin cream.

**Dorsal Septal Deviation**

The external rhinoplasty approach provides an excellent access for evaluation and correction of dorsal septal deviations. A graduated four-step approach was found to be very helpful in correcting such deviations; the first step (Fig. 1, *left*) is to separate the upper lateral cartilages from the septum without opening the underlying mucosa; this is facilitated by elevating that mucosa from the undersurface during septoplasty. The second step is to straighten the deviated dorsal septal cartilage by performing a series of vertical partial thickness cartilaginous incisions on the concave side of the septum (Fig. 1, *center*). In some cases in which the cartilage is found to be fractured and duplicated, one or two of the partial-thickness incisions were transformed into full-thickness incisions to break the spring action of the thickened cartilage.

The third step, after freeing and straightening of the septal cartilage, is to splint the scored cartilage with a piece of flat bone (5 to 6 mm × 2 to 2.5 cm) from the ethmoidal plate; this splinting graft is sutured 5 mm below the dorsal edge of the septal cartilage (Fig. 1, *right*) using 5-0 polydioxanone sutures in a horizontal mattress fashion.

The fourth step is to consider the need for spreader cartilage grafts based on the evaluation of the relationship of the upper lateral cartilages to the septum. According to this assessment one may require a unilateral spreader graft on the concave side or bilateral spreader grafts of different thickness to asymmetrically lateralize the upper lateral cartilages.

In cases in which the upper lateral cartilage and the nasal bone on the same side are both depressed, an extended spreader graft (Fig. 1, *right*) is used with its upper end wedged be-
between the septum and the nasal bone after performing a medial osteotomy. The upper end of the extended spreader graft is beveled according to the amount of nasal bone lateralization required.

**Caudal Septal Deviation**

Deviations of anterior part of the septal cartilage may lead to deflection of the caudal margin of the septum from the midline and its prolapse into one of the nostrils resulting in asymmetry of the nasal base. The first step toward correction is the full mobilization of the caudal septum by freeing it both ventrally and cephalically (Fig. 2, *left*). Ventrally, the cartilage is found to be dislocated off the maxillary crest; trimming of the overhanging part of cartilage will decrease the vertical height of the septum, thus allowing its replacement into the maxillary groove. Cephalically, a vertical cut is performed to separate the deviated caudal septum from the posterior part of the septal cartilage. The cut is made through the full thickness of the cartilage starting at the maxillary crest, proceeding upwards to stop at least 5 mm short of the dorsal margin. In cases having fractured nasal septum leading to sharp angulation of the caudal segment, cephalic separation is completed by performing a wedge excision of the fracture line (Fig. 2, *center*). The

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**Fig. 1.** Schematic diagram for the correction of dorsal septal deviation. (*Left*) Freeing the upper lateral cartilages from the dorsal septum without opening the underlying mucosa. (*Center*) Straightening of the deviated cartilage by a series of partial thickness incisions followed by splinting the cartilage by a bone graft fixed 5 mm below the dorsal edge of the septal cartilage. (*Right*) Using a beveled extended spreader graft to lateralize the upper lateral cartilage and the nasal bone on the right side.

**Fig. 2.** Schematic diagram for the correction of caudal septal deviation. (*Left*) Freeing of the caudal septal cartilage ventrally by excising the overhanging cartilage on the side of the maxillary crest and cephalically by performing a wedge excision at the site of maximum angulation. (*Center*) The mobilized caudal segment is brought back to the midline and fixed by suturing it to the maxillary spine (note the residual deflection of the anterior septal angle). (*Right*) A bony splinting graft is used to bring the anterior septal angle back to the midline.
second step, after achieving full mobilization of the caudal septum, is to bring the mobilized segment to the midline and fix it in the corrected position. Fixation is started ventrally by placing a figure-of-eight stitch between the caudal septum and the periosteum of maxillary groove. It is not uncommon for the dorsal part of the caudal septum at an anterior septal angle to show some residual deviation after completing the ventral fixation (which may lead to deflection of nasal tip). In this case, a thin piece of flat bone (4 to 5 mm \( \times \) 1.5 to 2 cm) from the perpendicular plate of ethmoid is used to splint the dorsal part of caudal septum in the midline (Fig. 2, right). This dorsal fixation is performed through the external rhinoplasty approach after using a no. 11 blade, in a rotary fashion, to make perforations in the bone graft for suture fixation. If bone thickness is greater than 1 mm, a drill with a fine diamond fraise is used to thin the bone graft and drill the suture holes. Finally, after the dorsal and ventral fixation is completed, the free margin of the caudal septum, which is now in the midline, is fixed to the medial crura in a tongue-in-groove fashion.

In some complex caudal septal deviations, as in the patient shown in Figure 3, in which the caudal septal cartilage is fractured, with the fracture extending to the caudal edge, the deviated caudal segment is excised and replaced by a caudal septum replacement graft that is fixed to the medial crura by horizontal mattress sutures. At completion of the procedure, the external rhinoplasty incisions are closed in a routine fashion, followed by external taping and splinting using an external metal nasal splint, which is removed after 1 week.

RESULTS

Of the 260 patients included in this study, 190 (73 percent) were primary cases and 70 (27 percent) underwent revisions after having had one or more previous rhinoplasties.

Regarding the cause of nasal deviation, 140 patients (54 percent) related it to a definite history of nasal trauma, 32 (12 percent) to previous nasal surgery, and 58 patients (22 percent) were not able to relate their nasal deviation to any previous trauma or surgery. Bony deviations limited to the upper third of the nose were found in 40 patients (15 percent), cartilaginous deviations confined to the lower two thirds in 80 patients (30 percent), and the remaining 143 patients (55 percent) had mixed bony-cartilaginous deviations. Variable degrees of nasal obstruction were present in 195 (75 percent) of the patients; this was mainly a result of deviated nasal septum (80 percent), nasal valve problems (52 percent), inferior turbinate hypertrophy (15 percent), and septal perforations (7 percent). Septal surgery was found necessary in 232 (89 percent) of the cases to correct the external nasal deviations and to improve breathing.

Regarding the outcome of the surgical procedure, 95 percent of the patients were satisfied with their aesthetic improvement, and functionally, 80 percent of the patients with preoperative nasal obstruction reported improved breathing. Revision surgery to correct minor degrees of residual deviations was required in 16 cases (6 percent).

DISCUSSION

External trauma to the nose resulting in fractured nasal bones usually affects the nasal septum, leading to fractures, deviations, or dislocations. In the course of emergency treatment of the fractured nose, however, the septal pathologies are usually neglected, which may result in incomplete correction or recurrence of the external nasal deviation.

Septal surgery was necessary in 89 percent of the patients with deviated noses, not only to improve breathing but also to achieve an aesthetically pleasing straight nose. The most common septal deviations affecting nasal symmetry are those involving the dorsal (Figs. 3 and 4) and caudal parts (Figs. 5 and 6) of the cartilaginous septum. As compared with central septal deviations, which can be safely excised, any excisions involving the dorsal or caudal segments will directly affect the shape of the external nose as a result of weakening of dorsal or tip support. Mobilization and straightening of the dorsal and caudal cartilaginous septum may be technically difficult to the extent that some authors have recommended radical excision of the entire septal cartilage and its reinsertion after correction of its deviation in what is known as extracorporal septrhoplasty. This technique was associated with some problems, however, in stabilizing the reinserted cartilage and in realignment of the nasal dorsum.

It is our strong belief that if the cartilage can be straightened outside the nose it can also be straightened in situ without compromising its structural role in dorsal and tip support. This
FIG. 3. (Left) Preoperative views of a patient with severe traumatic nasoseptal deviation. (Right) Two-year postoperative views after straightening the septum using the technique described in Figure 1. Straightening the dorsal septum and splitting it with the bony splitting graft and bilateral spreader grafts resulted in correction of the dorsal saddling without the need for any dorsal grafting. A caudal septum replacement graft was used to lengthen the shortened nose and increase the tip projection.
was greatly facilitated by using the external rhinoplasty approach, which provides an excellent exposure of the dorsal and caudal parts of the nasal septum, allowing the most complex corrective maneuvers to be conducted with ease under direct vision.\textsuperscript{15–22}

**Fig. 4.** (Left) Preoperative views of a patient with left C-shaped dorsal septal deviation and prolapsed right nasal bone. (Right) Three-year postoperative views after straightening the septum using the technique described in Figure 1, with placement of an extended spreader graft on the right side to lateralize the right upper lateral cartilage and the right nasal bone.
Moreover, the external approach provides safe access to the nasal septum in revision cases in which variable amounts of the bony cartilaginous septum has been previously excised. In such cases the whole septum is carefully instrument-palpated to map out the areas of previ-

Fig. 5. (Left) Preoperative views of a patient with right caudal septal deviation showing prolapsed caudal septum in the right vestibule and major shift of the anterior septal angle from the midline causing a bulge on the right side. (Right) Postoperative views 18 months after correcting the caudal deviation using the technique described in Figure 2.
ously excised bones or cartilage before attempting any septal flap elevation. In most of our revision cases previous septal excisions were found to be limited to the central part of the nasal septum; thus no septal flap elevation was performed centrally to avoid septal perfo-
...entions, but alternatively a ventral tunnel was performed by elevating the mucoperiosteum of the vestibular floor and maxillary crest to provide access to the bony septum, and the remaining dorsal part of the septum was accessed through the routine external approach.

In the current study, the first step toward correction of septal deviations associated with the crooked nose was to fully mobilize the deviated septal cartilage by freeing it from its attachments to the upper lateral cartilages and the maxillary crest, followed by straightening the cartilage by breaking its spring action, and finally fixing the cartilage in the midline. For fixation, different methods have been suggested. Gunter and Rohrich used silicon intranasal extramucosal septal splints; later, Ramirez and Pozner described using internal cartilage splints to avoid the discomfort and possible complications associated with the long-term use of the silicone septal splints. Byrd et al. depended on control sutures and cartilaginous spreader extension grafts for fixation, whereas Guyuron et al. used a combination of extramucosal septal splints and cartilaginous spreader grafts. In the current study, the bony splinting grafts were found to be a better alternative for fixation, as the thin flat bone of the ethmoidal plate provides rigid, permanent, internal stenting of the septal cartilage, allowing it to heal in the corrected position and preventing any cartilage deformation by contracture forces of the healing phase. The fixation of the bony splinting grafts is done 5 mm below and parallel to the dorsal edge of the septal cartilage to allow restoration of the normal relationship between the upper lateral cartilages and the dorsal septum. The second advantage of the low fixation of the splinting grafts is in cases where spreader grafts are needed, as that leaves an adequate space above the splinting graft for the placement and fixation of the spreader graft. The regular spreader grafts were helpful in cases requiring lateralization of the upper lateral cartilages (Fig. 3, above), and a modified extended spreader graft was used in cases that required lateralization of both the upper lateral cartilage and the nasal bones (Fig. 4, above).

In the current study, 80 percent of the patients with preoperative nasal obstruction reported an improvement in breathing, which was mainly a result of the straightening of the nasal septum and widening of the nasal valve areas by using spreader grafts. Other functional procedures that we performed less frequently included inferior turbinoplasty and septal perforation repair.

In 6 percent of our cases revision surgery was necessary as a result of partial recurrence of caudal septal deviation in 10 (25 percent) of the 40 cases in which the ventral fixation to the maxillary crest was performed using chromic catgut sutures. This incidence was later reduced to 2 percent by using 4-0 Dexon sutures. In eight cases (3 percent) the lateral osteotomy needed to be repeated to correct the inadequately medialized nasal bones on one side.

Despite the large number of surgical techniques described, a stable long-term correction of the severely deviated nose remains a difficult problem. It is our belief that the key for reliable and stable outcome is to completely mobilize and straighten the nasal septum without compromising its pivotal role in providing support to the external nose.

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REFERENCES


