Extended Osteocartilaginous Spreader Graft for Reconstruction of Deviated Nose

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Abstract

Objective. Correction of a deviated nose is a challenging problem for which different approaches may be considered. This study was designed to introduce a new technique for correction of a deviated nose with a high success rate.

Study Design. The study was a prospective follow-up of 59 patients with deviated nose who had undergone corrective surgery.

Setting. An extended osteocartilaginous spreader graft was harvested from the quadrangular septum and the perpendicular plate of the ethmoid. After a medial osteotomy that was performed on the concave side, the nasal bone was lateralized and an extended osteocartilaginous spreader graft was inserted between the nasal bone and the septum to prevent further retraction of the concave side due to fibrotic scar tissue. On the contralateral side, a low lateral osteotomy was done as routine.

Subjects and Methods. The operation was done on the 59 cases with deviated nose. The subjects were followed up during a period of 8 months to 4 years. According to physical examination, postoperative photography, and patients’ satisfaction, the final results were categorized as excellent, fair, or poor.

Results. Forty-eight patients (81.3%) were categorized as having excellent results. Eight patients (13.6%) showed fair improvement, while the results of surgery in only 3 patients (5.1%) were classified as poor.

Conclusion. An extended osteocartilaginous spreader graft, with medial osteotomy and lateralization of the nasal bone on the concave side, is a new technique with a high success rate for correction of deviated nose.

Keywords

deviated nose, medial osteotomy, rhinoplasty, spreader graft

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Different anatomic subunits of the nose (ie, the nasal bones, upper and lower lateral cartilages, or septum) are closely correlated with each other and make it an aesthetic and functional unit. Trauma is the most common cause of external nasal deformities, and in addition to affecting each subunit, it can also affect their correlations. This is especially important because the healing process of osteocartilaginous parts involves formation of fibrotic tissue, which resists against any correction. Therefore, the deviated nasal bone on the concave side of the nose has a tendency to recur due to the retraction effect of scar tissue and soft-tissue memory. Although various operative approaches have been recommended for the correction of deviated nose, there is no consensus on the most successful technique for this problem. This study introduces a new procedure for the reconstruction of deviated nose that has a very low failure rate and addresses both bony and cartilage components and their correlations.

Methods

Study design. All patients with deviated nose who had been operated by the senior author from 2005 through 2009 were included in the study irrespective of the leading cause of deviation and their previous history of surgery. If the amount of osteocartilaginous material in the cartilaginous septum and the perpendicular plate of the ethmoid bone was not sufficient for the graft, the patient was excluded from the study. Nearly all primary rhinoplasty procedures had sufficient amount of graft material. Aesthetic nasal characteristics were analyzed on photographs before and after the procedure. The follow-up period was 8 months to 4 years. Patients’ satisfaction of nasal straightening

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was classified as excellent, fair, or poor according to visual analog scale. The main question regarding satisfaction was, “Are you happy with straightening of your nose?”

This study was approved by the ethics committee of the Otorhinolaryngology Research Center.

**Surgical technique.** An open approach septorhinoplasty was carried out starting with a septoplasty. A 5-cm × 1-cm osteocartilaginous graft was harvested from the inferior parts of the cartilaginous septum and the perpendicular plate of the ethmoid. In this way, the L-strut in the caudal and dorsal regions remained undisturbed (**Figure 1**). A medial osteotomy was done on both sides, separating the nasal bones from the perpendicular plate of the ethmoid. Also, the upper lateral cartilages on both sides were separated from the septum. The graft was trimmed to the length that spanned the distance between the proximal parts of the nasal bones to the distal part of the upper lateral cartilages. After straightening the remnants of the cartilaginous septum by cross-hatching, the whole extended osteocartilaginous graft was placed on the concave side, leaving the nasal bone and upper lateral cartilage in lateral and the septum in medial (**Figure 2**). If the osseous part of the graft, which was encased in a bony packet of the septum and the nasal bone, caused the bony dorsum to appear unroofed, it was then trimmed by the drill. The cartilaginous component was fixed to the septum with 2 or 3 horizontal mattress sutures of 5-0 nylon. If the external deviation of the nose was not completely corrected, a routine low, with or without intermediate, lateral osteotomy was performed on the convex side of the nasal bones.

**Results**

Fifty-nine patients were included in the study with a mean follow-up period of 30 months (range, 8-48 months). Forty-eight patients (81.3%) were classified as excellent, believing that their noses were completely straight, and this was congruent with physical examination and postoperative photographs (**Figures 3** and **4**; Supplemental Figures S1A, B, available at otojournal.org). In 8 patients (13.6%), there was a minimal residual deviation according to either photographs or clinical examinations. Therefore, despite clinical improvement in aesthetics and patient satisfaction, the results were classified as fair. Three patients (5.1%) demanded revision surgery and were categorized as the group with poor results. Although the initial results were acceptable for this group, recurrence of the deviation was detected after 6 months by physical examination and postoperative photographs (Supplemental Table S1, available at otojournal.org). Careful follow-up revealed no other complications (eg, infection, graft necrosis, graft rejection, septal perforation, or nasal airway compromise).

**Discussion**

Deviated nose is categorized into 3 groups; C-shape, linear, and S-shape. According to a more practical classification, most cases of deviation involve the upper osseous third or the middle and the lower cartilaginous thirds. The most common procedure for correction of the deviation in the proximal part is osteotomy. Septoplasty and the use of grafts are the key methods to manage the middle third. Correction of the caudal septal deviation is an essential step for straightening the lower third. Apart from the emphasis on the critical role of the septum in the management of deviated nose, multiple approaches and systematic algorithms have also been introduced. Two major methods are anatomic reconstruction and camouflage techniques. Even though anatomic correction is preferred because of the optimal shape and rearrangement of the nose dimensions, the osseocartilaginous supports are left weakened. On the other hand, although main structural supports are maintained in the camouflage techniques, the final aesthetic results are not favorable. Nevertheless, the recurrence rate of both methods is high. This study introduces a new method based on anatomic realignment instead of anatomic reconstruction. In this method, a medial osteotomy is performed and the nasal bone is lateralized on the concave side. Thereafter, the bony part of the extended osteocartilaginous

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**Figure 1.** An osteocartilaginous graft harvested from the inferior parts of the cartilaginous septum and perpendicular plate of the ethmoid.

**Figure 2.** An extended osteocartilaginous graft fixed on the concave side between the nasal bone and upper lateral cartilage in lateral and the septum in medial.
graft is fixed between the remnants of the perpendicular plate and the lateralized nasal bone on the concave side to prevent further displacement of the nasal bone back to its primary position. This technique reduces the rate of recurrence of concavity after fibrotic scar formation. If the external bony deviation is not completely corrected with lateralization of the concave side, medial, lateral, and—if necessary—intermediate osteotomies are done on the convex side. Lateral
osteotomy is not performed on the concave side. It seems that the final aesthetic results are more predictable if the concave side remains undisturbed by performing only a medial osteotomy \(^\text{10}\) and lateralizing the nasal bone with the insertion of the spreader graft.

Another critical issue in the surgery outcome is the shape of the bone and the cartilage. In the deviated nose, the bone and the cartilage of the nondeviated side are usually depressed or concave \(^\text{10}\). Anatomic nasal realignment, without correction of the concave structural components, makes the nose appear deviated. \(^\text{11}\) An osteocartilaginous spreader graft extending from the proximal part of the nasal bone to the distal part of the upper lateral cartilage on the concave side simultaneously corrects the residual deformity in the bony and the cartilaginous parts. In this method, bony material is located between the nasal bone and the bony septum, and the cartilaginous part of the graft is fixed between the upper lateral cartilage and the quadrangular cartilage of the septum. The use of an osseous graft on the site where it is naturally bony and a cartilaginous graft on the naturally cartilaginous part is not only more compatible with the structure of the body but also decreases the risk of resorption.

The spreader graft can also be used for straightening the septum in high dorsal parts. \(^\text{6}\) The major positive role of the spreader graft in the nasal function is the widening of the internal valve. \(^\text{2,4,8,11,12}\) The graft functions both as a supportive strut for preserving the septum in its newly corrected position and as a protection against further traumatic force or scar contracture. \(^\text{2,4,8,12}\) In addition to widening the narrow or pinched dorsum, the spreader graft makes the brow-to-tip aesthetic line more distinct. \(^\text{4,11,12}\) The tip can be augmented and a short nose can be lengthened by the extension of the spreader graft to the tip-lobule region. \(^\text{12}\)

An external approach for the fixation of the spreader graft is offered because appropriate positioning and suturing of the graft is more feasible. In addition, there are usually accompanying tip asymmetries in the patients with deviated nose for which an open approach rhinoplasty is necessary. Nevertheless, this graft can be fixed with a closed approach by creating a tight tunnel in the submucoperichondrial and submucoperiosteal space. \(^\text{12}\)

The extended osteocartilaginous spreader graft is an autologous graft with a very low risk of infection or extrusion. \(^\text{13}\) The usual complications of autologous grafts are related to errors in surgical techniques. These errors include mistakes in graft reshaping and fixation leading to graft extrusion, displacement, or nasal obstruction following scar formation in the mucosa of the internal nasal valve. \(^\text{13}\) Since the open approach was chosen for all patients and the grafts were appropriately fixed, none of the above-mentioned complications were encountered. Aside from recurrence of deviation in 3 patients (5.1%), the only disadvantage of this procedure was a modest but inevitable widening of the dorsum. If the bony dorsum becomes too wide and appears to be unroofed, the osseous part of the extended spreader graft should be trimmed by an appropriate drill.

**Conclusion**

The extended osteocartilaginous spreader graft is an effective remedy for the correction of the deviated nose. The spreader graft can be fixed from the proximal part of the nasal bone to the distal part of the upper lateral cartilage on the concave side of the deviated nose. This could be accompanied by a medial osteotomy and the lateralization of the concave nasal bone. Besides its several aesthetic and functional advantages and a very low rate of complications, this graft prevents retraction of the nasal bone and recurrence of the deviation.

**Author Contributions**

Mahmood Sadooghi, conception and design; Matin Ghazizadeh, acquisition of data, analysis, interpretation of data

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**Supplemental Material**

Additional supporting information may be found at http://oto.sagepub.com/content/by/supplemental-data

**References**


