Anterior Septal Reconstruction

Outcomes After a Modified Extracorporeal Septoplasty Technique

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Objective: To describe a modified extracorporeal septoplasty technique and measure its efficacy with a validated quality-of-life instrument.

Design: A prospective observational outcomes study of patients with severe septal deviation who subsequently underwent anterior septal reconstruction. Preoperative and postoperative evaluation was performed using photographs and the Nasal Obstruction Symptoms Evaluation scale.

Results: Twelve consecutive patients were enrolled. No complications occurred. All patients noted improved airway function postoperatively. There was a significant improvement in mean Nasal Obstruction Symptoms Evaluation score postoperatively (76.6 vs 12.9; P < .01). Examination of postoperative photographs revealed improved midvault and tip anatomy.

Conclusions: The anterior septal reconstruction technique is effective in improving both nasal airway function and aesthetics in patients with severe septal deviation. The technique avoids the most common complication of standard extracorporeal septoplasty by preserving the dorsal strut of septal cartilage and its attachment to the nasal bones at the keystone area.

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S EPTAL DEVIATION, with or without inferior turbinate hypertrophy, is one of the most common findings in patients with symptomatic nasal obstruction. It follows that septoplasty and inferior turbinate reduction are perhaps the most commonly performed procedures for nasal airway obstruction. In patients with mild to moderate septal deviation, standard septoplasty is often adequate to improve the patient's nasal airway. However, septoplasty is often inadequate in cases of severe anterior septal deviation. Furthermore, in some patients the cause of nasal airway obstruction includes a narrow valve angle and high septal deflection, which are generally not treated with standard septoplasty techniques. Although placement of spreader grafts has been well described, this technique alone does not address significant deviations of the anterocaudal nasal septum.

In addition to airway obstruction, crookedness of the dorsal septum or asymmetries of the upper lateral cartilages can cause contour deformities of the middle third of the nose. A variety of techniques have been described to address this, including septal modifications, crossbar and camouflage grafts, and splitting of the septum with autologous or synthetic materials. Reconstruction of the anterior septum with a traditional septoplasty approach is limited by risks to tip support should overresection or overweakening of the cartilage occur. Furthermore, anterior septal deviations, particularly if high on the septum, are often accompanied by a narrow valve angle. For cases of severe septal deviation, extracorporeal septoplasty has been advocated. One drawback of this technique is destabilization of the junction of the quadrangular cartilage and nasal bones (keystone area), with resultant requirement for unique forms of fixation, such as percutaneous sutures, or sutures to the ethmoid or nasal bones. In cases where destabilization occurs, notching or saddling of the dorsum can occur. To minimize destabilization of the keystone (and thus preserve dorsal contour), I have sought to modify extracorporeal septoplasty by preserving the dorsal septum. Anterior septal reconstruction (ASR) is a more conservative approach to extracorporeal septoplasty that preserves dorsal support, designed to concomitantly address nasal obstruction and the external contour deformities.
To evaluate the functional effectiveness of this surgical technique, I performed a prospective outcomes evaluation. To measure functional outcomes, I used the Nasal Obstructive Symptoms Evaluation (NOSE) scale, a validated and disease-specific quality-of-life (QOL) instrument designed for use with patients with nasal obstruction.\textsuperscript{14,15}

\section*{METHODS}

\subsection*{STUDY DESIGN AND PATIENT SELECTION}

The study was conducted at the University of Washington Cosmetic Surgery Center, Seattle, with approval by the University of Washington Human Subjects Committee. The study hypothesis was that anterior septal reconstruction with or without turbinate reduction improves disease-specific QOL (eg, nasal obstruction symptoms) measured postoperatively.

I evaluated patients seen in consultation for nasal obstruction. Patients with symptoms of nasal obstruction of at least 1 year's duration caused by severe anterior nasal deviation were included in the study. I noted the status of the turbinates. Previous septoplasty did not exclude patients from consideration. Further inclusion criteria were failure of medical treatment, no history of nasal trauma or surgery within 1 year, and age of at least 18 years.

\subsection*{TECHNIQUE}

Anterior septal reconstruction is a modified extracorporeal septoplasty technique achieved via open rhinoplasty. Severe septal deviations can be classified as either roughly horizontal or vertical (Figure 1). In each case, when the deviation is severe, traditional septoplasty techniques are inadequate, primarily because the anterior septum and dorsal septum are required for support of the cartilaginous lower two thirds of the nose. Removing this without appropriate reconstruction results in nasal collapse. However, if the deviation involves these areas and is severe, traditional techniques (such as the swinging door technique or suturing to the maxillary spine) are often unsuccessful. Using ASR, the anterior septum can be addressed with concomitant unilateral or bilateral spreader grafting.

The septum is exposed initially through a traditional hemitransfixion incision. I prefer to use a left-sided incision in virtually all cases, regardless of direction of septal deviation. Bilateral submucoperichondrial flaps are elevated by dissection around the anterocaudal septum. If the exposure confirms the preoperative determination that the septum is too severely deviated for standard septoplasty, I undertake a conversion to open rhinoplasty. The upper lateral cartilages are released from the septum, and it is viewed from above.

A large portion of the quadrangular cartilage is resected (Figures 2, 3, and 4). However, rather than remove the entire cartilaginous septum, as described for standard extracorporeal septoplasty, a dorsal strut is preserved. This strut is at least 1.5 cm along its anteroposterior axis. The vertical height of the remnant is maximal at the keystone area, measuring at least 1 cm. Preservation of this attachment to the nasal bones is of utmost importance in maintaining the dorsal profile and for support of the ASR graft. Dorsal onlay grafting is not regularly used in this technique.

The ASR graft is placed on the concave side of the midvault (ie, the side opposite the midvault deviation) and acts as a spreader graft and splint for the dorsal remnant (Figure 5). The ASR graft is sutured between the dorsal remnant and the ipsilateral upper lateral cartilage. The contralateral upper lateral cartilage may be sutured to the dorsal remnant, or an intervening spreader graft may be placed. By splitting the dorsal septal remnant, the dorsum is straightened. External taping and splitting are left in place for 1 week, as in standard rhinoplasty. Intranasal silastic splints are regularly used for 1 week postoperatively.

Patients were photographed preoperatively and postoperatively. The disease-specific QOL instrument for nasal obstruction, the NOSE scale, was administered to all patients. Statistical analysis was undertaken using a 2-tailed t test.

Twelve consecutive patients were enrolled in the study. All patients underwent septal reconstruction as described in the “Methods” section. All but 2 patients underwent unilateral or bilateral turbinate reduction. The mean age was 34.5 years (range, 18–51 years). Sixty-seven percent of patients were men, and 33% were women. Two cases were revisions after previous septoplasty. In these cases, there was enough native septum remaining to provide for adequate grafting material. No septal perforations occurred. In all cases, comparison of preoperative and postoperative anteroposterior photographs demonstrated improved contour (Figure 6 and Figure 7).

\section*{RESULTS}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure1.png}
\caption{Categorization of severe septal deviations. Severe septal deviations generally occur along an axis roughly perpendicular to, or parallel to, the dorsum. Note that both can occur simultaneously as well.}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure2.png}
\caption{Anterior septal reconstruction (ASR): preservation of dorsal strut. The key element of the ASR-modified extracorporeal septoplasty is the preservation of the quadrangular cartilage attachment to the bony septum and nasal bones at the rhinion, or the keystone area, shown in blue. This both preserves dorsal contour and provides for a solid attachment site for the ASR graft (shown in red).}
\end{figure}
Dorsal contour remained the same or was improved in all cases, and in no cases did notching or saddling occur. No dorsal onlay grafting was used.

The NOSE scale is used to assess disease-specific QOL and is scaled from 0 to 100, with higher scores meaning more severe nasal obstruction. Baseline NOSE scores were obtained at a preoperative visit. Follow-up NOSE scores were obtained at postoperative visits. The average follow-up time was 5.4 months (range, 1.5-18 months). Two patients underwent ASR without turbinectomy. The average NOSE scores decreased for patients who underwent ASR, with or without turbinectomy (76.6 vs 12.9; \( P < .01 \)) (Table 1). Similar improvement was noted in patients who underwent ASR without or with turbinectomy (Table 1). Evaluation of each of the 4 items on the NOSE scale individually re-
Table 1. Scores on the Disease-Specific Quality-of-Life Instrument (NOSE Scale) Preoperatively and Postoperatively*

<table>
<thead>
<tr>
<th>Time of Visit</th>
<th>ASR With Turbinectomy (n = 10)</th>
<th>ASR Alone (n = 2)</th>
<th>All Subjects (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative</td>
<td>74.5 (14.2)</td>
<td>87.5 (17.6)</td>
<td>76.7 (14.8)</td>
</tr>
<tr>
<td>Postoperative</td>
<td>12.2 (14.2)†</td>
<td>16.2 (15.9)‡</td>
<td>12.9 (13.8)†</td>
</tr>
</tbody>
</table>

Abbreviations: ASR, anterior septal reconstruction; NOSE, Nasal Obstruction Symptoms Evaluation.
*Average follow-up was 5.4 months. Data are given as mean (SD).
†P<.01.
‡P<.05.

Table 2. Scores on Individual NOSE Items Preoperatively and Postoperatively in 12 Patients*

<table>
<thead>
<tr>
<th>Query†</th>
<th>Preoperative</th>
<th>Postoperative‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal congestion or stuffiness</td>
<td>2.8 (1.0)</td>
<td>0.9 (0.9)</td>
</tr>
<tr>
<td>Nasal blockage or obstruction</td>
<td>3.2 (0.8)</td>
<td>0.5 (0.7)</td>
</tr>
<tr>
<td>Trouble breathing through my nose</td>
<td>3.4 (0.7)</td>
<td>0.5 (0.7)</td>
</tr>
<tr>
<td>Trouble sleeping</td>
<td>2.8 (0.9)</td>
<td>0.2 (0.4)</td>
</tr>
<tr>
<td>Unable to get enough air through my nose during exercise or exertion</td>
<td>3.3 (0.8)</td>
<td>0.5 (0.7)</td>
</tr>
</tbody>
</table>

Abbreviation: NOSE, Nasal Obstruction Symptoms Evaluation.
*Average follow-up was 5.4 months. Data are shown as mean (SD).
†Query: “Over the past month, how much of a problem were each of the following for you?”, 0 = not a problem, 1 = very mild problem, 2 = moderate problem, 3 = fairly bad problem, 4 = severe problem.
‡P<.01 for all.

The difficulty in correction of severe deviations of the anterocaudal septum, with concomitant nasal airway obstruction and external deformity, has been recognized for more than 50 years.1 A variety of adjunctive techniques have been described to correct severe deviation or absence of the anterocaudal septum and have been vari-

ably successful.5-8,10 Extracorporeal septoplasty has been advocated as the ultimate corrective procedure for complex nasal septal deformities.1,10-13,17 Although this technique allows the entire cartilaginous septum to be addressed, it does have a few drawbacks. The most important of these is the tendency for the development of irregularities of the dorsum postoperatively, including notching or saddling.5,10 The present study describes a modified extracorporeal septoplasty technique that achieves improvement of external airway while maintaining the dorsal profile.

Gubisch11 has published the largest series on extracorporeal septoplasty, citing over 2000 cases. In this large series, published serially over the past 2 decades, Gubisch describes the techniques necessary for septal reconstruction in cases of a paucity of serviceable septal cartilage (Gubisch10,11 and Gubisch and Constantinescu12). In such cases, he describes the use of polydioxanone foil for stabilization of suture-reconstructed septal cartilage remnants. The present study includes 2 revision cases, in which some septal cartilage had been previously harvested. In both cases, the remaining cartilage was enough to create a solid, single-piece ASR graft. An advantage of the technique described herein is that a smaller reconstructive cartilage graft is required because the dorsal attachment to the rhinion is preserved.

The use of spreader grafts for splinting of the dorsal septum has been described previously.2,5 However, al-

Figure 5. Anterior septal reconstruction (ASR) graft in place. The ASR graft is shaped from a straight portion of the resected cartilage or bone and sutured to the dorsal remnant, upper lateral cartilages, and lower cartilages as required. The graft is placed on the concave side of the dorsal remnant in cases of dorsal septal deviation and acts as both a spreader graft and splint.

Figure 6. Patient before (A and B) and 6 months after (C and D) anterior septal reconstruction modified extracorporeal septoplasty.
though traditional septoplasty techniques may be used in conjunction with spreader grafts and splints, these techniques may prove inadequate in cases of severe caudal septal deformity. In these situations, the technique described herein offers the advantage of splinting of the dorsal septal deviation as well as correction of the caudal septal deformity with an autogenous graft. Byrd et al described use of a septal extension graft to splint the twisted anterocaudal septum. This technique has the advantage of preservation of a native L-shaped strut of septal cartilage. This may be effective for mild to moderate septal deviations, but in cases where extracorporeal septoplasty is being considered (eg, the severely deviated septum), the ASR technique may prove more effective than attempts at straightening the native cartilage in situ. Furthermore, the extension graft was described primarily to correct an aesthetic nasal deformity. The efficacy of the technique (which widens the anterior caudal septal strut by using splinting rather than replacement) in improving the nasal airway was not evaluated. In the present study, the efficacy of ASR has been evaluated not only from an aesthetic standpoint but also with a validated QOL instrument.

The NOSE scale is a validated disease-specific QOL instrument that has been used to measure the effectiveness of septoplasty and turbinate reduction. The scale has been designed for use in measuring nasal obstruction and thus provides an ideal instrument for use in functional rhinoplasty techniques. Herein, the effectiveness of a relatively specialized functional rhi-
noplasty technique, ASR, is measured using this QOL instrument. Although the number of patients in this cohort is relatively small, the strengths of this study are its prospective design, use of a validated instrument, and use of a patient-based outcome assessment. To date, a PubMed search has revealed no other prospective evaluations of functional rhinoplasty techniques using a disease-specific, validated QOL instrument. The use of prospectively designed studies to analyze functional rhinoplasty techniques, such as the present study, should ultimately benefit both rhinoplasty patients and surgeons.

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REFERENCES