Modified Back-to-Back Autogenous Conchal Cartilage Graft for Caudal Septal Reconstruction

The Medial Crural Extension Graft

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Objective: To report our experience with the use of a modification of the back-to-back autogenous conchal cartilage graft, used as a medial crural extension graft, for reconstruction of the caudal septum.

Methods: Retrospective review of all patients undergoing caudal septal reconstruction using a modification of the back-to-back conchal cartilage graft from January 1, 2007, through June 1, 2009, at a tertiary referral center. Photodocumentation of all patients was obtained preoperatively and postoperatively. Patients were asked to subjectively rate their functional and cosmetic outcomes at each follow-up visit.

Results: Eight patients underwent caudal septal reconstruction with the modified back-to-back conchal cartilage graft during the time period studied. Six patients underwent caudal septal reconstruction via external septorhinoplasty while 2 patients underwent an endonasal approach. The median duration of follow-up was 12 months. At the last follow-up, patients rated their breathing as normal in 7 of 8 cases and improved, but not to normal, in 1 of 8 cases. Cosmesis was rated as excellent in 7 of 8 cases and good in 1 of 8 cases. There were no postoperative complications.

Conclusions: Modification of the back-to-back autogenous conchal cartilage graft used as a medical crural extension graft should be considered for reconstruction of the caudal septum in the cartilage deficient nose. The technique produces reliable outcomes with minimal donor site morbidity.


THE CAUDAL SEPTUM IS CRITICAL TO THE SUPPORT OF THE NASAL TIP. ALTERATIONS TO THE CAUDAL SEPTUM AFFECT THE STABILITY OF THE NASAL TIP AND HAVE AESTHETIC AND FUNCTIONAL CONSEQUENCES. LOSS OF NASAL TIP SUPPORT Owing TO ANY MECHANISM MAY LEAD TO DECREASED TIP ROTATION, DECREASED TIP PROJECTION, AN ACUTE NASOLABIAL ANGLE, AND A DROOPY NASAL TIP. ABNORMALITIES OF THE CAUDAL SEPTUM CAN BE THE RESULT OF A VARIETY OF CAUSES, INCLUDING CONGENITAL, INFECTION, AUTOIMMUNE, TRAUMA, AND/OR PRIOR SURGERY.

The tongue-in-groove technique recreates nasal tip support and provides the rhinoplasty surgeon with a reliable method to attain desired tip dimensions. A caudal septal extension graft can be used in cases of caudal septal deficiency in order to apply the tongue-in-groove technique. Septal cartilage is the preferred source for a caudal extension graft; however, some patients with loss of nasal tip support and abnormalities of the caudal septum have undergone prior operations that left them deficient of septal cartilage. Other sources of cartilage must be used in these patients, including irradiated cadaveric rib, autologous rib, and conchal cartilage. This report describes our experience using a modification of the back-to-back auricular cartilage graft for reconstruction of nasal tip support in the deficient nose in both external and endonasal rhinoplasty. In this technique, the folded back-to-back conchal cartilage graft straddles the midline septum and serves as a bridge so that the medial crura are secured to the residual caudal septum.

Methods

This study was approved by the Mayo Clinic, Rochester, Minnesota, institutional review board. The medical records of all patients undergoing either external or endonasal rhinoplasty in the Division of Facial Plastic Surgery, Department of Otolaryngology–Head and Neck Surgery, at the Mayo Clinic were reviewed from January 1, 2007, through June 1, 2009, and all patients undergoing caudal septal reconstruction using the back-to-back autogenous auricular cartilage graft via an exter-
nal or endonasal rhinoplasty approach were included in the study. A retrospective medical chart review was conducted, and pertinent data extracted from the charts included, but was not limited to, demographics, procedural details, outcomes, and complications. All patients had preoperative and postoperative photographs taken, and informed consent was obtained for use of the photographs for publication and educational purposes. All patients were asked to report for follow-up at 1 week, 1 month, 3 months, 6 months, and 1 year. Patients were asked to rate their functional and cosmetic outcomes at follow-up according to the criteria shown in the “Results” section.

Lidocaine hydrochloride, 1%, with epinephrine (1:100 000) was injected at the site of harvest to provide vasoconstriction and hydrodissection. Auricular cartilage was harvested in a standard anterior approach by making an incision 3 to 4 mm below the anterior helical rim with a No. 15 blade. A combination of blunt and sharp dissection is used to elevate the soft tissue away from the cymba-cavum conchal cartilage complex (Figure 1A). The cartilage and perichondrium are incised and elevated from the posterior soft tissue as the graft is harvested. The incision is closed with a 5-0 fast absorbing gut suture, and a bolster is placed to prevent postoperative hematoma.

The roughly elliptical-shaped conchal cartilage graft is medially incised on its concave surface, taking care to leave the posterior perichondrium intact (Figure 1B and C). The 2 halves of the conchal cartilage graft are folded over on themselves with the sides containing the posterior perichondrium medially so that the ultimate shape is roughly triangular. Two horizontal mattress sutures are placed using 4-0 polyglactin 910 suture on the concave side being careful to preserve the posterior perichondrium. D, The ends of the graft are both rotated 90° with the posterior perichondrium sandwiched between the cartilage. E, Two horizontal mattress sutures are placed through the cartilaginous halves before insertion using 4-0 polyglactin 910 suture. F, The final back-to-back conchal cartilage graft ready for placement.

RESULTS

Eight patients underwent caudal septal reconstruction with the modified back-to-back conchal cartilage graft during the time period studied. There were 4 women and 4 men. The median age at the time of surgery was 47 years (range, 26-81 years). The median number of prior nasal procedures (septoplasty or septrhinoplasty) was 1 (range, 0-3 procedures). All patients (100%) experienced internal nasal valve collapse, 7 patients (87.5%) from a caudal septal deviation; 4 patients (50%) exhibited a saddle nose deformity; 2 patients (25%) exhibited nasal tip ptosis; 1 patient (12.5%) had a retracted columella; and 1 patient (12.5%) had extremely limited support of her nasal tip secondary to a large septal cartilaginous perforation due to prior cocaine abuse.

Six of 8 patients (75%) underwent an external approach to septrhinoplasty while 2 patients (25%) underwent an endonasal approach. The median duration of postoperative follow-up was 12 months (range, 3-20 months). At the last follow-up, 7 of 8 patients (88%) rated their breathing as normal, whereas 1 of 8 patients (12%) rated their breathing as improved but not normal. No patients rated their breathing as unchanged or worse. At last follow-up, cosmesis was rated as excellent by 7 of 8 patients (88%) and as good by 1 of 8 patients (12%). No patients rated their cosmesis as fair or poor. At last follow-up none of the patients evaluated exhibited signs of cartilage resorption (Figure 4 and Figure 5).

There were no immediate postoperative complications related to the septrhinoplasty or the donor site. None of the patients reported problems with postopera-
The structural integrity of the caudal septum and its attachment to the lower lateral cartilages is vital to both the cosmesis and function of the nose. Deficiency or deviation of the caudal septum can lead to ptosis of the nasal tip, columellar retraction, an acute nasolabial angle, and/or obstruction of the internal or external nasal valves causing nasal obstruction. The vital role of the caudal septum in the support and function of the nose requires careful reconstruction during septorhinoplasty. Unfortunately, severe caudal septal defects are difficult to treat.

Various methods for addressing caudal septal deviation have been reported in the literature. Metzenbaum described the “swinging door technique” in which a wedge of cartilage is excised from the inferior edge of the caudal septum followed by repositioning of the caudal septum and fixation to the anterior nasal spine. Others have advocated wedge resections, septal battens or morcelization of the native caudal septum to correct the deformity. While these techniques are successful in select cases, many cases require more rigid support in the form of cartilage or bone grafting to insure durable outcomes.

Cartilage grafting techniques are frequently used to strengthen the caudal septum. The ideal source of cartilage is the autogenous septum. In most patients there is sufficient cartilage that is strong, durable, and does not present the possibility of additional donor site morbidity. Dingman and Wal-
Foda\textsuperscript{a} described a caudal septal replacement graft in which the graft is placed against Mersilene mesh used for premaxillary augmentation and then fixed to the medial crura. Others advocate the use of bone from the septum for caudal septal reconstruction. Slavit et al\textsuperscript{7} described the complete removal of the caudal septum and subsequent reconstruction with the perpendicular plate of the ethmoid bone. These techniques successfully address the support and strength needed for caudal septal reconstruction. Unfortunately, many of the patients requiring caudal septal reconstruction present with a nose deficient of cartilage or bone due to a congenital absence, prior surgery, or trauma. Alternative sources of cartilage, other than the septum, must then be considered.

Alternative sources of cartilage include costal and conchal cartilage. Costal cartilage provides a large source of grafting material with excellent physical strength. The abundance of cartilage available from the rib comes at a price given the need for a distant donor site, the postoperative pain, and the potential risk for pneumothorax. Alternatively, conchal cartilage provides a more limited supply of cartilage for grafting but is easily accessible and causes minimal postoperative pain and donor site morbidity. The physical properties of conchal cartilage are desirable in some ways. Conchal cartilage is soft, has a low rate of resorption, and is pliable. The use of conchal cartilage also has limitations. Some have reported that conchal cartilage is too soft to provide adequate skeletal support for some areas of the nose and may require additional reinforcement. For example, Neu\textsuperscript{8} described the use of the perpendicular plate of the ethmoid bone to buttress a conchal cartilage graft used in septal reconstruction.

Figure 4. A 36-year-old woman with a severe caudal septal deviation and nasal tip bifidity. Appearance before (A-D) and 18 months after (E-H) surgery.
The use of conchal cartilage for caudal septal reconstruction has been reported previously. Pirsig et al first described the use of conchal cartilage in caudal septal reconstruction in 2004. Their technique involved folding the conchal cartilage on itself and securing it with horizontal mattress sutures in a back-to-back fashion. The graft was placed in an anterior septal pocket between the medial crura and secured to one side of the residual nasal septum in an oblique fashion. Pirsig et al reported improved appearance in 25 of 26 patients and improved nasal breathing in 21 of 26 patients, with no signs of cartilage resorption, after a mean follow-up of 36.7 months.

This report describes a modification to the back-to-back conchal cartilage graft used for caudal septal reconstruction. The original report of the back-to-back conchal cartilage graft by Pirsig et al described placing the graft in an oblique fashion to 1 side of the nasal septum. Unilateral placement of the graft may lead to increased bulk on 1 side of the septum and subsequent nasal obstruction, which was reported by 1 patient in their study. In contrast, we describe using the back-to-back conchal cartilage graft similar to a medial crural extension graft. The graft straddles the residual nasal septum, which minimizes increases in bulk to the septum and ensures that the septum maintains a midline position rather than being distorted to 1 side. This positioning leads to a decreased risk of postoperative nasal obstruction or graft migration with similarly favorable outcomes. All patients in our study reported improved breathing and cosmesis at follow-up without complication. Based on our experience, we recommend the use of the back-to-back conchal cartilage graft for caudal septal reconstruction in patients with a deficiency of autologous cartilaginous septum.

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