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

The Medial Crural Extension Graft

Cody A. Koch, MD, PhD; Oren Friedman, MD

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 septrhinoplasty 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.


T
HE CAUDAL SEPTUM IS CRITI-
cal to the support of the na-
sal tip. Alterations to the
caudal septum affect the
stability of the nasal tip and
have aesthetic and functional con-
sequences. 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 na-
sal tip. Abnormalities of the caudal sep-
tum can be the result of a variety of causes,
including congenital, infection, autoim-
mune, trauma, and/or prior surgery.

The tongue-in-groove technique recre-
ates nasal tip support and provides the rhi-
noplasty surgeon with a reliable method to
attain desired tip dimensions. A caudal sep-
tal extension graft can be used in cases of
caudal septal deficiency in order to apply
the tongue-in-groove technique. Septal car-
tilage is the preferred source for a caudal ex-
tension 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 sep-
tal cartilage. Other sources of cartilage must
be used in these patients, including irradi-
ated cadaveric rib, autologous rib, and con-
chal cartilage. This report describes our
experience using a modification of the back-
to-back auricular cartilage graft for recon-
struction of nasal tip support in the defi-
cient 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 se-
cured to the residual caudal septum.

Author Affiliations:
Department of
Otorhinolaryngology–Head and
Neck Surgery, Mayo Clinic
College of Medicine, Rochester,
Minnesota. Dr Friedman is now
with the Department of
Otorhinolaryngology–Head and
Neck Surgery, University of
Pennsylvania Medical Center,
Pennsylvania Hospital,
Philadelphia.

METHODS

This study was approved by the Mayo Clinic,
Rochester, Minnesota, institutional review
board. The medical records of all patients un-
derwent caudal septal reconstruction via external
giga while 2 patients underwent an endo-
nasal 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 ex-
cellent 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.


©2011 American Medical Association. All rights reserved.
external (formed prior to placement of the septal extension graft. Via an fixation in a tongue-in-groove fashion in order to extend the intentionally left so that the graft can straddle the septum for (Figure 1D and E). A small gap between the nonfolded ends is mattress sutures are placed using 4-0 polyglactin 910 suture that the ultimate shape is roughly triangular. Two horizontal the sides containing the posterior perichondrium medially so of the conchal cartilage graft are folded over on themselves with posterior perichondrium intact (Figure 1B and C). The 2 halves are incised on its concave surface, taking care to leave the cartilage and perichondrium are incised and elevated from 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 medi ally 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 (Figure 1D and E). A small gap between the nonfolded ends is intentionally left so that the graft can straddle the septum for fixation in a tongue-in-grove fashion in order to extend the causal length of the septum.

Any resection or modification to the causal septum is performed prior to placement of the septal extension graft. Via an external (Figure 2) or an endonasal (Figure 3) septrhinoplasty approach a pocket is created between the medial crura. The septal extension graft is placed in a tongue-in-grove fashion with the ends of the graft straddling the causal septum. The graft is fixed to the septum and medial crura using 4-0 plain gut sutures. Both endonasal and external rhinoplasty approaches are closed in a standard fashion. Silastic septal stents (Dow Corning Corp, Midland, Michigan) are placed in all patients and removed at the 1-week follow-up visit.

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.

**COMMENT**

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 morcellization 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-
Dyer and Kang\(^5\) advocated completely freeing the caudal septal deflection superiorly along the nasal dorsum and inferiorly along the maxillary crest, trimming the deflection as needed followed by fixation to the anterior nasal spine, and buttressing of the dorsum of the caudal septum with a cartilage plating graft taken from the posterior septum. Foda\(^6\) 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\(^7\) 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\(^8\) described the use of the perpendicular plate of the ethmoid bone to buttress a conchal cartilage graft used in septal reconstruction.
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 one side of the nasal septum. Unilateral placement of the graft may lead to increased bulk on one side of the septum and subsequent nasal obstruction, which was reported by one 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 one 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.

Accepted for Publication: July 14, 2010.

Correspondence: Oren Friedman, MD, Department of Otorhinolaryngology—Head and Neck Surgery, University of Pennsylvania Medical Center, Pennsylvania Hospital, 811 Spruce St, Philadelphia, PA 19107 (oren.friedman@uphs.upenn.edu).

Author Contributions: Study concept and design: Koch and Friedman. Acquisition of data: Koch and Friedman. Analysis and interpretation of data: Koch and Friedman. Drafting of the manuscript: Koch and Friedman. Critical revision of the manuscript for important intellectual content: Koch and Friedman. Statistical analysis: Koch. Administrative, technical, and material support: Friedman. Study supervision: Friedman.

Financial Disclosure: None reported.

Previous Presentation: This study was presented at the American Academy of Facial Plastic and Reconstructive Surgery 10th International Symposium of Facial Plastic Surgery; April 28, 2010; Hollywood, Florida.

Figure 5. A 46-year-old man with a severe caudal septal deviation and internal and external nasal valve collapse. Appearance before (A-D) and 24 months after (E-H) surgery.
REFERENCES

3. André RF, Vuyk HD. Reconstruction of dorsal and/or caudal nasal septum deformities with septal battens or by septal replacement: an overview and comparison of techniques. Laryngoscope. 2006;116(9):1668-1673.

Visit www.archfacial.com. As an individual subscriber you may view articles by topic. Topic Collections group articles by topic area within a journal and across JAMA and the Archives Journals. The Topic Collections displayed on each journal site show the topic areas most relevant to that journal’s readership. You may use the Topic Collections list in 3 ways:
1. From the Collections page, select the topic of interest to view all articles in that topic in 1 journal or all journals.
2. From an article page, click on the topic collections associated with that article to view other articles on that topic.
3. Sign up to receive an alert when new articles in JAMA and the Archives Journals are published on the topics of your choice.