Correction of Difficult Short Nose by Modified Caudal Septal Advancement in Asian Patients

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Abstract

Background: Correction of a short nose, defined by a reduced distance from the nasal radix to the tip, has represented one of the greatest challenges in rhinoplasty. Some short nose cases are too difficult to treat with conventional grafts because of their scanty, flimsy, pliable, or deviated septum or depleted donor supply of septal or conchal cartilage. Although costal cartilage graft may be an option, patients may be reluctant to undergo this invasive surgery.

Objective: The author presents his two-year aesthetic results from the treatment of difficult short noses with the modified caudal septal advancement method.

Methods: From November 2006 to August 2008, 41 patients (ages 23-59 years) with a short nose were treated with modified caudal septal advancement, with or without extracorporeal septoplasty.

Results: Among the 36 patients who remained for six months to two years of follow-up, 20 patients achieved “excellent” results and 12 patients showed “good” results, both based on nasal lengthening measurements taken by the author. Four patients had only “fair” results. Patients in this last group, including three with overlengthening and one with inadequate elongation, required revision surgery.

Conclusions: In the Asian population, when short-nosed patients present with weak or deviated caudal septums or a limited supply of donor conchal or septal cartilage, the modified caudal septal advancement method can more predictably and efficiently provide a stable nasal base support than the conventional extension grafts, spreader grafts, or extended spreader grafts. The author believes that this technique is a safe, effective, and reliable alternative to costal cartilage grafts in dealing with difficult short noses.

Keywords
short nose, caudal septum, contracted nose, rhinoplasty

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The short nose, characterized by a reduced distance from the nasal radix to the tip, has represented one of the greatest challenges in rhinoplasty. Conventionally, several techniques have been described for correction of the short nose, including extension grafts, spreader grafts, and extended spreader grafts. By joining to the stable caudal nasal septum, these grafts increase the nasal length. Therefore, the caudal nasal septum is considered the most important anatomic structure for providing nasal support. According to Newton’s third law, for every action force, there is an equal (in size) and opposite (in direction) reaction force. Likewise, in short nose correction, a reaction force will be generated after the lengthening procedure. Therefore, more stable nasal support is necessary to resist the reaction force (Figure 1). In Caucasian individuals, the remaining nasal septum is thick enough to endure the reaction forces resulting from nose elongation. However, in Asian patients, the septal cartilage is much smaller, thinner, and shorter. Especially when a patient with a short nose exhibits a scanty, flimsy, pliable, or deviated septum, the application of the conventional caudal extension grafts, spreader grafts, or extended spreader grafts will lead to a more unstable nasal base. Without stable nasal support, tip ptosis, caudal nasal deviation, and subsequent failure of the elongated nose will develop (Figure 2). We define these situations as “difficult short nose.” On the basis of the concept previously described by Dini and Ferreira, the author modified his nose elongation technique—called caudal septal advancement, with or without combined external septoplasty—to treat the difficult short nose. This article reports the author’s experience in treating Asian patients with short noses, the complications encountered during a two-year observation period, and the aesthetic results.

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Figure 1. When an extension graft is fixed to the caudal septum, a reaction force will be generated simultaneously (arrows). Reprinted with permission.

Figure 2. When the caudal septum is very pliable, deviated, or overresected, it may collapse and result in loss of tip projection or subsequent failure of the nose elongation. The inset illustration shows the potential one-side check-valve nasal obstruction developed as a result of a distorted dorsal-caudal nasal septum. Reprinted with permission.

Figure 3. (A) Caudal septal advancement technique. 1 = central-posterior septal cartilage to be harvested; 2 = L-shaped caudal septal component to be separated. (B) Caudal septal advancement technique. 3 = external septoplasty for the weak or deviated caudal septum; 4 = advanced caudal septum; 5 = inserted spreader grafts; 6 = implanted Gore-Tex on the dorsum; 7 = conchal cartilage graft to nasal tip. The inset shows a frontal view of this technique without implantation of Gore-Tex and conchal cartilage graft. Reprinted with permission.
Figure 4. Intraoperative demonstration of the author’s caudal septal advancement technique. (A) The resected central-posterior septum and caudal septum. (B) The weak caudal septum becomes distorted with applied pressure. (C) The reinforced caudal septum. (D) The caudal septum is reintroduced and spreader grafts are inserted. (E) Three layers of 2-mm-thick Gore-Tex are implanted to the nasal dorsum with conchal cartilage graft to the tip area.
METHODOLOGY

From November 2006 to August 2008, 41 patients (ages, 23-50 years) with a short nose were treated by caudal septal advancement. Of the 41 patients, four were lost to follow-up and one patient contracted an infection resulting in removal of the Gore-Tex and refused further rhinoplasty, leaving only 36 patients available for follow-up. Twelve patients were classified as having a primary short nose and 24 patients as having a secondary short nose. Three patients with saddle nose in conjunction with a short nose were also included in this series. The indications for surgery included (1) a short nose with a flimsy or pliable caudal septum that was unable to withstand the reaction force induced by nose elongation, (2) a short nose with caudal septal deviation that was judged intraoperatively to be unable to provide a stable nasal support after nose-lengthening procedures, and (3) a short nose with borderline limited supply of donor conchal or septal cartilage. The preoperative evaluation included physical examination and computer image simulation using Mirror imaging systems (Canfield Scientific, Inc, Fairfield, New Jersey).

Through an open approach, extensive undermining of the nasal skin and radical release of the lower lateral cartilage from the upper lateral cartilage were performed. Subsequently, the central-posterior septal cartilage was resected, to be used as a spreader graft. The L-shaped caudal septal component was then removed from its attachments around the nasal spine. To avoid destabilization of the middle nasal vault, the surgeon preserved a stable dorsal strut at least 1.5 cm in length along its anteroposterior axis and 1 cm in width (Figure 3A). Caudal septoplasty was then performed to strengthen and straighten the weak or deviated caudal septum. The batten graft was harvested from the resected central-posterior septum or conchal cartilage, depending on the availability of the donor cartilage. The reconstructed L-shaped caudal septum was reintroduced, with its inferior aspect sutured to the periosseum around the nasal spine or to the cancellous nasal spine by drilling two holes with a 21-gauge needle. Fixation was necessary to prevent the caudal septal strut from slipping out of the midline. The spreader grafts that were harvested from the thickest posterior septal base or thinner central septum were then placed. When the donor septal cartilage was too small or depleted, the conchal cartilage graft was chosen. In some patients who had a prior extension grafting procedure, the extension graft was carefully dissected and recycled as spreader grafts. The spreader grafts were fixated to the dorsal strut at the keystone area and L-shaped caudal septum, respectively. Finally, nose elongation was completed, with the medial crura sutured to the caudal margin of the advanced septal graft.

In this series, all patients also presented with underdeveloped nasal dorsum, which is very common in Asian patients. We chose Gore-Tex (expanded polytetrafluoroethylene or ePTFE, W. L. Gore & Associates, Inc, Flagstaff, Arizona) for dorsal augmentation because of its high tissue compatibility. The 2-mm-thick Gore-Tex was stacked in multiple layers as necessary and sutured into position with the open approach, and a tip cartilage graft was then implanted (Figures 3B and 4).

RESULTS

Patients were scheduled for follow-up at three months, six months, and then every six months thereafter. All patients were evaluated in person by the author. Patient photographs taken at each visit were also analyzed and compared. The amount of nasal lengthening varied, ranging from 2 to 8 mm depending on the final nasal length desired. Measurements were obtained and the results were classified into four groups. “Excellent” results indicated that the preoperative aesthetic goals were achieved completely. The outcome was defined as “good” if the nasal length was within 1 mm (shorter or longer) of the planned length. The result was judged as “fair” when the nasal length was 1 to 2 mm too short or too long. Any nasal length over 2 mm shorter or longer than the planned length was classified as “poor.”

Among 36 patients with six months to two years of follow-up, 20 patients achieved “excellent” results (Figures 5, 6, and 7), and 12 patients showed “good” results. Four patients were classified as “fair.” These four patients, including three with overlengthening and one with inadequate elongation, required revision surgery. In the overcorrected cases, the caudal part of the advanced septum was trimmed accordingly. In the undercorrected nose, more conchal cartilage grafts were added to the nasal tip and columella. When smiling, one patient had a “click” in the nasal spine area that required refixation of the base of the caudal septum to the nasal spine. No instances of caudal nasal deviation or destabilization occurred.

DISCUSSION

The caudal septum is considered the most important anatomic structure in providing nasal base support. Stabilizing the nasal base is a critical step in correction of the short nose. It can provide a good long-term outcome with preservation of the nasal tip projection. However, in Asian patients, the qualities of the caudal nasal septum are occasionally unsuitable. For instance, it may be very thin or weak, or it may be curved or distorted. Under these circumstances, achieving a stable support is difficult. Additionally, the amount of donor septal or conchal cartilages is occasionally limited and makes the buildup of a stable nasal base even more difficult. Therefore, when an extension graft is fixated to the caudal septum for lengthening the nose, the summation force (including the generated reaction force, the postoperative scar contraction force, and gravity) may shift the cartilage grafts to either side of the caudal septum and subsequently lead to the collapse and deviation of the nasal tip or nose elongation failure (Figure 2). In some situations, patients may even develop a one-side check-valve nasal obstruction because...
Figure 5. (A, C) A 25-year-old man who presented complaining of primary short nose. (B, D) One year after augmentation rhinoplasty with caudal septal advancement and external septoplasty because of a pliable and deviated caudal septum. The caudal septal batten graft and spreader grafts were harvested from central-posterior septum. Gore-Tex implantation to the nasal dorsum, conchal cartilage grafting to tip, and ala rim trimming were performed.
of the distorted dorsal-caudal nasal septum (Figure 2). When the short-nosed Asian patient presents with a weak or deviated caudal septum, the placement of spreader grafts or extended spreader grafts alone or in conjunction with a floating-type columella strut may create similar problems.

To overcome problems resulting from caudal septal instability, the caudal septum can be replaced in situ with batten grafts or septal replacement. However, batten grafts are usually difficult and may not easily allow complete elimination of the residual inherent tensile forces or cartilage memory of the deviated caudal septum, which may result in distortion later. Septal replacement is designed to remove the caudal septum and then replace it either after external remodeling with batten grafts or replace it completely with an alternative material, such as autogenous or banked rib cartilage grafts. However, many patients may be reluctant to undergo rib cartilage grafting surgery because of its invasiveness, rigidity, and...
Figure 6. (A, C) A 22-year-old woman who complained of caudal nasal deviation and recurrent short nose after septal extension grafting and Gore-Tex implantation one year previously. (B, D) Two years after the patient’s second surgery, involving augmentation rhinoplasty with caudal septal advancement and external septrplasty because of a nearly depleted donor central septum and a pliable caudal septum. A piece of cartilage from the posterior septum was used as a batten graft to enhance the strength of the caudal septum. The spreader graft was composed of recycled previously-implanted extension graft and conchal cartilage graft. Gore-Tex to the nasal dorsum and a conchal cartilage graft to the tip were applied as well. The patient also received a mastoid fascia-fat graft to her nasal tip seven months prior to these photos to correct skin thinning on the nasal tip.
Figure 6 (continued). (E, G) A 22-year-old woman who complained of caudal nasal deviation and recurrent short nose after septal extension grafting and Gore-Tex implantation one year previously. (F, H) Postoperative views two years after the patient’s second surgery, involving augmentation rhinoplasty with caudal septal advancement and external septoplasty because of a nearly depleted donor central septum and a pliable caudal septum.

potential warping problems. The caudal septal advance- ment technique therefore has several advantages. First, the caudal septum can be externally reinforced with batten grafts. Second, the caudal septum is not just replaced, but also advanced as a fixed-type columella strut graft, so the stability of the nasal base can be predictably achieved. Last, the strut cartilage graft is saved. Therefore, caudal septal advancement is strongly indicated in a patient with a more pliable, flimsy, or deviated caudal septum or with marginal shortage of cartilage graft supply.

The difference between Dini and Ferreira’s report 5 and the present study is the sequence of the procedures. Dini and Ferreira externally fixated the spreader graft to the L-shaped caudal component first and then reintroduced the caudal septum, with its inferior aspect fixated to the nasal spine. The disadvantage with that sequence is the difficulty of properly angling the spreader graft to the cephalic dorsal septum. Therefore, in the present investigation, the sequence of the procedures was modified by advancing the caudal septum with fixation to the nasal spine first. Spreader grafts were then used to bridge the gap between the caudal septum and the cephalic dorsal septum in the proper angle.

The fixation of caudal septum to the nasal spine must be addressed because an unstable suture may allow the caudal septum to slip out of the midline, resulting in
Figure 7. (A, D) A 28-year-old woman who complained of severe contracted nose after previous silicone augmentation rhinoplasty. Low-grade infection was suspected. (B, E) Three months after removal of the silicone implant, the short nose was improved. (C, F) Two years after reaugmentation rhinoplasty with caudal septal advancement and external septoplasty because of a pliable caudal septum and a nearly depleted donor central septum. Two pieces of conchal cartilage served as a batten graft to enhance the strength of the caudal septum. The spreader grafts consisted of a conchal cartilage graft and a septal graft harvested from the posterior septum. Gore-Tex to the nasal dorsum and a conchal cartilage graft to the tip were applied as well.

caudal nasal deviation (or the “click” when the patient smiles). Therefore, the fixation of the caudal septal base must be secured with two 5-0 polydioxanone sutures. With increased experience, the author now prefers to suture through two predrilled holes at the nasal spine for stable fixation.

To date, the literature contains no reports addressing difficult short nose correction by this integrated approach—that is, by combining caudal septal advancement with external septoplasty. These results show that when patients with short noses present with a weak or deviated caudal septum that is unable to sustain the reaction force induced by nose lengthening, the integrated approach is an appropriate and acceptable alternative to traditional techniques.

As a side note, for augmentation materials, the author prefers to use Gore-Tex rather than silicone implants because Gore-Tex is more biocompatible with the human body, and the long-term risks of capsular contracture and calcification-induced deformation are reduced.¹⁷
CONCLUSIONS
On the basis of these limited experiences, the author believes that, in Asian patients with short noses and weak or deviated caudal septums or a limited supply of donor conchal or septal cartilage, the application of the caudal septal advancement method can more predictably and efficiently provide a stable nasal base support than the conventional extension grafts, spreader grafts, or extended spreader grafts. This technique is a safe, effective, and reliable alternative to costal cartilage grafts in addressing the difficult short nose.

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REFERENCES