Correction of Severe Caudal Deflections With a Cartilage “Plating” Rigid Fixation Graft

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Objective: To evaluate a technique for correction of severe caudal septal defects.

Design: For all patients, preoperative photographs were analyzed and subjective nasal airway patency surveys were conducted. The caudal septal defects were then repaired with the cartilage “plating” rigid fixation technique. The intraoperative findings were documented in pictorial diagrams. Postoperative photographs and repeated airway surveys were obtained during the subsequent follow-up visits. Preoperative data and long-term postoperative data were compared and analyzed.

Setting: Private practice, ambulatory surgical center.

Patients: Thirty-six patients had significant caudal septal deviations and functional airway obstruction.

Main Outcome Measures: Accuracy and stability of the correction, airway improvement, patient satisfaction, and morbidity.

Results: Since 1988, 36 patients were treated for severe caudal septal defects using cartilage plating rigid fixation. Follow-up visits have ranged from 3 to more than 9 years. All patients have maintained an accurate correction of their caudal septal deflections. All patients have also noted subjective improvement of their nasal airway. No complication has been encountered.

Conclusion: Cartilage plating rigid fixation seems to be an effective method of correcting the functional problems associated with severe caudal septal deformities.


Severe caudal septal deflections that create nasal airway obstruction have always been challenging to correct surgically. The caudal edge of the septum is often displaced into one or both sides of the nasal vestibule with resultant nasal airway obstruction (Figure 1). The surgeon’s challenge is to straighten accurately the sharply deflected caudal septum to restore nasal function.

Metzenbaum, in 1929, was the first to specifically address the difficulty in treating anterior septal deformities. Many others have since attempted to correct this difficult problem with variable success. One of the more generally accepted methods of correcting the severely deviated caudal septum entails the use of the Metzenbaum “swinging door” maneuver with suture fixation of the cartilage to the nasal spine. This is often in conjunction with wedging, scoring, or morseling the septal cartilage. The weakened cartilage is often splinted with a batten graft.

Our approach to the surgical correction uses the open rhinoplasty approach. The open rhinoplasty approach provides complete exposure and an accurate assessment of the severity of the caudal deviation as it relates to the surrounding structures. This wide exposure also facilitates accurate correction of the caudal septal defects. The first part of the repair entails releasing all the forces and tension involved in the septal defect. The second part entails restoring the septum to a proper position using a cartilage “plating” rigid fixation technique. It is important to distinguish the function of the cartilage plating graft as a strategically placed rigid fixator rather than as a mere buttress for extensively scored or morselized caudal septum. The principle of this function is similar to that of a miniplate, which prevents rotation when used in a 2-point fixation of a tripod fracture. Once the caudal septum is accurately stabilized into its corrected position, the inherent strength of the cartilage is maintained by the rigid cartilage plating rigid fixation graft.
A retrospective review of 36 patients who underwent correction of severe caudal septal deflections was performed to evaluate the effectiveness of this technique in restoring nasal airway patency.

**RESULTS**

Using the above method since 1988, we have treated 36 patients with severe caudal septal defects (Table). Twelve of the 36 patients had previously undergone a septoplasty (Table). Most patients had sharp caudal septal deflections involving the entire vertical length, usually starting from the proximity of the septal angle superiorly and extending inferiorly to the region usually 5 to 10 mm posterior to the nasal spine. In addition, most cases showed the caudal edge of the septum to be displaced into the nasal vestibule opposite the septal deflection.

The clinical examination and analysis of the photographs showed that the correction of the septal defect has remained stable throughout the long-term follow-up period (ranging from 3 to >9 years) in all 36 patients (Figure 7). In terms of functional correction, all 36 patients who had compromised nasal airway noted considerable subjective nasal airway improvement, usually within 1 month. More importantly, they were noted to maintain their nasal airway patency throughout the length of follow-up.

Potential complications including displacement or resorption of the cartilaginous plating graft leading to weakening of the caudal septum, retraction of the columella, or overshortening of the nose have not been encountered. Other complications associated with septal surgery including infection, hematoma, septal perforation, granuloma formation, synchiae, or saddle nose deformities also have not been encountered.

**COMMENT**

The caudal septal defects are most often traumatic but also may be iatrogenic in origin. The defects, which are anterior to the nasal spine, may be easily addressed by...
simply shaving the caudal edge of the septum. However, the severe deflections that involve the region posterior to the nasal spine and involve the entire vertical length to the dorsal angle have proven to be technically challenging to correct. Although various methods have been discussed over the years, the severe caudal septal deformity remains a difficult problem to correct.

Metzenbaum,1 in 1929, was the first to specifically address the difficulty in treating the anterior septal deviation. He noted that posterior resection has minimal influence in correcting an anterior deviation. He, therefore, introduced the swinging door method in which a vertical wedge of the cartilage on the convex side is resected followed by repositioning of the anterior septum in a swinging door–like manner.

Peer,2 in 1937, recommended extensive excision of the septum, leaving only a strut to support the dorsum of the nose. He claimed that the tip support could be maintained with a piece of the resected septum inserted into the columella. Foman,3 in 1948, proposed a similar method using either a large strut or multiple struts placed in tandem position. He also believed that a strut introduced into the collumella without contact with the dorsal support is sufficient to maintain the collumella position and tip support without creating any retraction pockets. However, Converse,4 in 1977, demonstrated that excessive cartilage removed from the “weak triangle” in the region of the anterior septal angle can lead to a saddle nose deformity. In addition, these techniques significantly increase the risk of loss of tip projection, retraction of the collumella, and overshortening of the nose.

The concept of using a batten graft to support the caudal septum area was first introduced in 1956 by Digman.5 He advocated correction of the caudal deviation by scoring and resecting strips of septal cartilage and se-
curing an osseous or cartilaginous graft to the weakened cartilage to avoid recurrence (Figure 8). Dupont et al,6 in 1966, described a similar technique in which after the routine submucous resection, the deflections of the remaining dorsal-caudal strip of the cartilage are corrected by wedge resections. The vomer or perpendicular plate of the ethmoid bone was then harvested and used as a splint to reinforce the weakened caudal septum. More recently, Goode7 has discussed use of various combinations of wedging, scoring, shaving, or morselizing the caudal septum followed by splinting the weakened caudal septum with a cartilage batten graft or bony septal graft if cartilage graft is not available. Metzinger et al8 also recently described a technique in which bilateral ethmoid bone sandwich grafting is performed (Figure 9).

Our method entails first obtaining a wide exposure to visualize the full length of the caudal septum from the dorsum to the nasal spine. The procedure is performed through a bilateral elevation of the mucoperichondrial flaps to relieve all “tension” forces between the mucoperichondrium and the septal cartilage. Typically, deviation involving the caudal septum is judiciously approached with partial wedging, scoring, or morselizing. The deflections involving the dorsal edge of the caudal septum are approached even more cautiously for fear of losing dorsal septal support. As a result, the remaining unrelieved septal “spring” force may cause persistent or recurrent septal deflection. In these difficult situations, complete vertical disarticulation can be performed safely so long as the restored caudal septum is rigidly stabilized as shown in this technique.

Others have substantially weakened the caudal septum by either extensive scoring or by morselization and...
then buttressing the whole length of the weakened septum with a batten graft.5-7 This method would require a larger graft that may not be readily available in the posterior septal area. In addition, it may cause significant thickening of the septum, especially if bilateral sandwich grafts are used.

It is important to distinguish our cartilage graft as a plating graft that rigidly fixes and maintains the inherent strength of the caudal septum rather than as a mere buttress for a previously weakened septum (Figure 10). This rigid fixation prevents any rotation of the caudal septum, thus minimizing any chance of recurrent deviation. This principle is analogous to the use of a single rigid plate in a 2-point fixation of a tripod fracture.

In terms of choosing the plating graft for use in the caudal septal area, we believe that the autogenous cartilage grafts are superior to other grafts. Autogenous cartilage grafts in a suitable vascular bed can survive by transfer of living chondrocytes that grow and remain viable.11,12 Preserved or irradiated homografts and heterografts are devoid of any living chondrocytes and provide only a matrix that is slowly absorbed and replaced by fibrous ingrowth from the recipient bed.13 This may eventually result in reduced stabilization and recurrence of the septal deformity. In terms of bone grafts, membranous bone seems to be superior to endochondral bone with greater revascularization and survival rate.14,15 In general, however, bone grafts require good bone fixation to survive optimally.16,17 The caudal septal area is probably not an ideal recipient bed, and bone graft placed in this site may eventually lead to an unpredictable outcome.

Finally, to obtain the exposure for this type of repair, many of the nasal tip supporting mechanisms are compromised.18,19 These supporting mechanisms must
be meticulously reconstructed and often augmented with the use of a columellar strut graft.

**CONCLUSION**

We have discussed in this article our method of correcting severe caudal septal defects that entails using an open rhinoplasty approach to gain wide exposure, releasing all the forces involved in the septal deflection, restoring the septum to a proper position using a rigid fixation technique, and reconstructing the tip supporting mechanisms. Although this method proves to be technically more challenging, the cartilage plating rigid fixation technique seems to be an effective and long-lasting method of correcting functional problems associated with severe caudal septal deformities.

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**REFERENCES**


