

# Simplifying the Management of Caudal Septal Deviation in Rhinoplasty

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**Summary:** Correction of the deviated nose poses a challenge in even the most experienced hands. Frequently, the surgeon is faced with both a functional (airway obstruction) and an aesthetic problem that must be addressed conjointly. Accurate preoperative analysis and intraoperative diagnosis are integral to good outcomes. Caudal septal deviation is frequently present in patients presenting for rhinoplasty. The authors' current graduated technique for simplifying the management of the caudally deviated septum both aesthetically and functionally is described. If there is a persistent caudal septal deviation that has not been addressed by standard maneuvers, the caudal portion of the anterior septum is resected at the osseocartilaginous junction with the anterior nasal spine and maxillary crest and then sutured back to the periosteum of the anterior nasal spine with 5-0 polydioxanone. We have found this to be a safe and effective way of addressing the caudally deviated septum in the majority of cases. (*Plast. Reconstr. Surg.* 134: 379e, 2014.)

Achieving a consistent functional and aesthetic result when performing rhinoplasty demands intimate knowledge and understanding of nasal anatomy and physiology. Correction of the deviated nose is no exception. Accurate preoperative analysis and intraoperative diagnosis are essential to the surgeon's success. Correction of these deformities poses an array of challenges to the rhinoplasty surgeon because of the dilemma of dealing with both functional and aesthetic problems at the same time. The anatomy of a deviated nose can involve asymmetries of the bony pyramid, a septal abnormality, or asymmetries of the upper and lower lateral cartilages, but usually involves some combination of these problems. This can result in nasal airway obstruction without external deviation, external deviation without nasal airway obstruction, or external deviation with nasal airway obstruction. In addition, facial asymmetries add complexity to the analysis.

Classification systems exist for septal deformities<sup>1</sup> and the deviated nose.<sup>2</sup> A multitude of techniques to address these deformities, including swinging door flaps, a variety of grafts including

battens and spreaders, scoring, wedging, and extracorporeal septoplasty, have been described.<sup>1-20</sup> Despite these various techniques, management of caudal septal deviation remains challenging. Building on concepts and techniques used to correct posterior septal deviation,<sup>2</sup> this technique has evolved to include the management of the caudally deviated septum.

Caudal septal deviation is common in patients seeking rhinoplasty. We performed a recent review of 100 consecutive patients in a single surgeon's practice that showed a 44 percent prevalence of caudal septal deviation. In this article, our current technique for simplifying the management of the

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caudally deviated septum both aesthetically and functionally is outlined.

### OPERATIVE TECHNIQUE

Open rhinoplasty is the preferred approach for accurately diagnosing and correcting all deviated structures. This exposure allows unprecedented access to the entire septum and direct visualization of all structures.

#### Release of the Mucoperichondrium

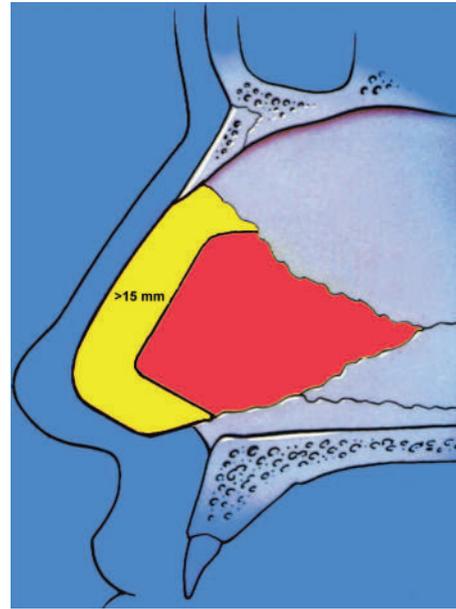
A submucoperichondrial dissection is performed using a Cottle elevator, beginning at the anterior septal angle. Bilateral mucoperichondrial tunnels are dissected deep to the upper lateral cartilages, and a scalpel is used to separate the upper lateral cartilages from the dorsal septum. The mucoperichondrial attachments must be widely released to allow any deviated portions of the septum to be returned to the correct position. In the case of caudal septal deviation, the mucoperichondrium must be released all the way to the anterior nasal spine. In some cases, the septum will straighten after release of the mucoperichondrium if there are no intrinsic forces causing deviation of the cartilaginous or bony septum.

#### Creation of the L-Strut

Once the deforming extrinsic forces have been released, the septum is assessed for intrinsic deviation. Septal reconstruction is performed to correct intrinsic septal deviation. Anterior septal deviation will lead to an external deformity. The anterior septum is separated from the posterior septum by creating an L-strut composed of the dorsal and caudal anterior septum. The dorsal and caudal L-strut should be at least 10 mm wide; however, this will depend on the strength of the septal cartilage, and in many instances, a width of 15 mm or more may be required to ensure long-term support. In addition, curving the transition points between the perpendicular plate of the ethmoid and the dorsal L-strut, and also between the dorsal and caudal L-strut, can help to strengthen the construct<sup>20</sup> (Fig. 1).

#### Reconstruction of the Posterior Septum

The anterior two-thirds and the inferior aspect of the septum posteriorly can affect nasal airflow significantly when deviated from the midline.<sup>21</sup> Anterior and inferior septal deviations tend to be poorly tolerated, as the cross-sectional area of the nasal airway is small compared with posterior in the nasal cavity.<sup>21</sup> Septal reconstruction involves

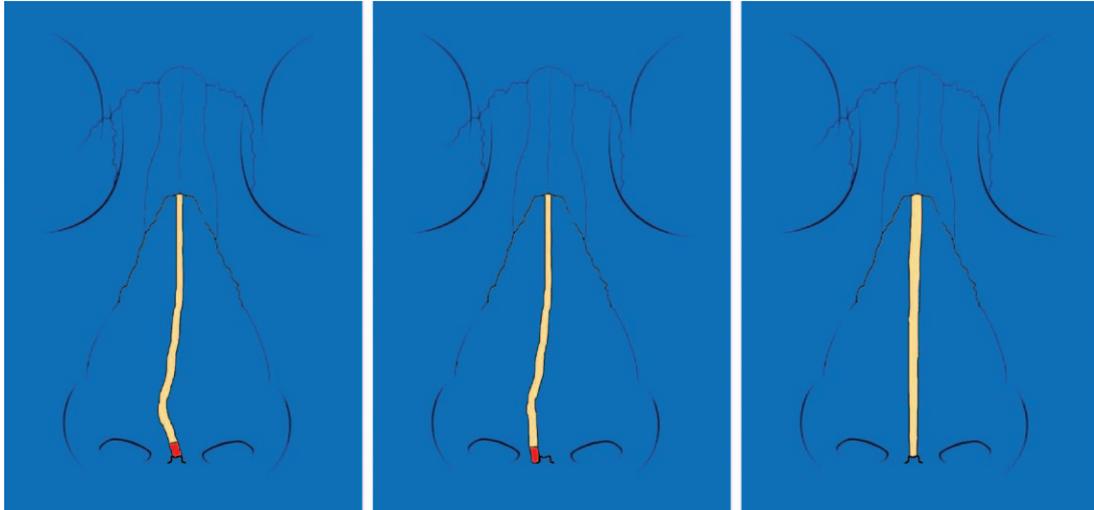


**Fig. 1.** In many instances, the width of the dorsal and caudal L-strut should be 15 mm or more to ensure long-term support. Curving the transition points between the perpendicular plate of the ethmoid and the dorsal L-strut and between the dorsal and caudal L-strut can help add strength.

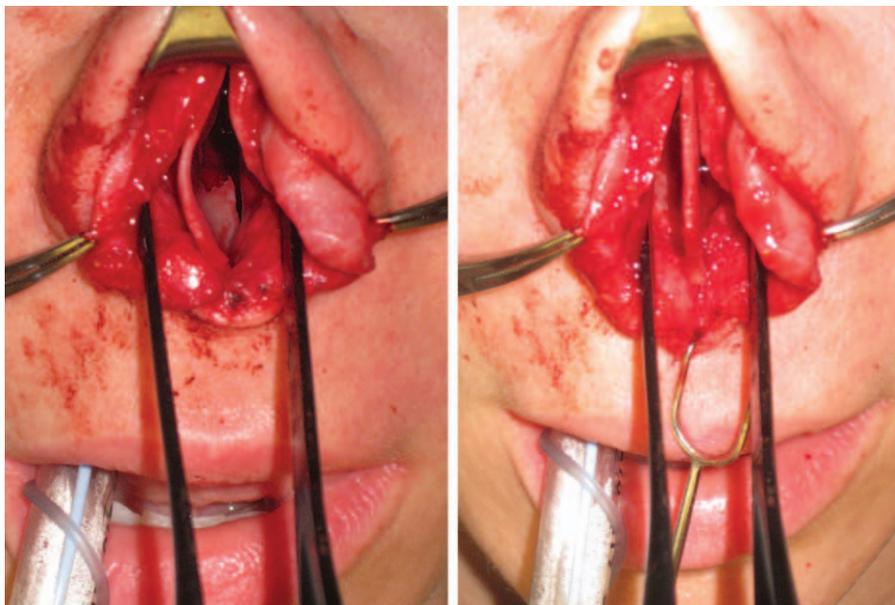
returning the deviated septum to the midline. The principle of cartilage preservation is essential. Cartilaginous septum that is deviated or required for grafting should be removed. When addressing the bony septum, the septum can be microfractured and returned to the midline. In cases of C- or S-shaped craniocaudal deviation, there is vertical excess of the septum, and removing the inferior aspect of the septum allows for microfracture of the remaining septum and return to the midline. Microfracture should be performed in a careful and controlled manner to avoid uncontrolled fractures into the superior nasal septum and cribriform plate. This is particularly important in posttraumatic cases where there may have been a prior septal fracture. Bony spurs of the septum can be removed using Takahashi forceps. Septal cartilage or bone should be removed with ease; if there is any resistance, residual soft-tissue attachments should be completely released.

#### Correcting Caudal Septal Deviation

Once the posterior septum has been reconstructed, if there is a persistent caudal septal deviation, this is typically caused by vertical excess of the anterior septum (Fig. 2). The caudal portion of the L-strut is disarticulated from the osseocartilaginous junction with the anterior nasal spine and maxillary crest. The degree



**Fig. 2.** (Left) Cranial caudal septal deviation caused by vertical excess shown in red. (Center) Release of the caudal L-strut from the maxillary crest, with the amount of vertical excess shown in red. (Right) Repositioning of the caudal L-strut to the midline after excision of the excess caudal L-strut.



**Fig. 3.** Intraoperative views showing correction of vertical excess of the septum (left) before release of the caudal L-strut and shortening followed by (right) repositioning to the midline by suturing to the anterior nasal spine.

of vertical excess is assessed and excised to allow the previously deviated septum to be returned to the midline (Fig. 3). (See **Video, Supplemental Digital Content 1**, which addresses vertical excess of the L-strut followed by repositioning the caudal septum to the midline, <http://links.lww.com/PRS/B65>.) Both excision of the caudal septum and release and excision of the septum at its articulation with the anterior nasal spine and maxillary crest have the potential to decrease tip projection. In many cases, only the portion of

the caudal L-strut that articulates with the anterior nasal spine and maxillary crest needs to be excised and the free edge of the caudal septum remains, whereas in other cases, both need to be altered. These maneuvers will alter tip projection and rotation in different ways, and their effects must be kept in mind when manipulating the tip complex and setting tip projection and rotation. In addition, suturing the caudal L-strut back to the anterior nasal spine must be accurate to recreate the articulation. A 5-0 polydioxanone suture



**Video.** Supplement Digital Content 1 addresses vertical excess of the L-strut followed by repositioning the caudal septum to the midline, <http://links.lww.com/PRS/B65>.

is used to suture the septum down to the periosteum of the contralateral aspect of the nasal spine. This suture must be placed precisely and without too much tension to avoid creating an asymmetry of the nasal base by flaring the contralateral medial crural footplate on that side. When the anterior nasal spine is located away from the midline, it may be necessary to osteotomize the anterior nasal spine to return it to the midline or excise the anterior nasal spine and suture the septum down to the periosteum of the maxilla. If this maneuver is required, great care must be taken, as excessive resection of the anterior nasal spine can damage the anterior maxillary nerve and subsequently cause some upper lip numbness.

### Supporting the Dorsal Septum

In some cases, it may be necessary to perform clocking sutures between the upper lateral cartilages and the dorsal septum as described by Guyuron et al.<sup>1,19</sup> Reattaching the upper lateral cartilages to the septum with 5-0 polydioxanone mattress sutures will bolster the septum through the upper lateral cartilages to the pyriform aperture. Differential septal sutures are very effective in this situation.<sup>1</sup>

### Supporting the Tip Complex and Alar Rims

Multiple maneuvers described decrease tip support and/or projection, namely, performing the open approach, separating the upper and lower lateral cartilages from each other, shaving down the nasal spine, and shortening the caudal septum. A vital component to the operation, a columellar strut is placed to support and unify the tip complex<sup>22</sup> and maintain projection. In some instances, caudal septal deviation can be exaggerated by malposition of the medial crura, and this

should also be corrected.<sup>23–25</sup> The alar rims can be strengthened using alar contour grafts or lateral crural strut grafts, depending on the length and strength of the lateral crura. In instances of asymmetric alae or enlargement, it may be necessary to modify the alar bases through alar base excision or even lower lateral cartilage modifications.

At the end of the procedure, a dorsal nasal splint is placed along with Doyle internal nasal Silastic splints to keep the repositioned septal structures in the midline. It may be necessary to leave the internal nasal splints in place for 1 to 3 weeks, depending on the degree of stability of the septum after reconstruction.

## CASE REPORTS

### Case 1

A 60-year-old man presented for primary rhinoplasty with a crooked nose and caudal septal deviation (Figs. 4 and 5). He had an asymmetric, boxy tip, and severe malposition of the caudal septum into the left nostril, with accompanying flaring of the left medial crural footplate. In addition, he had nasal airway obstruction. He had open rhinoplasty with component dorsal reduction. He underwent septal reconstruction with correction of caudal septal deviation using disarticulation of the L-strut from the anterior nasal spine, shortening of the L-strut at its articulation with the anterior nasal spine, and 5-0 polydioxanone suture from the L-strut to the periosteum of the anterior nasal spine. He had a columellar strut graft and medial crural-columellar strut sutures followed by transdomal and interdomal sutures to improve symmetry and tip definition. An infratip graft was placed to improve tip definition. Percutaneous perforated lateral nasal osteotomies were used to close the open roof. Two-year postoperative follow-up photographs are shown, with straightening of the nose from the frontal and lateral views and improvement of tip definition. On the basal view, the caudal septal deviation is significantly improved and the overall aesthetics of the columellar base are more symmetrical.

### Case 2

A 38-year-old woman presented for secondary rhinoplasty with an S-shaped dorsal deviation along with caudal septal deviation (Figs. 6 and 7). She had an overprojected, asymmetric tip; right alar notching; and malposition of the caudal septum into the left nostril. In addition, she had nasal airway obstruction. She underwent open rhinoplasty with component dorsal reduction; the upper lateral cartilages were later used as autospreader flaps and fixed to the dorsum with upper lateral cartilage tension spanning sutures. She underwent septal reconstruction with correction of caudal septal deviation using disarticulation of the L-strut from the anterior nasal spine, shortening of the L-strut at its articulation with the anterior nasal spine, and 5-0 polydioxanone suture from the L-strut to the periosteum of the anterior nasal spine. Wide undermining of the medial crura was performed to decrease tip projection and excision of the medial crural footplates. She had a columellar strut graft and medial crural-columellar strut sutures followed by transdomal and interdomal sutures to improve symmetry and tip definition. Bilateral alar contour grafts were placed. Medial crural footplate reapproximation sutures were used to contour the columellar base.



**Fig. 4.** Case 1. Preoperative (*left*) and 2-year postoperative views (*right*), including frontal (*above*), lateral (*center*), and basal (*below*) views.

Percutaneous perforated lateral nasal osteotomies were used to close the open roof. Two-year postoperative follow-up photographs are shown with straightening of the nose from the frontal

and lateral views and deprojection of the tip. On the basal view, the caudal septal deviation and the overall aesthetics of the columellar base are significantly improved.

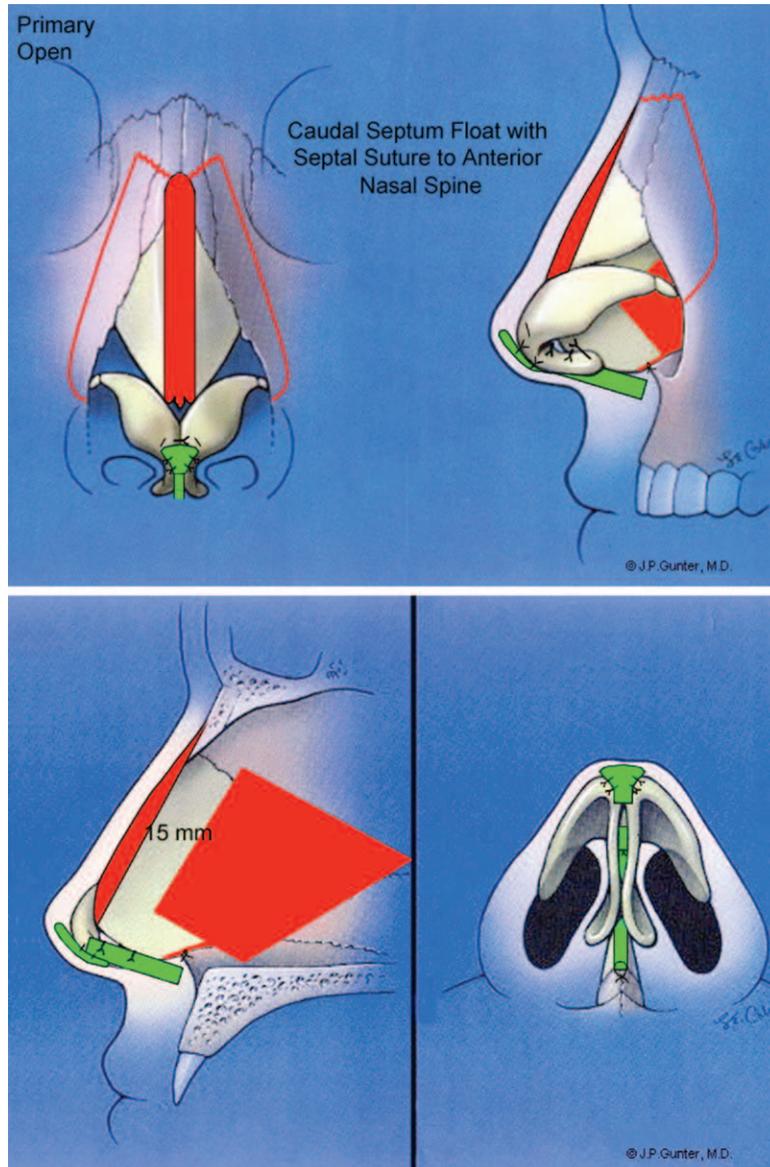


Fig. 5. Gunter diagrams for case 1.

### DISCUSSION

When addressing the deviated nose, an accurate preoperative analysis and intraoperative diagnosis are integral to good outcomes. Caudal septal deviation is relatively common in patients presenting for rhinoplasty, and recognition of this frequent deformity is essential to correction of the deviated nose. This deformity is most readily recognized from the basal view. It is important to also recognize other deformities that can contribute to asymmetry that will require correction: tip deviation, nostril asymmetry, and medial crural deformities.

In addressing the deviated nose, the open approach allows unprecedented exposure and access of the entire septum. It provides wide

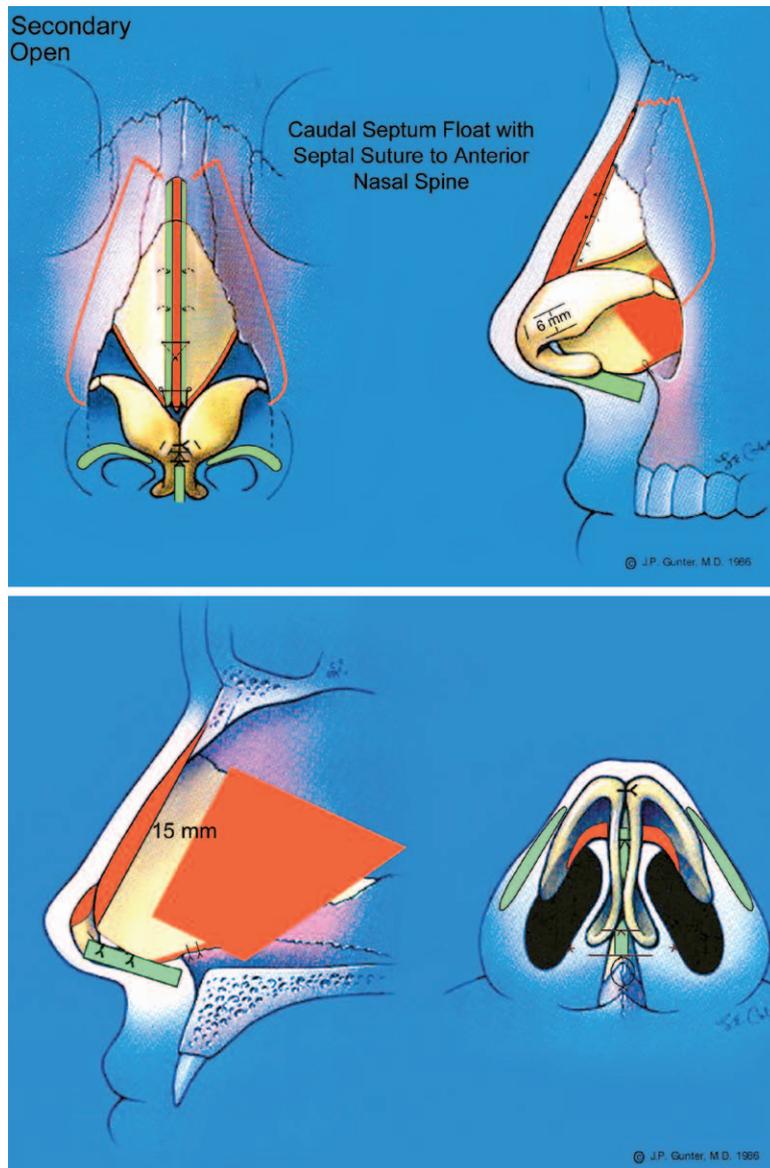
exposure not only for diagnosis of deformities but also for manipulation of the septum under direct visualization. In addition, this approach allows for complete release of the septum from all extrinsic deforming forces. When correcting caudal septal deviation, it is critical to extensively and completely release the mucoperichondrial attachments all the way to the osseocartilaginous junction with the anterior nasal spine. The entire caudal edge of the nasal septum should be free of any deforming forces arising from the mucoperichondrium and the lower lateral cartilages. Only once these extrinsic forces are released can true intrinsic septal deviation be assessed. An accurate diagnosis of the problem is critical to achieving success.



**Fig. 6.** Case 2. Preoperative (*left*) and 2-year postoperative views (*right*), including frontal (*above*), lateral (*center*), and basal (*below*) views.

Repositioning or resection of the deviated septum is referred to as “septal reconstruction,” as opposed to septoplasty or submucous resection.

Treatment of the posterior septum should include harvest of any septal cartilage for grafting, removal of any significantly deviated septum or

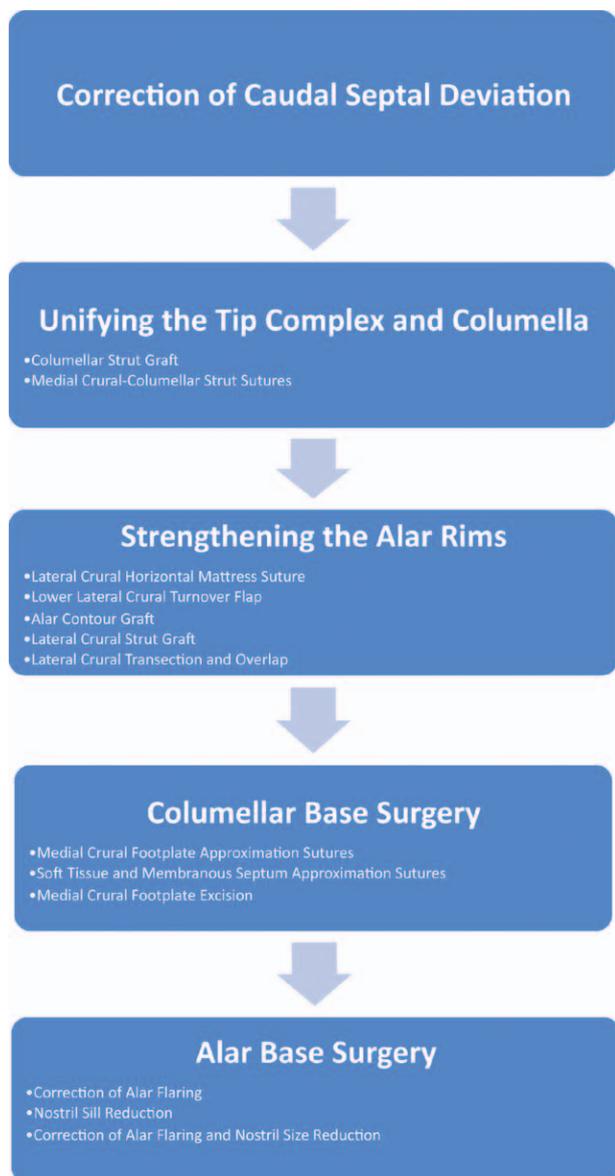


**Fig. 7.** Gunter diagrams for case 2.

spurs contributing to nasal airway obstruction that cannot be repositioned, and microfracture of any mildly deviated septum with repositioning to the midline. Preservation of cartilage is a key principle in modern rhinoplasty, and applies to septal reconstruction as well. If there is harvested cartilage that remains unused at the end of the procedure, it can be banked posterior to the L-strut in the mucoperichondrial pockets. Releasing the L-strut/anterior septum from the posterior septum allows straightening of the L-strut by removing posterior deforming forces from the septal deviation. The literature is replete with the adage that only 8 to 10 mm of dorsal and caudal L-strut needs to be preserved to maintain its structural integrity. Instead, the amount of L-strut that

should be preserved is highly dependent on the strength and quality of the anterior septum—in general, more is better; it is best to leave more than 10 mm caudal and dorsal and if possible 15 mm. In addition, curving the posterior edges of the L-strut at the superior osseocartilaginous junction or transition from the dorsal to caudal L-strut may contribute strength.<sup>20</sup>

If the L-strut remains deviated after the aforementioned maneuvers, it is most likely caused by vertical excess of the L-strut. The bony roof and floor of the pyriform aperture and nasal cavity are fixed structures. Vertical excess of the L-strut will contribute to craniocaudal C- or S-shaped deviation. The caudal L-strut can be disinserted at the osseocartilaginous junction with the anterior nasal



**Fig. 8.** Sequential approach for the management of the nasal base begins with correction of caudal septal deviation. This is followed by assessment and alteration of the tip complex, alar rims, columellar base, and alar base. This approach will ensure a balanced and proportionate result when correcting caudal septal deviation.

spine and maxillary crest and then shortened to remove the vertical excess. This is followed by suturing it back to the periosteum of the anterior nasal spine with 5-0 polydioxanone. Although these concepts and simplified approach to correction of caudal septal deviation may work effectively in the majority of cases, in some instances, it is necessary to be more aggressive in correcting severe deformities of the anterior septum. As we described previously,<sup>2</sup> scoring or partial-thickness wedge excisions coupled with the application of

splinting grafts may be required to establish a straight and stable L-strut. Similarly, deformities of the anterior septum stemming from previous fracture lines such as sharp angulations or overlapping segments also require more complex maneuvers to first weaken or divide the anterior L-strut and then reinforce or reconstruct the L-strut into a straight construct. Techniques such as splinting grafts, tongue-in-groove grafts, drill-hole fixation, or medial crural footplate excision may be necessary for adequate correction of severe caudal septal deviations. These techniques may require more cartilage than present in the septum and necessitate ear or rib cartilage harvest.

Several other maneuvers are worth mentioning when performing the aforementioned steps for correcting the caudally deviated septum. When extensive work has been performed on the caudal septum, it is usually necessary to place several through-and-through horizontal mattress 5-0 chromic gut sutures in the caudal septum to reapproximate the caudal mucoperichondrial flaps to the midline.<sup>26</sup> This allows the flaps to scar down in the midline position and provide extra long-term support. Along the same lines, it may be necessary to perform clocking sutures from the upper lateral cartilage to the dorsal septum to help reposition the L-strut in the midline.

Although all of these maneuvers will correct caudal septal deviation, it is important to note that other asymmetries apparent on the basal view including tip deviation and alar asymmetries may still require further graduated maneuvers to achieve complete correction, such as tip suturing and adjustment of the length and strength of the lower lateral cartilages.<sup>1</sup> We have adopted an algorithm for sequentially addressing the aesthetics of the nasal base (Fig. 8). The initial maneuver is ensuring the septum is straight and located in the midline; this is followed by assessment and alteration of the tip complex, alar rims, columellar base, and alar base. Structures (including the medial crura and columellar soft tissues) contributing to the deformed columella that commonly accompanies the caudally deviated septum are addressed through this approach and will ensure a balanced and proportionate result when correction of caudal septal deviation is performed.

It is also important to mention that one must always check for bony deviations. Should a patient also exhibit deviations caused by the osseous abnormalities, lateral osteotomies are the preferred method of correction once all internal nasal work has been completed. Finally, Doyle splints are very effective at keeping septal

structures in the midline after septal reconstruction as opposed to nasal packing. These are usually placed with antibiotic ointment and secured using a 2-0 nylon suture. They are typically removed after 7 to 10 days.

## CONCLUSIONS

The deviated nose is a common problem seen by the rhinoplasty surgeon. We have described a simplified method of addressing caudal septal deviation through a graduated approach. If there is a persistent caudal septal deviation that has not been addressed by standard maneuvers, the caudal portion of the anterior septum is resected at the osseocartilaginous junction with the anterior nasal spine and maxillary crest and then sutured back to the periosteum of the anterior nasal spine with 5-0 polydioxanone. We have found this to be a safe and effective way of addressing the caudally deviated septum.

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## PATIENT CONSENT

*Patients provided written consent for the use of their images.*

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