

Overview of the different surgical modalities for correction of caudal septal dislocation; a review article

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Abstract:

Objectives: Despite the various approaches currently available to treat CSD, this issue still needs to be resolved. Different methods and techniques to manage caudal septal dislocation with good results and according to each patient. This article reviewed the other surgical modalities for correcting caudal septum dislocation with the effectiveness of currently practiced modalities.

Searching strategy: We reviewed relevant literature and used PubMed and Google Scholar. Published articles in English were included in the search. The unique and compound keywords used were caudal septum dislocation. The primary search resulted in many reports from all databases and search engines, followed by the exclusion of irrelevant articles.

Findings: Different surgical modalities for correcting caudal septum dislocation have been described to correct caudal septum dislocations. Several techniques and maneuvers for surgical correction of caudal septal displacement are mentioned in the literature; nevertheless, there are different opinions and preferences regarding which approach to use.

Conclusion and recommendations:

An ideal caudal septoplasty should be minimally invasive and improve nasal obstruction. Surgical correction of a deviated septum can be performed using the traditional open endonasal approach, the endoscopic approach, or the open septorhinoplasty approach. In Saudi Arabia, many patients are seeking caudal septal

deviation correction. However, there is a need for more trained surgeons, and it is recommended that all levels of training be considered.

Keywords: caudal, septum, dislocation, surgical modality

1. Introduction

The nasal septum (NS) separates the nose into the right and left nasal cavities. The anterior caudal part of the nasal septum is a quadrangular cartilaginous structure, divided posteriorly by the vertical plate of the ethmoid bone and inferiorly by the alveolar ridge. In its most anterior part, it forms the anterior nasal spine (1). The nasal septum (figure 1) is a vertical midline structure extending anteriorly to the columella, posteriorly to the rostrum sphenoidal, superiorly to the anterior base of the skull, and inferiorly to the nose floor (2).

Deviating the caudal portion of the NS (figure 2) can result in nasal obstruction, a crooked nose, and columella irregularities (3). The intercrural ligament connects the cartilaginous nasal septum to the inferior lateral crura (3).

The caudal septum (CS) is part of the NS closest to the opening of the nostrils, which supports the tip of the nose and allows an even flow of air through the nostrils (4).

In children, most of the supporting structures of the nose are composed of cartilage, and the nose does not project as far forward as in adults (5). The developing nasal bone has a midline in infants and younger children, and the nasal septum is almost entirely cartilage. The pediatric nose undergoes two major growth spurts between two and five years and then again at puberty (6).

Caudal septal deviation (CSD) is a functional and aesthetic problem. The CS, which causes nasal obstruction, displaces the right or left columella. Despite the various maneuvers currently available for treatment, this issue is still controversial (7).

The caudal septum that causes nasal obstruction displaces the right or left of the columella (1).

Patients with caudal septal deviation account for 5% to 8% of patients with nasal septal deviation. CSD can lead to nasal obstruction, crooked nose, columellar irregularities, and asymmetry of the nostrils (8, 9).

Adequate management is challenging because of its importance to nasal function and the final cosmetic result. Many surgical options exist to correct and align this structure (10). Despite the various maneuvers currently available for treatment, this issue remains controversial (11,12).

The earliest and most common method for correcting caudal septal dislocation is Metzenbaum's "swinging door" technique. The dislocated caudal septum is shifted to the midline and fixed to the nasal spine (13).

CSD is among the most challenging nasal surgeries, even for experienced surgeons. Correction of the deviated nose presents a challenge because frequently, a functional and an aesthetic problem must be addressed (14).

Despite the various approaches currently available for the treatment of CSD, this issue is still controversial—different methods and techniques to manage caudal septal dislocation with good results and according to each patient.

This article reviewed the different surgical modalities for correcting caudal septum dislocation with the effectiveness of currently practiced modalities.

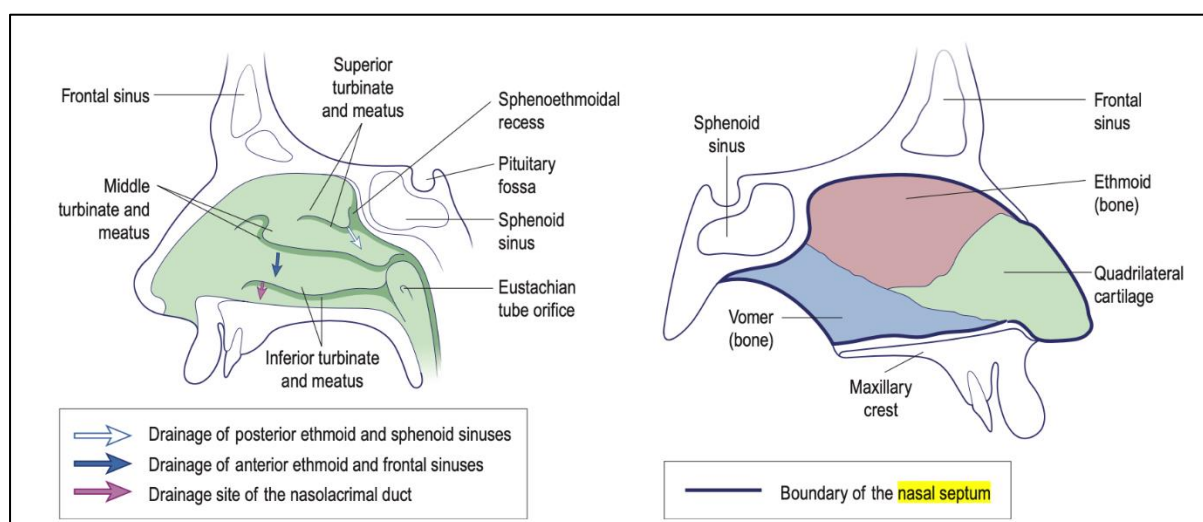


Figure 1: Anatomy of the Structure of the lateral wall of the nasal cavity and caudal septum (CS), cited from **Ear, Nose and Throat and Head and Neck Surgery**, an illustrated colour text (15)

2. Searching strategies:

The **searching strategies** for the recent and effective literature on the different surgical modalities for correction of caudal septum dislocation. To review relevant literature, PubMed and Google scholar were used. Published articles in English were included in the search.

The unique and compound keywords used were caudal septum dislocation. The primary search resulted in many articles from all databases and search engines, followed by the exclusion of irrelevant articles. The other pieces have been organized and used in this section. We found 35 articles related to correcting caudal septum dislocation at the primary. After excluding the irrelevant, we found 20 searches linked to the topic (Table 1).

3. Findings:

Different surgical modalities for caudal septum dislocation have been described to correct caudal septum dislocations, but the issue still needs to be resolved conclusively.

Bone bar grafting via the endonasal approach is an efficient and reliable method with a low complication rate to correct CSD. This method significantly improves patients' subjective nasal symptoms and is an efficient option for surgeons to restore CSD (16).

The caudal septal extension graft (CSEG) is a predictable method of positioning the tip and columella during rhinoplasty and is commonly performed with permanent sutures and, in some cases, with fixation of the graft to the nasal spine region (NSR). Suturing the CSEG with absorbable material without focusing on the NSR is a reliable variant of the conventional technique (17).

Recently, some new modifications in the placement of caudal extension grafts in rhinoplasty have been presented. The caudal extension graft is usually a cartilage graft that overlaps the caudal margin of the nasal septum. The surgeon may also use the caudal extension graft in angulated caudal septal deviations and angulated or deviated caudal septa (18).

A review of surgical correction of caudal end deformities using an algorithm for approximating various caudal tail-end deformities was performed to determine a method to correct caudal end deformities based on preoperative patient data. An algorithm was created to select a method for remedying caudal end deformities based on preoperative patient data (19).

Recent publications have shown that cartilage preservation and remodeling techniques can efficiently treat the caudal septum. Adequate treatment of the caudal portion of the nasal septum is challenging because of its importance to nasal function and the final cosmetic result. There are many surgical options to correct and align this structure, and no single surgical technique can be used in all cases. A step-by-step approach includes the various techniques that evolve from simple to more complicated. The ultimate surgical goal should be cosmetically pleasing noses that function appropriately (20).

The surgical outcomes of bony lath grafting for treating caudal septal deviation in endonasal septoplasty. Septoplasty with bony lath grafts helps correct caudal septal deviation with favorable surgical results and an acceptable complication rate (21).

A significant disadvantage of the Killian incision is the inability to reach the caudal septum and correct the caudal septal deviation. In such cases, open septorhinoplasty and Hemi-transfixion septorhinoplasty are considered necessary. The J-septorhinoplasty method for correcting mild caudal septal deviation is easily performed by a modified Killian incision and is helpful in selected patients (22).

The two-level septocolumellar suture technique is an effective and easy-to-use method for correcting caudal septal dislocation. It can also increase the stability of the corrected septum with other techniques. A two-level suture technique increases correction success and decreases the risk of postoperative caudal

septal dislocation by stabilizing the upper part of the caudal septum. Therefore, it would reduce the rate of repeat surgery (23).

Endonasal septoplasty in appropriate cases and suture with nonabsorbable suture material is well suited for caudal septal dislocations and can be used without problems in open and endonasal septoplasty. This suture reduces postoperative NOSE scores, and patients are satisfied with the surgical outcomes. The stability of the nasal septum may decrease in the open septoplasty group with a longer postoperative duration. However, broad exposure can be ensured with open septorhinoplasty. In appropriate cases, it is better to perform endonasal septoplasty and suture with nonabsorbable sutures (24).

Evaluation of patients who underwent endonasal septoplasty using the caudal L-strut's cutting and suture technique showed that the caudal L-strut's cutting and suture technique seems helpful to be performed with relative ease and simplicity (25).

A prospective, single-center observational study evaluated the septal cartilage traction suture technique for correction of caudal septal deviation. The septal cartilage traction suture technique significantly improved subjective and objective outcomes in patients with caudal septal deviation. This technique is a simple, safe, and effective treatment for caudal septal deviation (26).

A study comparing traditional with endoscopic methods found that septoplasty is one of the most established and commonly performed procedures in otolaryngology. However, it is mainly committed to correcting structural deformities that result in nasal obstruction (27).

The Septoplasty technique and placement of the trans-columellar strut is an easy, efficient, and complication-free method for simultaneous correction of caudal deviation of the nasal septum, reinforcing the external nasal valve and preventing tip ptosis (28).

Evaluation of the A New Persistent Suture Technique for Correction of Caudal Septal Dislocation indicated that this technique prevents re-deviation in the same direction, especially in the superior portion of the caudal end to the memory of cartilage tissue. It will therefore reduce revision rates (8).

The mattress suture technique for caudal septal dislocations in open and endonasal septoplasty is suitable for CSD and can be easily applied in open and endonasal septoplasty. This suture reduces postoperative nasal scores, and patients are satisfied with the outcome of surgery. The stability of the nasal septum may decrease in the open septoplasty group with a longer postoperative duration. However, broad exposure can be ensured with open septorhinoplasty (28).

Centering the cartilaginous vault with a caudal septal expansion graft combined with unilaterally extended spreading grafts is a valid technical option for correcting a deviated nose. It improves the projection of the nasal tip and the shape of the nostrils (30).

Depending on the intended surgery, a transfixated or hemitransfixated incision is used. Toward the end of the procedure, a columella stabilization suture is placed to reposition the anterior-caudal portion of the septum, correct displacement, and prevent loss of apex support. A columella pocket is formed with curved iris scissors to separate the medial crura vertically (31).

Septoplasty in Japan is usually performed with a Killian incision. However, the major disadvantage of the Killian incision is its inability to correct the deviation of the caudal portion of the septum. We performed a modified Killian incision in patients with a slight variation of the caudal part of the septum but with a straight caudal end. We used a batten graft to correct the deviated cartilage under endoscopy. The septoplasty with a batten graft described here is technically simple and is considered helpful for deviation of the caudal portion of the septum in selected cases (32).

A study evaluated the surgical outcomes of bone flap grafting for treating CSD. It indicated that the Septoplasty with bony lath grafts is useful for correcting caudal septal deviation with favorable surgical results and an acceptable complication rate (33).

3. Discussion

CSD results in significant nasal obstruction due to nasal passage blockage and impairment of the internal nasal valve. Cosmetically, changes in the CNS result in a twisted nasal tip, loss of projection, rotation, and imbalance in the ala-columellar relationship (1).

In Saudi Arabia, the correction of caudal septal deviation with a batten graft has recently become popular. However, there are few reports on the surgical results of this technique, especially on the use of bony batten grafts in septoplasty. An ideal caudal septoplasty should be minimally invasive and improve nasal obstruction.

Surgical correction of a deviated septum can be performed using the traditional open endonasal approach, the endoscopic approach, or the open septorhinoplasty approach. Based on the knowledge of the basic sciences, the surgical techniques are necessary to perform a successful septoplasty using either method. Compared with the traditional open technique, endoscopic septoplasty better visualizes nasal anatomy and is advantageous in treating posterior septal problems.

Caudal deformities are most easily treated with open techniques. The location and severity of the septal deformity and the surgeon's experience and preference play a significant role in selecting the septoplasty technique.

5. Conclusion:

The NS is a poorly understood and appreciated structure by lay, non-nasal, and ENT surgeons. Several techniques and maneuvers for surgical correction of caudal septal displacement are mentioned in the literature; nevertheless, there are different opinions and preferences regarding which approach to use. In Saudi Arabia, many patients are seeking caudal septal deviation correction. However, there is a need for more trained surgeons, and it is recommended that all levels of training be considered.

6. Abbreviations: NS, nasal septum; CS, caudal septum; CSD, Caudal septal deviation; CSEG, caudal septal extension graft; NSR, nasal spine region.

7. Conflicts of interest

No conflict was alleged in this article.

Table 1: Research of caudal septal deviation correction modalities

Author/year	Caudal septal deviation correction modalities	Study Design
Aksakal C. (2020)	Bony batten grafting through endonasal septoplasty (16)	Case-control
Benavides (2019)	The caudal septal extension graft with Absorbable Material and Not Fixed to the Nasal Spine Region Compared with the Conventional Fixation Method (17)	Case-control
Sazgar (2021)	placement of caudal extension grafts in rhinoplasty (18)	Retrospective
Younes (2019)	Compare 4 techniques (19): - Modified swinging door techniques with fixation to anterior nasal spine technique - tongue-in-groove technique - caudal end splinting using septal bone - septal extension graft with tongue-in-groove technique.	Retrospective
Cobo R (2017)	cartilage preservation and remodeling techniques (20)	Review
Kim DY (2017)	bony batten grafting for the management of caudal septal deviation in endonasal septoplasty (21)	retrospective cohort
Iimura (2020)	J-septorhinoplasty method (22)	prospective
Demirbilek (2016)	Two-level septocolumellar suture technique (23)	prospective
Dikici (2019)	endonasal septoplasty in appropriate cases and suture with nonabsorbable sutures (24)	Case-control
Jang (2009)	endonasal septoplasty using the cutting and suture technique of the caudal L-strut (25)	Retrospective

Seo (2020)	Septal Cartilage Traction Suture Technique for Correction of Caudal Septal Deviation (26)	prospective observational
Shah (2018)	endoscopic methods found that septoplasty (27)	Case-control
Ghorbani (2018)	insertion of a transcutaneous columellar strut. After intranasal incision and elevation of mucoperichondrial flap, Caudal septum released from anterior nasal spine (ANS) and a band of cartilage removed from inferior and caudal part of septum and septum again fixed to ANS. (28)	prospective
Batioglu-Karaaltin (2014)	New Persistent Suture Technique for Correction of Caudal Septal Dislocation (8)	prospective
Dikici (2019)	Mattress Suture Technique for Caudal Septum Dislocations in Open and Endonasal Septoplasty (29)	Case-control
Chen (2020)	Centering a deviated nose by caudal septal extension graft and unilaterally extended spreader grafts (30)	Retrospective observational
Mustafa (2016)	Columella-stabilising suture: a simple adjunct to nasal septalsurgery (31)	Technical note
Nakayama (2014)	Endoscopic single-handed septoplasty (32)	prospective
Kim (2017)	Surgical Outcomes of Bony Batten Grafting (33)	Retrospective cohort

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