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Review Article

Caudal Septal Deviation: Pertinent Literature Review

Waleed M Alshehri[1*], Ibrahim H AlAwadh[2], Mohammed A Jomah[2], Badi F Aldosari[2]

[1]Ministry of Health, Imam Abdulrahman Alfaisal Hospital, Riyadh, KSA

[2]Department of Otolaryngology - Head & Neck Surgery, King Saud University Medical City, College of Medicine, King Saud University, Riyadh, KSA

[*]**Corresponding author:** Waleed M Alshehri, Ministry of Health, Imam Abdulrahman Alfaisal Hospital, Riyadh, KSA

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Abstract

Caudal end septal deviation is a common deformity; it results in functional and aesthetic problems. There are several techniques for the correction of the caudal deviations. Here we highlight caudal septal deviation and its management. The participated authors searched for articles related to the current subject and included 10 articles to write this article. The information was organized under main titles. After the discussion of the subject, we could conclude that the caudal septal deviation causes problems in the function of the individual, such as obstruction of the nasal airway. It also causes ethical problems that may affect the patient satisfaction. The gold standard management for the correction of the caudal septal deviation is septoplasty. There are several techniques involved in the management process. The use of a certain technique depends on the severity of the condition.

Key Words: Caudal end septal deformities; Trauma; Septoplasty

1. Introduction

Caudal end septal deformities are common deformities; these deformities result in both function and esthetic problems. Twisting of the lower third of the nose is caused by caudal end deviations, whereas tip ptosis and under projection are caused by caudal end deficiency. These deformities are caused mainly by trauma. Deficiency of the caudal end and losing of the nasal tip support is caused by aggressive iatrogenic excision of the caudal end [1,2]. There are several

techniques for the correction of the caudal deformities, including two large categories; cartilage reconstruction and cartilage reshaping. Cartilage reconstruction involves the replacement of the caudal end by a straight piece of cartilage involving extracorporeal septoplasty, whereas cartilage reshaping includes several surgical maneuvers such as suture techniques, batten grafting of the caudal end, swinging and modified swinging door techniques [3]. Here we discuss an overview of caudal septal deviation and its management.

2. Materials and Methods

The participated authors searched for articles related to the current subject depending on the online research process. The searching process was done through the scientific website, Google Scholar, Embase, and MEDLINE until October 2020 There were few articles included in this work some articles included and mentioned the same information.

3. Results and Discussion

We included 10 articles to extract information about the current subject. Each author was responsible for discussing one or more main titles in the article. After finishing the article, each author reviewed the article as a whole.

3.1 Overview of caudal septal deviation

3.1.1 Anatomy: The nasal septum is a cartilaginous and bony structure that separates the nasal cavity into two halves. The nasal septum stabilizes the lower and upper lateral cartilages, and it is considered a major tip-supported mechanism. Cartilage composes the anterior and caudal extent of the septum. These cartilaginous quadrangular forms attachment inferiorly at the maxillary crest and cranially at the osseous septum. The septum is connected to the paired upper lateral cartilages dorsally. The internal nasal valve is formed by the fusion of the cartilaginous structures in the midline. Caudally, the intercrural ligament connects the septum to the lower lateral crural; this fibrous attachment provides additional tip support [4].

3.1.2 Caudal septal deviation: Caudal septal deviation is the deviation of the anterior-most portion of the nasal septum. It causes functional symptoms such as nasal obstruction, epistaxis, crusting, and recurrence rhinosinusitis, as well as significant cosmetic deformities such as tip ptosis, deformity of the middle and lower thirds of the nose, and lobule deviation. The etiology of the deviated septum is generally congenital; however, trauma and iatrogenic causes can result in deviated septum [5]. The caudal septal deviation involves a portion of the septum that contributes to the support of the nasal tip and the nasal valve area; this makes it differ from the traditional septal deviation [5,6]. The caudal deviations, even being small, cause important nasal obstruction, as they are located in the nasal valve and the narrowest portion of the nasal cavity [7]. Caudal deviations can also result in under projection, twisting of the nose, and dorsal depressions [5]. The caudal deviation presents among 5%-8% of patients with deformities [8,9]. The caudal deviation is classified into four classes; type A, B, C, D. Type A involves the dislocation of caudal length with excess length bending on itself or coming out of one of the nostrils, causing visible external deformity. Type B (C-shaped) is a deviation of the caudal end, causing bending of the septum in one or both nostrils. Type C Swing door caudal septal deviation is the third class that involves angulated caudal septum with an internal septum in the midline or mild deviation, causing obstruction and deformity. Type D involves complex

caudal deviation, including an S-shaped deviation [10].

3.1.3 The treatment approach of caudal septal deviation: Surgical correction of caudal septal deviation is technically challenging. The removal of the deviated caudal nasal septum results in a shortening of the columella and loss of the tip support; it also can lead to complications that are ranging from tip tposis to severe valve collapse. On the other side, inadequate surgical correction results in persistent nasal obstruction [6]. The caudal septal deviation is classified into mild, moderate, and severe. No single method of correction showed efficacy in all cases [5].

3.1.4 Septoplasty: Septoplasty is the most commonly performed otolaryngologic surgery alone or with a turbinate reduction to correct the persistent nasal obstruction [5,6,11]. The caudal septoplasty was reported to be relatively easy to be performed, effective, and had long-term reliability in the correction of caudal septal deviation. It is effective in resolving the nasal obstruction and improving the nasal airflow as well as improving cosmesis [9]. The caudal septoplasty also was shown to be safe and effective and resulted in patient satisfaction [7]. However, the success rate of septoplasty ranges from 43% to 85% [12-14], indicating that more than 15% of patients experience persistent symptoms and don't get improved. Post-septoplasty persistent nasal obstruction can be attributed to several causes, involving recurrence of septal deviation, residual septal deviation, the progression of allergic mucosal disease, improper management of turbinate hypertrophy, and unrecognized nasal valve compromise. Also, improper and incomplete correction of the deformity acts as a huge reason for the failure of septoplasty [11]. Intracorporeal septoplasty involves six steps, and they are approach, mobilization, resection, repositioning, reconstruction, and stabilization [15].

3.2 Cartilage reshaping

3.2.1 Septal repositioning: Cartilage repositioning can be done by the swinging door method; it involves the removal of a vertical wedge of cartilage on the convex side of the deformity. The anterior septum is then repositioned in a swinging door like pattern and secured. The modification of this technique involves repositioning of the septum to the other side of the anterior septal spine, where the septal spine is used as a doorstop to stop the septum from returning to its original position. The interior septum is finally secured to the spine with absorbable or non-absorbable suture. Translocation of the caudal end deviation to the other side of the anterior septal spine without weakening the caudal septum is used in most patients with mild to moderate to caudal deviation [5]. In one study [9], it was reported that the translocation technique resulted in excellent results. The study included the data of sixty-two patients who performed standard septoplasty, and after performing the septoplasty, the deviated caudal septum was simply repositioned to the contralateral side or the midline of the anterior septal spine. After translocation, a polydioxanone suture was used to secure the caudal end to the septal spine. In case of the excess length was the cause of the deviation, an anterior strip was removed. There were 82% of patients showed no postoperative obstruction of the nasal airway on the long-term follow-up [9].

3.2.2 Spreader grafts: The placement of thin grafts between the upper lateral cartilages and the dorsal septum results in predictable and consistent results. The graft material can be obtained from the perpendicular plate of the ethmoid, the quadrangular,

conchal, rib or irridated rib cartilages. The spreader grafts can be used to stabilize the deviated caudal septum. For this purpose, a rigid bone from the perpendicular ethmoid plate is most often used [5].

3.2.3 Wedging, scoring, and morselizing: This is one of the most conservative methods for the management of caudal septal deviation. The deformed cartilage can be reshaped to create a midline septum following the removal of deviation quadrangular cartilage and the preservation of caudal strut between 1.2 and 2 cm. The reshaping of cartilage requires weakening of the cartilage structure. The incision process can be made in a serial wedge or scoring fashion. The incomplete incisions are made in the cartilage at the convex surface. This method is effective in mild and moderate deviations, but it shouldn't be used for severe caudal septal deviation. This technique may result in tip ptosis in the long-term [5].

3.2.4 Suture technique: The mustarde-type suture may be used for the correction of the bowed or curved caudal septum. A series of two to four Mustarde-type sutures can mold a curved segment of cartilage and result in a more vertical relationship. However, this technique is rarely effective in the severe cases of caudal deviations. It is effective in mild and moderate deviations [5].

3.2.5 Tongue-in-groove technique: Stabilization of the repositioned caudal septum can be performed by the tongue-in-groove technique. This technique involves the stabilization of the septum in a groove between the medial crura. Securing the septum in this pocket requires using a suture. As reported in one study used this technique; all patients were satisfied with their functional outcome at follow-up, no one needed revision of the surgery [16].

3.2.6 Batten grafting: Batten grafting is commonly used for stabilization of caudal septum with scoring. The graft material should be strong, perfectly thin, and efficient in size to span the length of the corrected septal segment. Each costal cartilage, septal cartilage, vomer, calvarial bone, and perpendicular ethmoid plate can be used as a batten graft. This technique involves the isolation of the deformed caudal end of the septum and identification of the defected region. Then, the deformed region is gradually weakened by morselizing or scoring to properly reposition the segment. Wedges or strips of cartilage may also be removed to facilitate repositioning. The batten graft is secured adjacent to the weakened caudal segment to prevent recurrence and support the tip. The batten graft may be secured with suture to the adjacent caudal septum. The batten graft may be secured to the nasal spine to add additional support [17,18].

3.2.7 Septal reconstruction: Intracorporeal septoplasty is inadequate to treat severe septal deformities, so extracorporeal septoplasty is more reliable [19]. Extracorporeal septoplasty aims to restore the loss of septal portions and cure more severe deviations [20]. It involves total removal of the quadrangular cartilage followed by the extracorporeal reconstruction of a new septal plate that is re-implanted between the two mucoperichondrial flaps [19]. The complications associated with this technique include the tendency for the development of dorsum irregularities. Also, some patients develop saddling or notching of the nose [21,22]. A modified technique was reported to avoid the drawbacks of extracorporeal septoplasty was reported in a retrospective observational study that involved twelve patients who were suffering severe

septal deviation and performed anterior septal reconstruction. The study showed that anterior septal construction was effective technique in improving the nasal airway function and the aesthetics. Moreover, this technique avoided the most common complications of the standard extracorporeal septoplasty by preserving the attachment of the dorsal strut of the septal cartilage to the nasal bone at the keystone area [23]. Another study conducted on animal model showed that the use of resorbable polydioxanone foil prevented a secondary deviation in the surgically treated growing septal cartilage in young rabbits. This foil could reduce the late complications including septal deviation in the growing nasal septum after septoplasty [24].

3.2.8 Marionette septoplasty: Although open septoplasty became the procedure of choice for the correction of caudal septal deviations, minimally invasive procedures are more favorable options whenever possible [25]. Marionette septoplasty (MS) is a procedure of modified extracorporeal endonasal septoplasty. It is used for several caudal septal deviations; it is a less invasive method compared to open septoplasty. MS has a shorter operative time and shorter recovery time. Moreover, it doesn't cause unnecessary edema or scaring [26]. This technique was described by Kayabasoglu et al. [25]. for the first time. It was found that MS was successful in the correction of mild, mo derate, and severe caudal septal deviation. This technique requires sufficient experience of the surgeon because the insufficiently experienced surgeon may face difficulties regarding applying of prolene sutures on the dorsal remnant cartilage [25]. Further investigations found that MS was an effective technique for the correction and stabilization of severe caudal septal deviations. It also could provide protection with a low incidence of dorsal irregularity and provide tip support [26].

4. Conclusion

The caudal septal deviation causes functional and aesthetic problems. It can cause obstruction of the nasal airway and aesthetic problems. Septoplasty is the gold standard for the management of the caudal septal deviation. There are several techniques involved in the correction process. The use of a certain technique depends on the severity of the condition. Also, there is modification performed on the traditional septoplasty to be suitable for different cases as the management is dependent on the severity of the deviation. No single technique can be used for mild, moderate, and severe conditions; Each degree of severity of caudal septal deviation can be managed by a specific technique.

Data availability

No data were used to support this study.

Conflicts of interest

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

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