# An algorithm for management of nasal caudal septal deformities

Ahmed Younes, Rasha El-Dsowkey, Sameh M. Ragab, Hosam E. Romaih, Mohamed N. Elsheikh

Department of Otolaryngology, Tanta University, Tanta, Egypt

Correspondence to Ahmed Younes, MBChB, MD, MRCS (ENT), Department of Otolaryngology, Tanta University Hospital, El Geish Street, Tanta 31527, Egypt.
e-mail: aayounes@hotmail.com

**Received:** 23 March 2019
**Revised:** 30 June 2019
**Accepted:** 15 August 2019
**Published:** 16 October 2019

**The Egyptian Journal of Otolaryngology**
2019, 35:352–356

**Introduction**
Caudal end septal deformities are common deformities. Trauma is a main cause of these deformities. there is lack of an algorithm for choosing the suitable technique for the type of deformity. The aim of this retrospective study was to put an algorithm for approaching different caudal end deformities.
**Patients and methods**
Retrospective review of 136 patients underwent surgical correction for caudal end deformities. Data collection included functional breathing outcomes and drawbacks of different techniques as postop caudal end sublaxation and firm nasal tip sensation.
**Results**
Patients were divided into 4 groups (according to the technique by which the caudal end of nasal septum was managed) as following: Group A: 90 patients who had undergone surgeries with swinging door or modified swinging door techniques with fixation to anterior nasal spine technique, Group B: 26 patients who had undergone surgery with tongue in groove technique, Group C: 10 patients who had undergone surgery with caudal end splinting using septal bone, Group D: 10 patients who had undergone surgery with septal extension graft with tongue in groove technique.
**Conclusion**
An algorithm was obtained to help in deciding a methodology for correcting the caudal end deformities according to preoperative patient data.

**Keywords:**
caudal septal end, nasal septum, nasal trauma, NOSE score, septorhinoplasty

Egypt J Otolaryngol 35:352–356

1012-5574

## Introduction

Caudal end septal deformities are common deformities faced by otolaryngology surgeons. They cause both functional and esthetic complaints. Caudal end deviations cause twisting of the lower third of the nose, whereas caudal end deficiency can cause tip ptosis and underprojection. Trauma is a main cause of these deformities. Aggressive iatrogenic excision of the caudal end can lead to its deficiency with loss of nasal tip support [1,2]. Many techniques have been described in the literature for correction of caudal end deformities. They can be classified into two large categories: cartilage reshaping and reconstruction techniques. Cartilage reshaping techniques include a wide variety of surgical maneuvers such as swinging door and modified swinging door techniques, suture techniques, tongue in groove, and batten grafting of the caudal end [3–6]. Reconstruction techniques involve replacement of the caudal end by a straight piece of cartilage including extracorporeal septoplasty [7]. However, there is a lack of an algorithm for choosing the suitable technique for the type of deformity. The aim of this retrospective study was to put an algorithm for approaching different caudal end deformities.

## Patients and methods

### Study design a retrospective review

Electronic files of patients who underwent surgery for caudal end septal management in the past 5 years were reviewed. The study protocol was approved by the ethical committee of the institution. Two hundred and twenty patients were identified to have such surgery. All surgeries were done by a single surgeon (A.Y.). The exclusion criteria included patients who did not sign a consent form for approval of their files reviewing for research, pediatric patients, and those who did not have adequate follow-up data. A total number of 136 patients were enrolled in the study. Demographic data, follow-up clinical notes, and breathing evaluation NOSE scores (which is routinely filled during preoperative and postoperative visits) were collected. The NOSE scale (Fig. 1) consists of five questions about nasal breathing. Each question is answered by the patient from 0 (not a problem) to 4

**Figure 1**

Nasal Obstruction Symptom Evaluation (NOSE) instrument

Please help us to better understand the impact of nasal obstruction on your quality of life by answering this survey. Thank you.

Over the past 1 month, how much a problem were the following conditions for you?

Please circle the most correct response:

| | Not a problem | Very mild problem | Moderate problem | Fairly bad problem | Severe problem |
|---|---|---|---|---|---|
| 1. Nasal congestion or stiffness | 0 | 1 | 2 | 3 | 4 |
| 2. Nasal blockageor obstruction | 0 | 1 | 2 | 3 | 4 |
| 3. Trouble breathing through my nose | 0 | 1 | 2 | 3 | 4 |
| 4. Trouble sleeping | 0 | 1 | 2 | 3 | 4 |
| 5. Unable to get enough air through my nose during exercise or exertion | 0 | 1 | 2 | 3 | 4 |

NOSE score.

(severe problem), and then the final score is calculated on a 0–100 scale by multiplying the sum of patient's answers by 5. So, score 0 means no problem at all in nasal breathing, and score 100 means the worst complete nasal obstruction. Negative difference between postoperative and preoperative scores means improvement of the nasal breathing [8]. Follow-up clinical data included follow-up duration, method of caudal end correction, complications, patients' concerns regarding tip sensation, and surgeon's concerns regarding caudal end subluxation.

Four surgical techniques of caudal end management were identified in the study:

(1) Fixation of the caudal end to the anterior nasal spine as a swinging door flap: after completing the septoplasty surgery, a suture was taken between the inferior septal angle and the fascia over the anterior nasal spine. The suture used was 5/0 prolene suture (Ethicon Inc., Somerville, New Jersey, USA). The caudal end was being accommodated in a tunnel in the area of membranous septum that was dissected through the hemitransfixation incision using retrograde dissection [9].
(2) Fixation of the caudal end between the two medial crura as tongue in groove: dissection between the two media crura was done separating them and delivering the caudal end between them (Fig. 2). Transverse mattress sutures using 5/0 PDS (Ethicon Inc.) was taken through the caudal end and both crura taking care to start from the midline, so knots would be buried in the groove between both crura. This can be done through

**Figure 2**

Tongue-in-groove technique.

**Figure 3**

Caudal end splinting.

endonasal or external rhinoplasty approaches; however, the latter would be easier to access [6].

(3) Splinting the caudal end with septal bone (caudal septal batten): a septal bone graft from the perpendicular plate of ethmoids was used to splint a curved caudal end. The assistant straightens the caudal end over the bony splint graft that was applied toward the concave side of the caudal end (Fig. 3). The surgeon fixed them in this straight alignment using 4/0 or 5/0 prolene transverse mattress sutures (Ethicon Inc.) keeping the knots on the caudal end side. The splinted caudal end was fixed as tongue in groove [10].

(4) Septal extension graft: in this technique, septal cartilage from the posterior part of the septum was used to replace a deficient or comminuted caudal end. The graft was sutured side by side to the septum using 5/0 prolene (Ethicon Inc.) transverse mattress sutures, and then the extension graft was fixed as tongue in groove [11].

### Statistical analysis

Data were expressed as mean±SD. *P* values less than 0.05 were considered significant. Parametric tests were applied for data that followed or were transformed to a normal distribution. $\chi^2$ test was applied for data that did not follow a normal distribution. SPSS version 16 (SPSS for Windows, version 16.0.; SPSS Inc., Chicago, Illinois, USA) was used for analysis.

## Results

In this study, patients were divided into four groups (according to the technique by which the caudal end of nasal septum was managed) as follows:

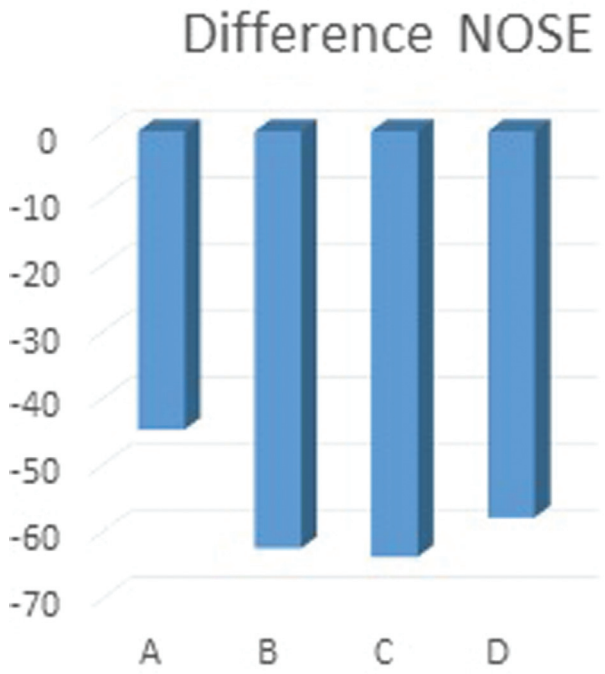
Group A: 90 patients who had undergone surgeries with swinging door or modified swinging door techniques with fixation to anterior nasal spine technique.

Group B: 26 patients who had undergone surgery with tongue-in-groove technique (stabilizing the septum in a groove between the two medial crura).
Group C: 10 patients who had undergone surgery with caudal end splinting using septal bone.
Group D: 10 patients who had undergone surgery with septal extension graft with tongue-in-groove technique.

Approximately 62% of patients (84 patients) were male and 38.2% (52 patients) were female. The mean age was 24.8 years, and the mean follow-up period was 6.9 months, with no statistically significant difference among the four groups regarding sex, age, and follow-up duration. Approximately 49% of patients (44 patients) in group A and 92.3% (24 patients) in group B had associated rhinoplasty. All patients in groups C and D had associated rhinoplasty.

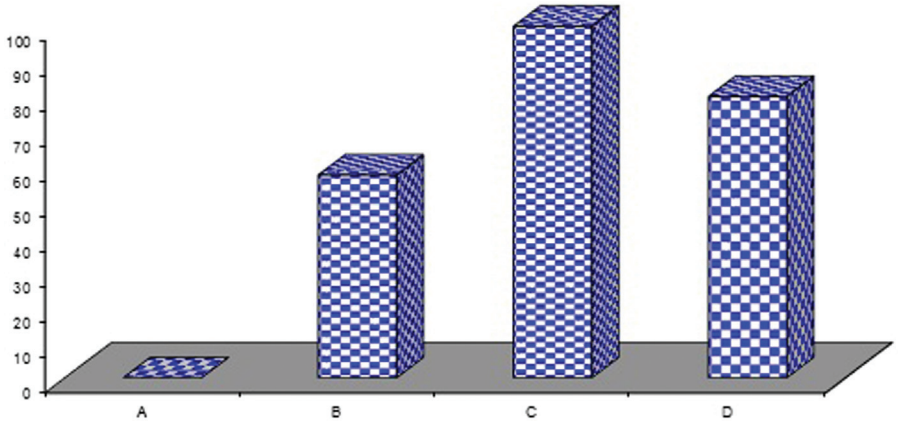
The mean NOSE score preoperatively was 66.83 for group A, 72.5 for group B, 81.3 for group C, and 75.6 for group D. The mean NOSE postoperative score was 22.11 for group A, 10 for group B, 17.5 for group C, and 17.7 for group D. The mean NOSE difference (improvement) was −44.72 for group A, −62.5 for group B, −63.8 for group C, and −57.9 for group D (Fig. 4). The NOSE scores improvement was

**Figure 4**



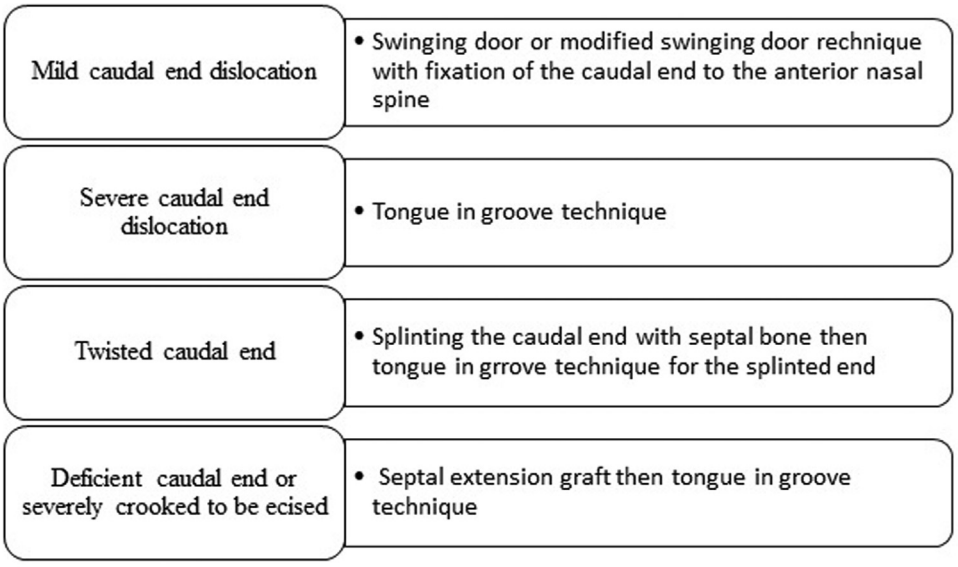

Differences in NOSE scores between the four groups.

**Figure 5**




Percentages of firm nose sensation in the four groups.

**Figure 6**




An algorithm for correction of caudal end deformities.

statistically significant in all groups using $f$ test ($P<0.0001$). A $P$ value of less than 0.05 is considered statistically significant.

Overall, seven (7.8%) patients in group A and one (10%) patient in group D had residual postoperative caudal sublaxation of the caudal end, whereas in groups B and C, there was no residual postoperative caudal subluxation.

Overall, 100.0% of patients of group C (10), 80% of patients of group D (eight), and 57.7% of patients of group B (15) have postoperative firm sensation of the tip, whereas none of the group A patients had this complaint postoperatively (Fig. 5).

By reviewing the results of this study, an algorithm was obtained to help in deciding a methodology for correcting the caudal end deformities according to preoperative patient data (Fig. 6).

## Discussion

Correction of caudal end deformities aims to achieve both functional and cosmetic improvement. NOSE scale is a validated outcome measuring tool for nasal breathing that was created and validated by Stewart *et al.* [8] and approved by the American Academy of Otolaryngology Head and Neck Surgery. Dolan [12] found that NOSE correlates well with subjective evaluation. In our study, we found that there is postoperative significant improvement in nasal breathing evaluated by NOSE scale using any of the four methods of correction of caudal end deformities.

Kridel *et al*. [6] used tongue-in-groove technique in 287 patients. Overall, 108 (37.6%) showed caudal septal deviation. Satisfactory to excellent results were reported, with no revision surgery required. The literature lacks comments about tip sensation after tongue-in-groove technique either used alone or with addition to septal batten or splinting with bone or in association with septal extension graft. In this study, we evaluated the clinical notes of the follow-up patient visits for tip sensation. We found 57.7% of the patients who had undergone tongue-in-groove technique alone had postoperative firm sensation of the tip. Moreover, 100% of patients who had undergone septal bone splinting of the caudal end or septal extension graft with tongue in groove had this firm sensation. On the contrary, patients who had caudal end correction with swinging door or modified swinging door technique did not have this complaint. We think that this is an important note to be discussed with the patient during the preoperative consultation appointment. On the contrary, the possibility of postoperative caudal end subluxation should be explained to the patients offered swinging door or modified swinging door techniques for caudal end correction. The point to be considered is that techniques other than caudal end fixation to the anterior nasal spine need a good rhinoplasty experience and a learning curve. Batioglu-Karaaltin *et al*. [13] evaluated suture techniques using inabsorbable sutures to fix the caudal end in a pocket between the medial crura, and they reported reduction in the revision rates. However, they did not comment on the tip sensation or the percentage of caudal end subluxation. André and Vuyk [4] compared two techniques of caudal end correction, which were septal batten and septal replacement. They found 86% improvement of breathing in the former compared with 92% in the latter; however, this difference was not statistically significant. This retrospective study can provide an algorithm for choosing the suitable method for caudal end correction according to the type of deformity. The study techniques used autologous cartilage and bone, decreasing the risk of infection and extrusion, which was not face in any single case in this study. The techniques used in this study go in accordance with the concepts of modern rhinoplasty that depend on reconstruction rather than resection. In this study, we did not compare between patients who underwent septoplasty versus those who underwent septorhinoplasty, because our approach to the septum depends on correcting the septal deformity completely including using rhinoplasty techniques even for functional septal deformities.This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. There was no conflict of interests for all authors. Ethical committee approval was obtained before starting the study. Patient privacy was respected as no identifying data were collected in the study files.

**Financial support and sponsorship**
Nil.

**Conflicts of interest**
There are no conflicts of interest.

## References

1 Guyuron B, Behmand RA. Caudal nasal deviation. Plast Recon Surg 2003; 111:2449–2457.

2 Becker DG. Surgical management of nasal obstruction: facial plastic surgery perspective. Otolaryngol Clin North Am 2009; 42:xiii–xiv.

3 Metzenbaum M. Dislocation of the lower end of the nasal septum cartilage. Arch Otolaryngol 1936; 24:78.

4 André RF, Vuyk HD. Reconstruction of dorsal and/or caudal nasal septum deformities with septal battens or by septal replacement: an overview and comparison of techniques. Laryngoscope 2006; 116:1668–1673.

5 Ellis MS. Suture technique for caudal septal deviations. Laryngoscope 1980; 90:1510–1512.

6 Kridel RWH, Scott BA, Foda HM. The tongue-in-groove technique in septorhinoplasty: a ten-year experience. Arch Facial Plas Surg 1999; 1:246–256.

7 Gubisch W. The extracorporeal septum plasty: a technique to correct difficult nasal deformities. Plast Recon Surg 1995; 95:672–682.

8 Stewart MG, Witsell DL, Smith TL, Weaver EM, Yueh B, Hannley MT. Development and validation of the nasal obstruction symptom evaluation (NOSE) scale. Otolaryngol Head Neck Surg 2004; 130:157–163.

9 Pastorek NJ, Becker DG. Treating the caudal septal deflection. Arch Facial Plast Surg 2000; 2:217–220.

10 Lee JW, Baker SR. Correction of caudal septal deviation and deformity using nasal septal bone graft. Facial Plast Surg 2013; 15:96–100.

11 Seyhan A, Ozden S, Ozalan U, Sir E. A simplified use of septal extension graft to control nasal tip location. Aesthetic Plast Surg 2007; 31:506–511. discussion 512-513.

12 Dolan RW. Minimally invasive nasal valve repair: an evaluation using the NOSE scale. Arch Otolaryngol Head Neck Surg 2010; 136:292–295.

13 Batioglu-Karaaltin A, Yiqit O, Donmez Z. A new persistent suture technique for correction of caudal septal dislocation. J Cranifac Surg 2014; 25:2169–2171.