

Surgical Correction of Caudal Septal Dislocation in Septoplasty and Septorhinoplasty

Emanuel Sargon Emanuel , Hiwa Asaad Abdulkareem

ABSTRACT:

BACKGROUND:

Several techniques and maneuvers for surgical correction of caudal septal dislocation have been mentioned in the literature nevertheless the subject has still bearing different opinions and preferences on which approach to be applied.

AIM OF STUDY:

to assess different surgical approaches and techniques that are used in the management of caudal septal dislocation.

PATIENTS AND METHOD:

A prospective, observational study was conducted on 50 patients from 10 January 2018 to August 2018 with age range from (18-39 years) who underwent nasal surgery (septoplasty, septorhinoplasty). The study conducted in Center of Otolaryngology- Head and Neck surgery/ Sulaymaniyah Teaching Hospital and Azmar private hospital. Preoperative assessment data were gathered & compared with postoperative assessment data after 3-6 months follow up. The data was analyzed statistically using SPSS version 25.

RESULTS:

patients included in the study were 64% males and 36% females, 22% went through septoplasty while 78% went through septorhinoplasty. For the techniques that used in surgical correction of the caudal dislocation (wedge resection, batten graft and L-strut graft) the results were significant postoperatively while for scoring technique the results were insignificant postoperatively .

CONCLUSION:

There are different techniques used in surgical correction of caudal septal dislocation with good results and according to each patient. The use of L-strut graft technique whenever it needed especially in severe deviation .

KEY WORDS: Caudal dislocation, L-strut graft, scoring and wedge excision.

INTRODUCTION:

Septal deviations are one of the most common causes of disordered nasal breathing. Specifically, caudal septal deviations represent a unique challenge. This portion of the nasal septum serves multiple functions regarding shape and support for nasal breathing and for facial aesthetics. The nasal surgeon is tasked with ensuring reduction, or total correction, of the offending deviation while maintaining adequate support and projection of the nasal tip⁽¹⁾ .

Complicating matters is the caudal septum's contribution to the internal nasal valve area and the attention that must be given to this critical area to improve nasal breathing⁽²⁾ .

Surgical techniques:

Surgical resection of the bony & cartilaginous septum may occur without compromising the support & shape of the external nose as long as a 1-cm dorsal & caudal strut is left intact³. The caudal septal deviation can be classified as mild, moderate, and severe. Methods for managing caudal septal dislocations can be divided into (**cartilage reshaping procedures**) and (**septal reconstruction maneuvers**). Metzenbaum is accredited as the first to address the challenges of the caudal septal deviation. In 1929, he documents **swinging door method** of cartilage repositioning⁴. **Spreader grafts** have been long known as a method of opening the internal valve angle and acquisition control over the middle nasal vault. The septum should be sandwiched between two spreader grafts for improved stability⁽⁵⁾.

Center of Otolaryngology- Head and Neck Surgery/ Sulaymaniyah Teaching Hospital and Azmar private Hospital. Sulaymaniyah/Iraq.

Wedging, Scoring, & Morselizing are generally recognized as one of the most conservative methods of managing the caudal septal deviation. Bowed caudal septum may also be corrected by using of **Mustarde-type sutures**. Ellis first described using cartilage manipulating techniques that many apply for prominent ears⁶. This technique can be effective for mild to moderate deviations. Stabilization of the repositioned caudal septum can also be done by way of a tongue ingroove technique. Kridel describes stabilizing the septum in a groove between the medial crura. Suture is used to secure the septum in the intracural pocket⁽⁷⁾. Digman first described the use of batten grafting in 1956. Since that time multiple incarnations of this theme have been proposed by various authors⁽⁸⁻¹⁰⁾.

For **Septal reconstruction**, moderate to severe caudal deviations may require more aggressive strategies. Complete resection of the cartilaginous septum with reconfiguration of an L-shaped strut has been termed extracorporeal septoplasty by King and Ashley in 1952⁽¹¹⁾. The cartilage is removed en-bloc and placed in the mucoperichondrial pocket and secured to the dorsal remnant with suture and at the anterior septal spine. Gubisch has followed over 2000 patients for the last two decades using the extracorporeal septoplasty with excellent result⁽¹²⁻¹³⁾.

PATIENTS AND METHODS:

Study Design and Setting:

A prospective, observational study was conducted on 50 patients (18 females and 32 males) who underwent nasal surgery (11 septoplasty, 39 septorhinoplasty). The study conducted in Center of Otolaryngology- Head and Neck surgery/ Sulaymaniyah Teaching Hospital and Azmar private hospital from 10 January 2018 to August 2018.

Sampling

Preoperatively patients were assessed for functional, aesthetic complaints. Analyzing the facial components. Internal examination of the nasal cavity was done. Nasal patency assessed by cotton wool test, Cottle test. Assessment of the caudal part of the septum was done and classified to mild, moderate and severe according to the ratio of deviated caudal septum into the nostril (mild=1/3 of the nostril, moderate=between 1/3 to 2/3, severe=more than 2/3). Nasal Obstruction Symptom Evaluation (NOSE) scale was provided

to the patients and explained thoroughly. These informations were gathered and arranged during initial examination.

Exclusion criteria: age group younger than 18 years old. Revision nasal surgery. Patients with allergic rhinitis. Enlarged inferior turbinates causing severe nasal obstruction.

Operative procedures

Septoplasty: Under general anesthesia with reverse Trendelenburg position(30° raised head) Injecting the septum bilaterally with 1% lidocaine with 1:100,000 epinephrine. Once the patient is draped, a hemitransfixion incision is made along the free caudal edge using a number 15 blade. The incision is carried through the mucoperichondrium to expose the septal cartilage. Submucoperichondrial and submucoperiosteal flaps are elevated bilaterally using Freer elevator. the quadrilateral cartilage will separate from the bony septum posteriorly. By using turbinates scissors, cuts are made high (dorsally) and low (over the maxillary crest), and the deflected segment is removed. For the gently bowed caudal septum to one side, we used many techniques: like for example, scoring the deviated caudal septum from convex side and realign it to midline or excision a wedge piece from posterior part and moving the septum to midline. In some cases, we used suturing technique by creating a tunnel between the crura. After scoring or excising a wedge piece from posterior part we move the caudal septum inside the tunnel created and using a suture 4.0 vicryl, first the needle passed from the incision side from lateral to medial over the (caudal septal cartilage) forward through opposite side and again from medial to lateral through cartilage then full-thickness suturing was done then tied and repeated again inferiorly. In some cases we used angled converse scissors and we removed a small wedge of cartilage (about 2 to 3 mm) over the anterior nasal spine by blade no.15 and this allow movement of the caudal strut to midline site over the anterior nasal spine which is shown in figure (1).When caudal septum is angulated; we transected the caudal strut along cephalocaudal vector, in this case the caudal septum becomes two segments. The excess length will allow the two segments to be overlapped and suture secured to one another to strengthen the caudal strut. Sometimes that junction is stabilized by using a harvested septal cartilage as a reinforcement batten graft, which is then sutured in

CORRECTION OF CAUDAL SEPTAL DISLOCATION

place on one side to bridge the two segments as shown in figure (2). Finally, the septal flaps from either side are quilted to one another with a running through-and-through 4-0 vicryl suture.

Septorhinoplasty:

Patient's position same as mentioned in septoplasty with same local anesthesia was used for infiltration inside nasal cavity. In columella, an incision(reverse V shape) was done with marginal incision along anterior margins of lateral crus. extraperichondrial and subperiosteal elevation of skin and muscles in one layer. Humpectomy was done according to each patient. Management of deviated bony pyramid via lateral and medial osteotomies. For septorhinoplasty; The deviated caudal septum is managed by either: Scoring or wedge excision and realignment of deviated caudal part was used for mild to moderate cases, Removing the deviated part and support of the dorsal and anterior by a L-strut graft as shown in Figure (3) or cutting through angulation line of the deviation with removing wedge piece from the septum to get the two parts edge to edge and enforce it by suturing together or with a batten graft at the concave side. Spreader grafts were taken from septal quadrilateral cartilage, the length of spreader grafts where selected according to the

distance between the rhinion and the caudal end of the septum. A typical spreader graft will need to be approximately 1.5 -2.5 cm long, 3-5 mm wide, and 2-3 mm thick. We insert Spreader graft in between the septum and upper lateral cartilages. The graft was stitched to the dorsal septum with 5-0 polydioxanone(PDS) sutures. Reversed V shape columellar incision was closed by 6-0 nylon suture, marginal incisions was closed by using 3-0 Vicryl suture. In all cases bilateral internal nasal silastic splinting, anterior nasal packing, and external plaster of Paris were applied.

Follow up:

Nasal packing was removed after 24 hours. After 8 days internal nasal silastic splints, and external cast were removed, and the patients were assessed for the pain, bleeding, and nasal obstruction. Follow up were done after 6 months for all patients by nasal assessment including: we collected 50 patients' parameters which included: examination of type and severity of caudal dislocation, preoperative (NOSE) scale scores, perioperative techniques that were used during surgical procedures, postoperative nasal examination and correction degree of septal deviation and postoperative (NOSE) scale scores. The results were gathered and calculated by SPSS version 25.

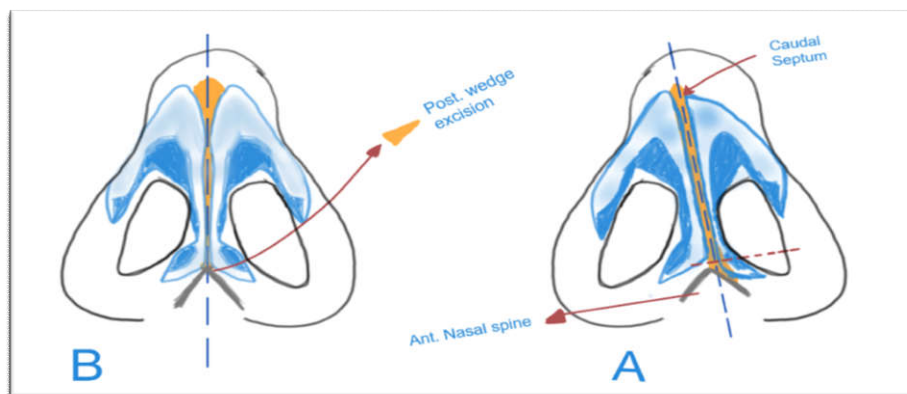


FIG. 1: Caudal septum is tilted over the anterior nasal spine (A), excising a small wedge of cartilage allows the caudal strut to move into the midline (B).

CORRECTION OF CAUDAL SEPTAL DISLOCATION

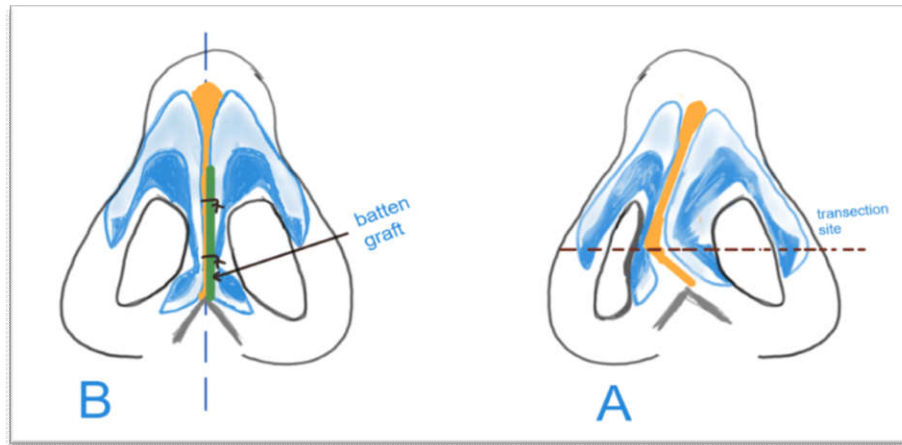
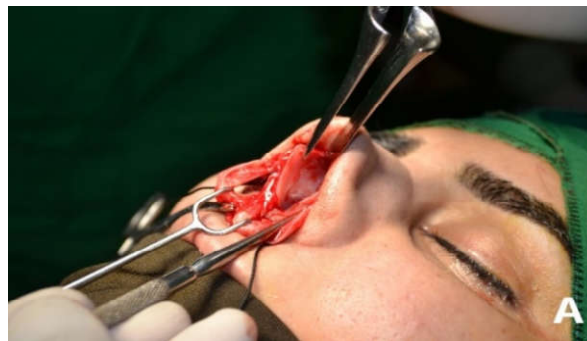
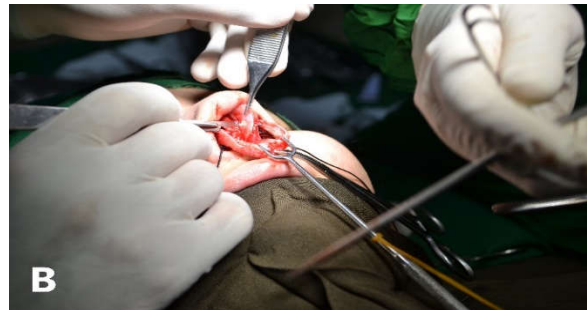


FIG. 2: Caudal septum is divided through the angulation apex. The anterior and posterior segments can be overlapped, the overlap can be excised, and the two segments aligned end to end and stabilized with a sutured batten graft.



A. Caudal dislocation with fracture line.



B. Removing the deviated part.

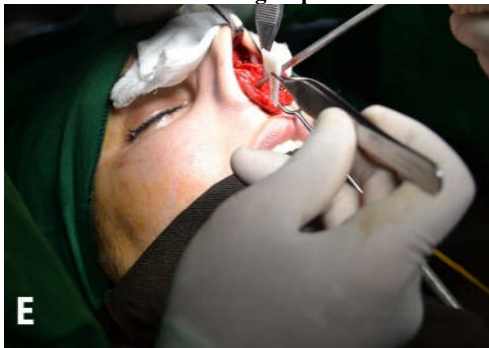
CORRECTION OF CAUDAL SEPTAL DISLOCATION



C. Finishing step B.



D. L-strut graft from the deviated part



E. Inserting L-strut.



F. After suturing as spreader graft.



G & H. Setting caudal part of L-strut between crura & suturing the layers.

FIG(3).shows the L-strut technique.

RESULTS:

For current study 50 patients' parameters were evaluated and the results were arranged as follow:

1.Age :The mean of age is [(24.5).18-39 years],the age distribution is shown in the figure(4)

CORRECTION OF CAUDAL SEPTAL DISLOCATION

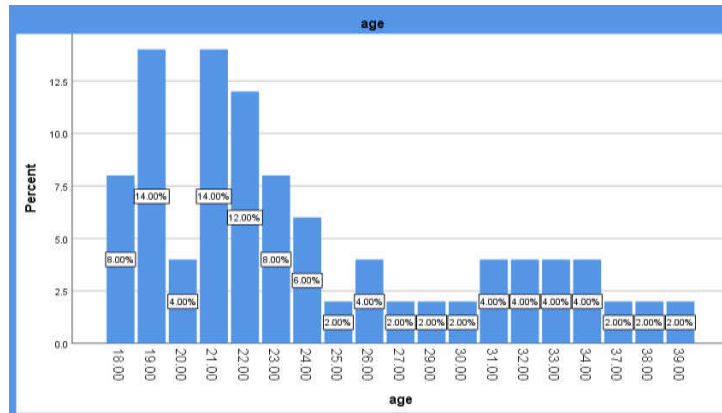


Fig 4:Age distribution as percentage in current study.

2. Gender: The data showed that 32(64%) were male and 18 (36%) were female. As shown in figure (5) below:

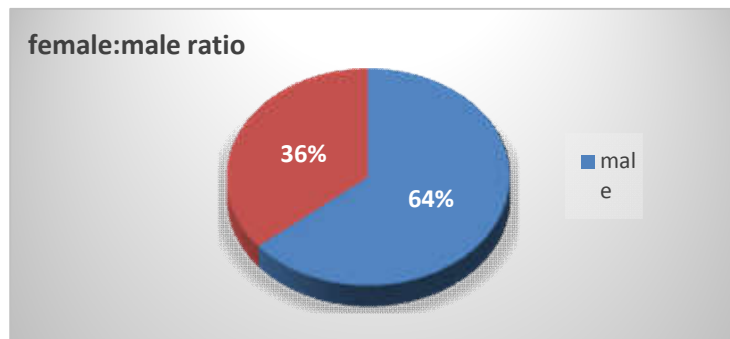


Fig5:Shows female to male ratio in current study.

3. Side of deviation: The deviation toward the left side is 28 cases (56%), while to the right side is 22 cases (44%). As shown in figure (6) below:

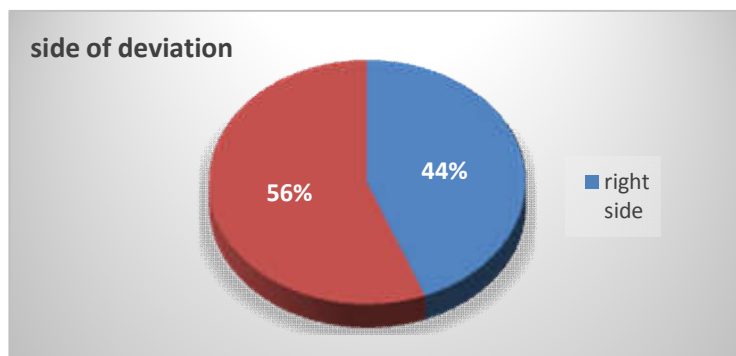


Fig 6:Shows side of deviation in current study.

CORRECTION OF CAUDAL SEPTAL DISLOCATION

4. Severity of caudal dislocation: The severity of mild, moderate in 23(46%) and severe in 15(30%) caudal septal deviation is 12(24%) cases were cases. As shown in table(1) below :

Table 1: Shows severity degree of septal dislocation.

	No. of cases	Percentage
Mild	12	24%
Moderate	23	46%
Severe	15	30%
Total	50	100%

5. Severity of deviation in between septoplasty & septorhinoplasty: The severity of caudal dislocation distribution in patients who went through septoplasty was as shown in the table (2) below:

Table 2: Shows severity degree of septal dislocation among septoplasty & septorhinoplasty patients in current study.

	Septoplasty	Septorhinoplasty
Mild	5(45.4%)	7(17.1%)
Moderate	3(27.3%)	20(52.2%)
Severe	3(27.3%)	12(30.7%)
Total	11(100%)	39(100%)

6.(NOSE) scale questionnaire scores examination and after 6 months we provide same For all patients we provide a (NOSE) scale questionnaire preoperatively during initial the table (3) below(P value < 0.01):

Table 3: Preoperative & postoperative (NOSE) scale results for patients in current study .

		Mean	N	Std. Dev.	Correlation
Septoplasty	Preoperative	44.09	11	29.56	Significant
	Postoperative	11.81	11	08.73	
Septorhinoplasty	Preoperative	55.76	39	25.19	Significant
	Postoperative	18.20	39	12.90	

7. Surgical techniques : In current study sample of (50) patients, 11(22%) cases went through septoplasty and , 39(78%) cases went through septorhinoplasty with different techniques for different degrees of severity. These techniques with related severity degrees are shown in the table(4) below:

Table 4:Shows distribution of technique used in current study .

Technique	No. of cases	Percentage.	Severity of caudal dislocation
Scoring	6	12 %	(6) mild.
Wedge exc.	10	20 %	(6) mild,(4) moderate.
Suturing	3	6 %	(2) moderate, (1) severe.
Batten graft	11	22 %	(7) severe, (4) moderate.
L-strut graft	20	40 %	(13) moderate, (7) severe.
Total.	50	100%	

CORRECTION OF CAUDAL SEPTAL DISLOCATION

8. Postoperative septal examination: We examined the septal alignment postoperatively for its position, we categorize it into midline, slightly

deviated and severe deviated. The results of our postoperative septal examination are shown in the table(5) below:

Table 5: Shows caudal septum alignment postoperatively in current study.

Technique	No. of patients	Midline.	Slightly dev.	Moderate.	Severe .
Scoring	6	4 patients	2 patients	-----	-----
Wedge exc.	10	9 patients	1 patient	-----	-----
Suturing	3	2 patients	1 patient	-----	-----
Batten graft	11	5 patients	3 patients	-----	3 patients
L-strut graft	20	17 patients	2 patients	-----	1 patient
Total.	50	37 patients	9 patients		4 patients

by calculating the correlation between different techniques used and corrected cases using **paired t**

test, the results came as shown in the table(6) below:

Table 6: Shows correlations of different techniques.

Technique.	Corrected patients.
Scoring	Non-significant.
Wedge excision	Significant.
Suturing	Significant.
Batten graft	Significant.
L-strut graft	Significant.

(P value < 0.01).

DISCUSSION:

The total number of patients in current study is 50 patients. 32 of which were males while 18 were females with male: female ratio of (64%:36%). The age was ranged between 18 years to 39 years with the mean of (24.5±5.866) which is correlated with a study was done by S.Nadeem¹⁴ in 2016, in Pakistan with male: female ratio of (69%:31%) and mean of age (37.1). In current study 28(56%) cases had deviated caudal septum to the left side, while 22(44%) cases were to the right side which is correlate with a study was done by Garcia¹⁵ in 2011, in Brazil with most cases(70%) were deviated to the left side and this is related to trauma or sport injury which mostly affect the left side. The severity of caudal septal dislocation in current study was distributed to mild 12(24%) cases, moderate 23(46%) and severe in 15(30%) cases. These results are correlated to a study was done by M.J.Lipan, in 2011, in USA¹⁶. For these cases were mostly moderate to severe and they complained from other problems (like crooked nose, dorsal

hump .etc.) which indicate the open approach to deal with other conditions too. In current study we provide a questionnaire which include (NOSE) scale to the patients during initial examination and we provide it again after 6 months postoperatively. The mean of (NOSE) scale scores for our patients was (53.20 ± 26.3 SD) preoperatively and for postoperative scores the mean was (16.80 ± 12.3 SD) and the correlation was significant for overall sample and that because most of our patients had moderate caudal septal dislocation and we approached most of cases with a rhinoplasty technique which is correlated with a study done by Surowitz in 2014 in USA¹. It was correlated with Garcia et al. in 2011, in Brazil¹⁵ which shows close results with using the same technique and contradict a study done by Saha et al, in 2015 in india¹⁷. In current study sample we used different techniques, for whom 6(12%) cases were managed by scoring, 10 (20%) managed by wedge resection, 3(6%) cases by suturing, 11(22%) cases by batten

CORRECTION OF CAUDAL SEPTAL DISLOCATION

graft and 20(40%) cases managed by using L-strut graft. For the scoring technique the results were inconclusive, and the correlation was undetectable because after six months the scored septi showed less improvement. For the wedge excision cases the results were excellent most of cases are in midline and the correlation with results is significant because most of cases are mild to moderate cases this correlate with a study was done by Lee et al, in 2013, in South Korea¹⁸. For the suturing technique cases the results were good and it showed significant correlation with the results because of stabilizing the septum by the suture which will counteract the deviating part, this result correlate with a study was done by Demirbilek et al.¹⁹ in 2016, in Turkey in which they used same technique. For the cases that managed by batten grafts, 5 cases are in midline, 3 cases slightly deviated, and three cases showed no improvement. The correlation between the technique and the results is significant. This is correlate with a study was done by Andre et al.²⁰ in 2006, in Netherlands. For the cases that went through using L-strut graft, postoperatively, 17 cases of the 20 overall cases are in midline, 2 cases are slightly deviated and one case severe deviated. The technique shows a significant correlation with the results. this is correlate with a study was done by Constantine et al.²¹ in 2013 in Canada in which they used a near like our technique to manage severe caudal dislocation. Using a relocation of caudal septum with notching maneuver with suturing the cartilage to the nasal spine with a good result as Akduman et al²². Use bony batten grafts with closed septoplasty and has a significant result regarding obstruction symptoms improvement, as Chung et al²³.

CONCLUSION:

There are different approaches and techniques to be used in management of caudal septal dislocation with good results and according to each patient. The use of L-strut graft technique whenever is needed especially when facing severe caudal dislocation.

RECOMMENDATIONS:

Further studies and collecting a large number of cases are recommended for better assessment to demonstrate the effectiveness of these procedures in long term follow up .

REFERENCES:

1. Surowitz J, Lee MK, Most SP. Anterior septal reconstruction for treatment of severe caudal septal deviation: clinical severity and outcomes. *Otolaryngology–Head and Neck Surgery*. 2015 ;153:27-33.
2. Williams CT, Sherris DA. Caudal septal reconstruction for severe deviation: a modification to respect the valve area. *Ann Otolaryngology Rhinol*. 2016;3:1097.
3. Gunter JP, Rohrich RJ. Management of the deviated nose. The importance of septal reconstruction. *Clinics in plastic surgery*. 1988;15:43-55.
4. Metzenbaum M. Replacement of the lower end of the dislocated septal cartilage versus submucous resection of the dislocated end of the septal cartilage. *Archives of Otolaryngology*. 1929;9:282-96.
5. Metzinger SE, Boyce RG, Rigby PL, Joseph JJ, Anderson JR. Ethmoid bone sandwich grafting for caudal septal defects. *Archives of Otolaryngology–Head & Neck Surgery*. 1994;120:1121-25.
6. Ellis MS. Suture technique for caudal septal deviations. *The Laryngoscope*. 1980;90(9):1510-2.
7. Kridel RW, Scott BA, Foda HM. The tongue-in-groove technique in septorhinoplasty: a 10-year experience. *Archives of facial plastic surgery*. 1999;1:246-56.
8. DINGMAN RO. Correction of nasal deformities due to defects of the septum. *Plastic and Reconstructive Surgery*. 1956;18:291-304.
9. DUPONT C, CLOUTIER GE, PREVOST Y. Autogenous vomer bone graft for permanent correction of the cartilaginous septal deviations. *Plastic and reconstructive surgery*. 1966;38:243-7.
10. Goode RL. Nasal septal surgery. In: Krause CJ, Mangat DS, Pastoreck N, editors. *Aesthetic facial surgery*. Philadelphia: JB Lippincott Co.; 1991: 133–60.
11. KING ED, ASHLEY FL. The correction of the internally and externally deviated nose. *Plastic and Reconstructive Surgery*. 1952;10:116-20.
12. Gubisch W, Constantinescu MA. Refinements in extracorporeal septoplasty. *Plastic and reconstructive surgery*. 1999;104:1131-39.

CORRECTION OF CAUDAL SEPTAL DISLOCATION

13. Gubisch W. Extracorporeal septoplasty for the markedly deviated septum. *Archives of facial plastic surgery*. 2005 ;7:218-26.
14. Haq SN, Ahmed A, Ayub Z. CORRECTION OF CAUDAL SEPTAL DEVIATIONS VIA CLOSED RHINOPLASTY APPROACH. *Pakistan Armed Forces Medical Journal*. 2016;66:909-12.
15. Garcia LB, Oliveira PW, Vidigal TD, Suguri VD, Santos RD, Gregório LC. Caudal septoplasty: efficacy of a surgical technique-preliminary report. *Brazilian journal of otorhinolaryngology*. 2011 ;77:178-84.
16. Lipan MJ, Most SP. Development of a severity classification system for subjective nasal obstruction. *JAMA facial plastic surgery*. 2013;15:358-61.
17. Shah A, Pfaff M, Kinsman G, Steinbacher DM. Alar-columellar and lateral nostril changes following tongue-in-groove rhinoplasty. *Aesthetic plastic surgery*. 2015;39:191-8.
18. Lee JE, Jung HJ, Chang M, Jin HR. A novel wedge technique to correct the curved deviation of the cartilaginous nasal septum. *Auris Nasus Larynx*. 2014;41:190-4.
19. Demirbilek N, Evren C, Elbistanlı MS, Altun U, Günay SS. Two-level septocolumellar suture technique for correction of septal caudal dislocation. *Brazilian journal of otorhinolaryngology*. 2016;82:403-7.
20. 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. *The Laryngoscope*. 2006 ;116:1668-73.
21. Constantine FC, Ahmad J, Geissler P, Rohrich RJ. Simplifying the management of caudal septal deviation in rhinoplasty. *Plastic and reconstructive surgery*. 2014;134:379e-88e.
22. Akduman D, Haksever M, Yanilmaz M. Repositioning of the caudal septal dislocations with notching and suturing the cartilage to the nasal spine. *European Archives of Oto-Rhino-Laryngology*. 2014 ;271:81-5.
23. Chung YS, Seol JH, Choi JM, Shin DH, Kim YW, Cho JH, Kim JK. How to resolve the caudal septal deviation? clinical outcomes after septoplasty with bony batten grafting. *The Laryngoscope*. 2014 ;124:1771-76.