



Functional and Aesthetic Outcomes of Asymmetric Dorsal Preservation for Correction of I-Shaped Crooked Nose Deformity

Original Investigation

✉ Mehmet Akif Alan, ✉ Hilal Yücel

Department of Otorhinolaryngology Head and Neck Surgery, Konya City Hospital, University of Health Sciences Turkey, Konya, Turkey

Abstract

Objective: The study was designed to evaluate the effectiveness of the asymmetric dorsal preservation technique for correcting I-shaped crooked nose deformity (CND).

Methods: Patients with I-shaped CND who underwent asymmetric dorsal preservation in the period from September 2020 to September 2021 were included in this retrospective study. The Rhinomanometry and Standardized Cosmesis and Health Nasal Outcomes Survey (SCHNOS) was used to assess the outcomes. Deviation angle (DA) measurements were used to evaluate the degree of crookedness. The results were recorded both preoperatively and 12 months postoperatively.

Results: Twenty-three patients were included in the study. Total nasal airflow and long-side nasal airflow were significantly higher 12 months postoperatively ($p=0.001$ each). Total nasal resistance, long-side nasal resistance, SCHNOS scores and DA measurements were significantly lower 12 months postoperatively ($p<0.001$ each).

Conclusion: Asymmetric dorsal preservation is a successful alternative technique for correcting I-shaped CND and achieving optimal aesthetic and functional outcomes.

Keywords: Nose, facial asymmetry, rhinoplasty, rhinomanometry

ORCID IDs of the authors:

M.A.A. 0000-0002-2039-8701;
H.Y. 0000-0002-1855-3186.

Cite this article as: Alan MA, Yücel H.
Functional and Aesthetic Outcomes of
Asymmetric Dorsal Preservation for Correction
of I-Shaped Crooked Nose Deformity. Turk Arch
Otorhinolaryngol 2023; 61(1): 14-19

Corresponding Author:

Mehmet Akif Alan;
makifalann@gmail.com

Received Date: 14.12.2022

Accepted Date: 21.03.2023

©Copyright 2023 by Turkish Otorhinolaryngology-
Head and Neck Surgery Society / Turkish Archives
of Otorhinolaryngology is published by Galenos
Publishing House

Licensed under Creative Commons Attribution-
NonCommercial 4.0 International (CC BY-NC 4.0)



DOI: 10.4274/tao.2023.2022-12-1

Introduction

Crooked nose deformity (CND) is one of the most difficult surgical challenges in rhinoplasty (1). The deviation of the nasal bone and the cartilage roof from the midline to any side is called a CND. There are three types of CND: I-shaped, C-shaped, and S-shaped. An I-shaped CND is a linear deviation to one side. In a C-shaped CND, there is concavity on one side and convexity on the opposite side. An S-shaped CND has more than one convexity and concavity. In I-shaped

CND, the nasal bone is usually short on the deviated side and long on the opposite side. The management of CNDs is still difficult and controversial, and complications are among the most common causes of revision rhinoplasty (1, 2).

Dorsal preservation is a technique in which the nasal dorsum and middle roof are preserved. In this technique, dorsal hump reduction is achieved by removing the cartilage and bony septal strip and using either the “let down” or “push down” technique (3).

In 1914, the let-down technique, which uses wedge resection and subdorsal cartilage resection, was defined by Lothrop (4). Cottle and Loring (5) described the push-down technique in 1946. In 1975, Huizing (6) applied Lothrop's technique while pushing down the nasal pyramid with wedge bone resection.

Successful results were obtained with the dorsal preservation technique by combining these two techniques in the correction of I-shaped CNDs. The push-down technique is applied to the side of the short nasal bone where there is deviation, and the let-down technique is applied to the opposite side. Thus, the nasal pyramid is brought to the midline. This technique is called "asymmetric dorsal preservation" (7).

This study aimed to evaluate nasal patency and cosmetic results obtained by rhinomanometry, deviation angle (DA) measurements and the Standardized Cosmesis and Health Nasal Outcomes Survey (SCHNOS) in patients undergoing asymmetric dorsal preservation.

Methods

This retrospective study included 23 patients with I-shaped CND who underwent surgery between September 2020 and September 2021 in our tertiary hospital. The study was approved by the Necmettin Erbakan University Ethics Committee (decision no: 2022/4004, date: 07.10.2022). Patients with S-shaped or C-shaped CND were excluded from the study. All surgeries were carried out by the senior author (M.A.A.), and all patients were followed up at least 12 months postoperatively. Informed consent was obtained from the patients depicted in Figures 1, 2 and 3 to use their photos for medical and academic purposes.

Surgical Technique

All patients included in the study had undergone closed rhinoplasty. In all patients the nasal dorsum was dissected via the subperichondrial and subperiosteal planes. A high septal strip was removed from the subdorsal septum. A bony strip was resected with a rongeur from the perpendicular plate of the ethmoid. Radix, transverse, and lateral osteotomies were carried out with a microsaw. The maxillary bony wedge was removed with a straight lateral microsaw from the longer non-deviated side. Complete release of the nasal pyramid was followed by the push-down technique on the shorter deviated side and the let-down technique on the longer non-deviated side. Radix transition was camouflaged with drilling, and the asymmetric tip was solved with an asymmetric lateral crural steal and medial crural overlay. A columellar strut graft was used, and the Pitanguy ligament was preserved in all cases. Septoplasty was carried out with conservative resections and scoring. After the septum was separated from the maxillary spine, a burr hole was made in the maxillary spine, and the septum was fixated to the non-deviated side with 5-0

Prolene® suture. Radiofrequency cauterization was applied to the inferior concha, and outfracture was performed bilaterally in all cases.

Rhinomanometry

Rhinomanometry was performed according to the international RIGA consensus dated 2017 (8). Nasal decongestant spray was used 15 minutes before each rhinomanometry (performed one day preoperatively and 12 months postoperatively). The results were recorded and evaluated as total nasal airflow (TNA), nasal airflow for the long side (NALS), nasal airflow for the short side (NASS), total nasal resistance (TNR), nasal resistance for the long side (NRLS) and nasal resistance for the short side (NRSS) at 150 Pascal.

Deviation Angle Measurements

The Adobe Photoshop 2021 software package was used for the measurements. The reference middle line was drawn from the midpoint of the nasion to the midpoint of the upper lip. The other line was drawn from the nasion to the most prominent point of the nasal tip. These two lines were used to measure the angle of deviation. The degree of the angle between these two lines was recorded as the DA pre- and postoperatively (Figure 1).

Standardized Cosmesis and Health Nasal Outcomes Survey

The SCHNOS evaluates the functional and aesthetic results of rhinoplasty (9). The SCHNOS scale includes 10 questions and 2 parts. Each question is scored on a 6-point scale (0= no trouble to 5= extreme trouble). SCHNOS-O includes 4 questions and evaluates obstruction (items 1-4, maximum score of 20). SCHNOS-C includes 6 questions and evaluates cosmesis (items 5-10, maximum score of 30). The Turkish validated SCHNOS scale was used one day preoperatively and 12 months postoperatively (10). Pre- and postoperative SCHNOS scores were used to evaluate nasal patency and cosmesis.

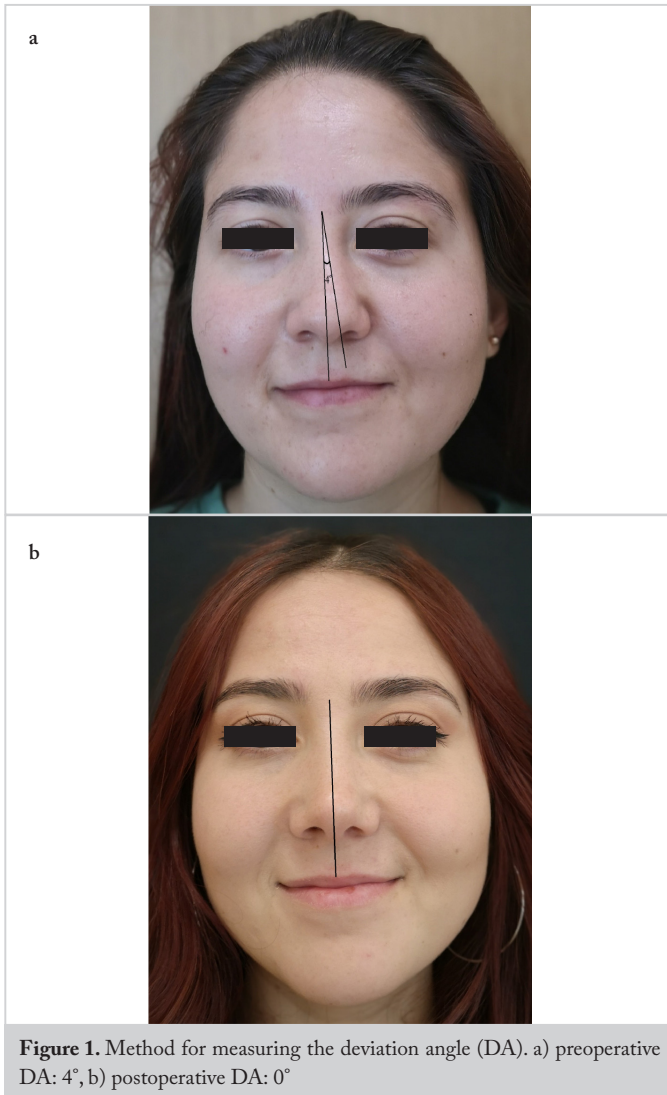
Statistical Analysis

Statistical analyses were done with SPSS 22.0 for Windows. All continuous variables were assessed for normality using the Shapiro-Wilk test. Nasal airflow, nasal resistance, DA and SCHNOS score changes were analyzed by the Wilcoxon signed-rank test. For all statistical analyses, results were considered significant at $p < 0.05$.

Results

This study was conducted with 23 patients (12 females and 11 males). Their mean age was 24.1 ± 2.1 years (range, 20-29). While all patients had I-shaped axis deviation,

nine had deviation to the right side and 14 had deviation to the left side. TNA, TNR, NASS, NALS, NRSS, NRLS, SCHNOS-O, SCHNOS-C and DA results preoperatively and 12 months postoperatively are shown in Table 1.



Photos of two patients preoperatively and 12 months postoperatively are shown in Figures 2 and 3.

None of the patients had severe complications perioperatively and/or postoperatively. Most of the patients were satisfied with the functional and cosmetic outcomes 12 months postoperatively.

Discussion

Various techniques have been described for the correction of CND (11–15); however, most of them are associated with high revision rates. Many surgeons have emphasized the importance of septal surgery in the management of CND (16, 17). A classification of septonasal deviations was reported by Guyuron et al. (18), who in their study, evaluated 93 septoplasty patients of whom 40% had I-shaped, 32% had C-shaped and 9% had S-shaped septal deviation. In the study of Stepnick and Guyuron (1), the authors suggested separation of the posterocaudal septum from the vomer, partial separation of the quadrangular cartilage from the perpendicular plate and midline repositioning of the caudal septum on the maxillary crest for the correction of I-shaped deformities. Additionally, correction of the septum and nasal pyramid with asymmetric osteotomies and complete separation of the osteocartilaginous structures, rather than correction with asymmetric spreader grafts, are performed (1, 2).

Demir (2) emphasized a new method using a unilateral spreader graft for the correction of CND. They used this approach for the long side, performed asymmetric osteotomy, separated the caudal septum from the nasal spine and fixed the neutral position. Only aesthetic outcomes were evaluated in their study using DA.

Kavuzlu and Şahin (19) used a cross-spreader graft for I-shaped CND in their retrospective study of 25 patients. They used the Nasal Obstruction Symptoms Evaluation

Table 1. Preoperative and postoperative rhinomanometry results, DA measurements and SCHNOS scores

	Preoperative		Postoperative 12th month		p-value*
	Mean	SD	Mean	SD	
TNA	642.5	83.6	765.0	57.2	0.001
NA(SS)	371.4	22.9	391.4	48.0	0.167
NA (LS)	271.0	85.3	373.1	44.6	0.001
TNR	0.23	0.03	0.19	0.01	<0.001
NR (SS)	0.39	0.02	0.37	0.03	0.017
NR (LS)	0.61	0.19	0.42	0.05	<0.001
SCHNOS-O	16.7	3.6	1.5	1.8	<0.001
SCHNOS-C	27.2	4.1	2.1	1.8	<0.001
DA	7.4	1.5	0.8	1.2	<0.001

*P-value for Wilcoxon signed-ranks test. TNA: Total nasal airflow, NA: Nasal airflow, SS: Short side, LS: Long side, TNR: Total nasal resistance, SCHNOS: Standardized Cosmesis and Health Nasal Outcomes Survey, O: Obstruction, C: Cosmesis, DA: Deviation angle, SD: Standard deviation

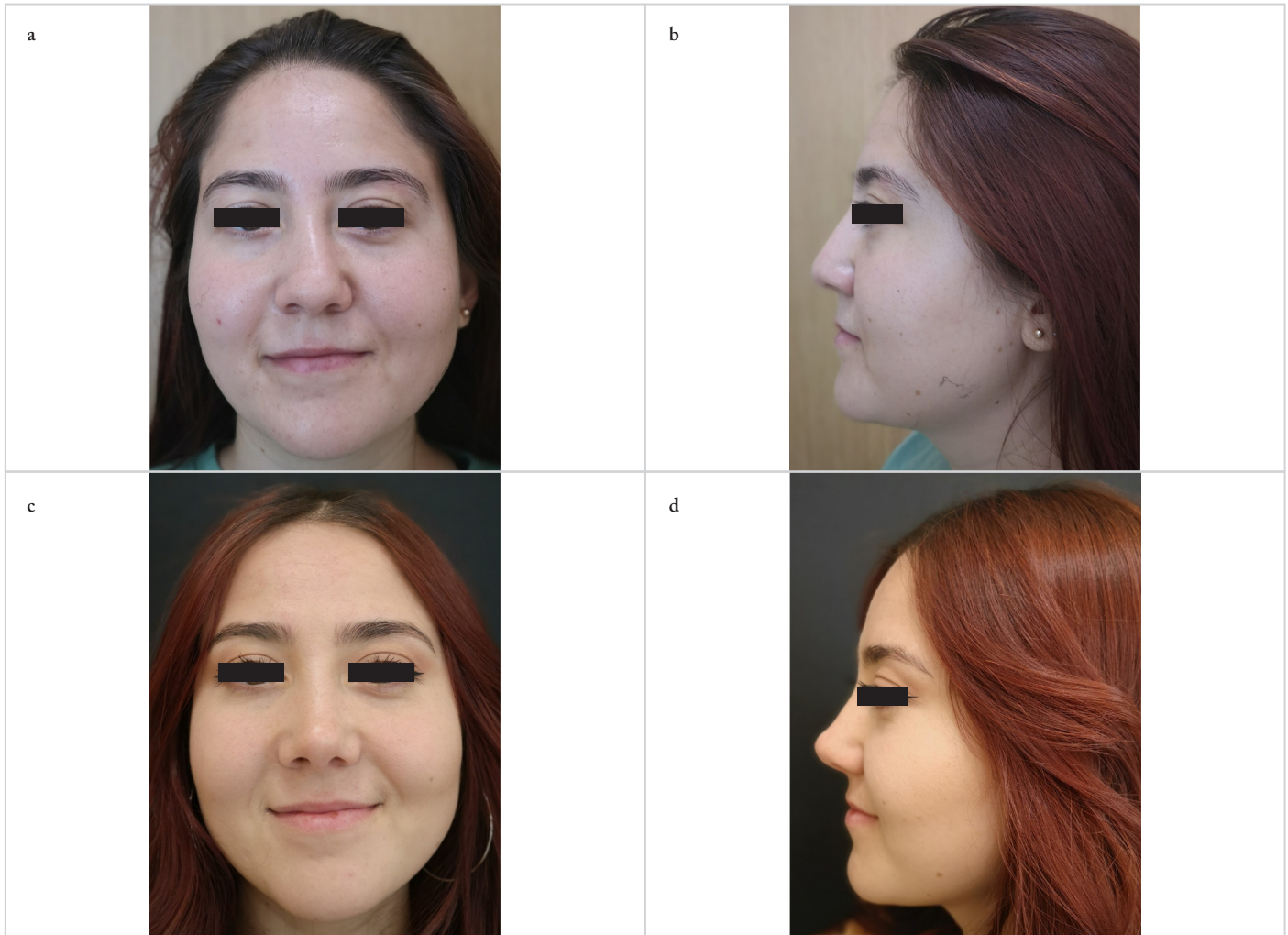


Figure 2. Twenty-one-year-old female who has severe I-shaped axis deviation and underwent closed approach preservation rhinoplasty. a, b) frontal and profile views (preoperatively), c, d) frontal and profile views (12th month postoperatively)

and Rhinoplasty Outcomes Evaluation scales and DA measurements for outcome evaluation, determining that the cross-spreader graft is an effective method for correcting I-shaped CND and promises good functional and aesthetic results.

In the recent years, the asymmetric dorsal preservation technique has come to the fore as a good alternative for I-shaped CND correction (7). Asymmetry in the nasal pyramid is corrected using the let-down technique with bony wedge resection on the long side and the push-down technique on the short side. Given that the main problem in these patients is usually nasal bone asymmetry, the nasal roof is not opened, which eliminates the need for a spreader graft. We think it is a conservative approach and a useful method for I-shaped CND.

Preservation of the natural nasal dorsum avoids complications associated with midvault reconstructions. In structural rhinoplasty, especially with the use of spreader grafts, some

patients experience widening of the roof. Preservation rhinoplasty avoids this widening, as it does not disrupt the natural roof (3).

One of the subtleties of preservation rhinoplasty is choosing the right patient. It is important that S-shaped and C-shaped CND cases be excluded, as done in our study. In severe septal deviations, low septal strip removal using the Cottle technique may be preferred instead of high septal strip removal. One of the common problems in preservation rhinoplasty is a residual hump—a major cause of patient dissatisfaction. This is less common in cases where the high septal strip is removed (3, 7).

Most studies have used DA measurements for CNDs (2, 7). We, too, used DA measurements but left the evaluation of the aesthetic results to the patients using the SCHNOS-C scale. Since rhinoplasty focuses on patient satisfaction, this is also subjective. Some studies have shown that the dorsal preservation technique provides successful aesthetic



Figure 3. Twenty-four-year-old female who has mild axis deviation and underwent closed approach preservation rhinoplasty. a, b) frontal and profile views (preoperatively), c, d) frontal and profile views (12th month postoperatively)

results in I-shaped CNDs, but we observed that functional outcome assessment is incomplete in many studies on CND; and further noted that objective evaluations, such as rhinomanometry, are not often used in similar studies on CNDs (7).

Our study is unique in that rhinomanometry shows that asymmetric dorsal preservation provides good functional outcomes in I-shaped CND. At 12 months postoperatively, there was a significant increase in TNA, a decrease in TNR, an increase in NALS and a decrease in NRLS. The significant decrease in SCHNOS-O scores 12 months postoperatively shows that nasal patency increased to a degree that the patients could notice. In terms of aesthetic results, there was a significant decrease in SCHNOS-C scores 12 months postoperatively. This study is also unique as the first to evaluate the functional effects of the asymmetric dorsal preservation technique.

The limitations of our study are that it is retrospective and does not have a control group. More valuable results could

be obtained by designing a prospective study with a control group in which CND was corrected with the structural rhinoplasty technique.

Conclusion

Although few studies have evaluated the success of asymmetric dorsal preservation in I-shaped CND, especially regarding aesthetic results, this study, using objective and subjective evaluations, has shown that the asymmetric dorsal preservation technique is a good alternative for the correction of I-shaped CND, with successful aesthetic and functional outcomes.

Ethics Committee Approval: This study was approved by the Necmettin Erbakan University Ethics Committee (decision no: 2022/4004, date: 07.10.2022).

Informed Consent: Informed consent was obtained from the patients depicted in Figures 1, 2 and 3 to use their photos for medical and academic purposes.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: M.A.A., Concept: H.Y., Design: M.A.A., H.Y., Data Collection and/or Processing: M.A.A., H.Y., Analysis and/or Interpretation: M.A.A., H.Y., Literature Search: M.A.A., H.Y., Writing: M.A.A., H.Y.

Conflict of Interest: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Main Points

- Crooked nose deformity (CND) is one of the most difficult surgical challenges in rhinoplasty.
- The management of crooked nose is still difficult and controversial, and complications are among the most common causes of revision rhinoplasty.
- Successful results were obtained with the dorsal preservation technique in the correction of I-shaped CND.
- Asymmetric dorsal preservation technique is a good alternative for the correction of I-shaped CND, with successful aesthetic and functional outcomes.

References

1. Stepnick D, Guyuron B. Surgical treatment of the crooked nose. *Clin Plast Surg* 2010; 37: 313-25. [Crossref]
2. Demir UL. A novel approach to crooked nose in rhinoplasty: asymmetric level osteotomy combined with unilateral spreader graft. *J Craniofac Surg* 2019; 30: 1512-5. [Crossref]
3. Saban Y, Daniel RK, Polselli R, Trapasso M, Palhazi P. Dorsal preservation: the push down technique reassessed. *Aesthet Surg J* 2018; 38: 117-31. [Crossref]
4. Lothrop OA. An operation for correcting the aquiline nasal deformity; the use of new instrument; report of a case. *Boston Med Surg J* 1914; 170: 835-7. [Crossref]
5. Cottle MH, Loring RM. Corrective surgery of the external nasal pyramid and the nasal septum for restoration of normal physiology. *Ill Med J* 1946; 90: 119-35. [Crossref]
6. Huizing EH. Push-down of the external nasal pyramid by resection of wedges. *Rhinology* 1975; 13: 185-90. [Crossref]
7. Özücer B, Çam OH. The effectiveness of asymmetric dorsal preservation for correction of I-shaped crooked nose deformity in comparison to conventional technique. *Facial Plast Surg Aesthet Med* 2020; 22: 286-93. [Crossref]
8. Vogt K, Bachmann-Harildstad G, Lintermann A, Nechyporenko A, Peters F, Wernecke KD. The new agreement of the international RIGA consensus conference on nasal airway function tests. *Rhinology* 2018; 56: 133-43. [Crossref]
9. Moubayed SP, Ioannidis JPA, Saltychev M, Most SP. The 10-Item Standardized Cosmesis and Health Nasal Outcomes Survey (SCHNOS) for functional and cosmetic rhinoplasty. *JAMA Facial Plast Surg* 2018; 20: 37-42. [Crossref]
10. Gode S, Ozturk A, Sahin M, Berber V, Apaydin F. Turkish validation of the standardized cosmesis and health nasal outcomes survey. *Facial Plast Surg* 2019; 35: 397-9. [Crossref]
11. Keeler JA, Moubayed SP, Most SP. Straightening the crooked middle vault with the clocking stitch: an anatomic study. *JAMA Facial Plast Surg* 2017; 19: 240-1. [Crossref]
12. Toriumi MD, Watson D. Innovative surgical management of the crooked nose. Rohrich R, Adams W, Ahmad J, Gunter J, editors. *Dallas Rhinoplasty: nasal surgery by the masters*. St. Louis: Quality Medical Publishing; 2002.p.829-45. [Crossref]
13. Byrd HS, Burt J. The crooked nose: an algorithm for repair. Rohrich R, Adams W, Ahmad J, Gunter J, editors. *Dallas Rhinoplasty: nasal surgery by the masters*. St. Louis: Quality Medical Publishing; 2007.p. 816-28. [Crossref]
14. Tugrul S, Dogan R, Kocak I, Ozturan O. Asymmetrically pressing nasal splint for crooked nose deformity. *J Craniofac Surg* 2015; 26: 180-5. [Crossref]
15. Taş S. Correcting the alar base retraction in crooked nose by dissection of levator alaque nasi muscle. *Ann Plast Surg* 2016; 77: 383-7. [Crossref]
16. Metzenbaum M. Replacement of the lower end of the dislocated septal cartilage versus submucous resection of the dislocated end of the septal cartilage. *Arch Otolaryngol* 1929; 9: 282-96. [Crossref]
17. Killian G, Foster EE. The submucous window resection of the nasal septum. *Ann Otol Rhinol Laryngol* 1905; 14: 363-93. [Crossref]
18. Guyuron B, Uzzo CD, Scull H. A practical classification of septonasal deviation and an effective guide to septal surgery. *Plast Reconstr Surg* 1999; 104: 2202-9. [Crossref]
19. Kavuzlu A, Şahin E. A useful approach to i-shaped crooked nose correction: cross-spreader graft technique. *Aesthetic Plast Surg* 2022; 46: 833-40. [Crossref]