

# Achieving a Strong and Straight Septal Extension Graft: A Novel Four-step Surgical Approach in Rhinoplasty

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**Background:** Septal extension grafts allow the precise elongation of the nasal septum to attain facial harmony and optimize aesthetic outcomes. In this context, septal surgery requires meticulous design to address both functional and aesthetic goals. Traditional septoplasty techniques often overlook aesthetic considerations and postoperative nasal structural stability, resulting in unresolved or recurrent deviations, nose tip drooping, and obstruction recurrences. Despite advancements in surgical techniques, achieving simultaneous septal alignment and long-term stability remains a significant challenge.

**Methods:** This study introduces a systematic 4-step technique. The procedure encompasses caudal septum liberation, placement of the septum extension cartilage graft, positioning of an ethmoidal bone graft, and redefinition through an intermediate cartilage.

**Results:** A retrospective analysis of outcomes involving 753 patients was conducted with a minimum follow-up of 6 months. During follow-up visits, 1.73% of cases exhibited residual columellar asymmetry, and 0.66% showed tip asymmetries. The infection rate was 0.40%, with no cases of tip drop identified. The overall satisfaction rating on the Rhinoplasty Outcomes Evaluation questionnaire at 12 months postoperative was 9.3.

**Conclusions:** The technique provides a systematic approach to integrate functional and aesthetic objectives, emphasizing septal stability and alignment while concurrently addressing tip projection and stability. The study provides comprehensive insights into the principles, methodology, and advantages of this rhinoplasty technique. The outcomes underscore the efficacy of the technique, presenting a reliable and long-term stable solution. (*Plast Reconstr Surg Glob Open* 2024; 12:e6272; doi: 10.1097/GOX.0000000000006272; Published online 16 October 2024.)

## INTRODUCTION

Rhinoplasty constitutes a complex and intricate surgical procedure with the aim of reshaping the nasal contour.

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The employment of a septal extension graft (SEG), when deemed appropriate, consents the precise elongation of the nasal septum to attain facial harmony and optimize the aesthetic outcome. In this context, the scrupulous management of the nasal septum, a key factor influencing both anatomical form and physiological function, is crucial for the procedural success. Although traditional septoplasty approaches have predominantly been targeted to the relief of obstructive symptoms,<sup>1,2</sup> they often fail in addressing aesthetic considerations and postoperative nasal structural stability, resulting in unresolved or recurrent deviations, nose tip drooping, and obstruction recurrences.<sup>3,4</sup>

Despite advancements in surgical techniques, the attainment of concurrent septal alignment and long-term

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stability remains a significant challenge, particularly when integrating the utilization of an SEG. To address this issue, a 4-step technique was designed to integrate functional and aesthetic goals. This approach specifically focuses on achieving septal stability and alignment while concurrently addressing tip projection and stability, making it particularly effective for elongating short noses and correcting crooked noses. In this procedure, septoplasty, while preserving its functional attributes, has been modified as a propaedeutic measure for aesthetic management. This adaptation involves the supplementary incorporation of a partial excision of the ethmoidal perpendicular plate, alongside the conventional cartilage management. Conventionally, partial ethmoid resection has been used to rectify deviations and enhance respiratory capacity,<sup>5,6</sup> although its systematic harvest and utilization in aesthetic rhinoplasty has been scarcely documented.<sup>7-11</sup> In this article, the principles and methodologies of this procedure are delineated with the aim of enhancing nose aesthetics while concurrently addressing any functional limitations.

## MATERIALS AND METHODS

In this study, we conducted a retrospective analysis of patients who underwent rhinoplasty at our institution from January 2018 to December 2022. The inclusion criteria encompassed primary or secondary rhinoplasty procedures involving septum cartilage harvest, with a mandatory follow-up period of at least 6 months. Exclusion criteria included smoking, noncompliance with follow-up appointments, and the absence of documented information.

The collected data from participants included demographics (sex and age), clinical history, surgical technical details, and any encountered complications. Additionally, photographic documentation was systematically collected, capturing postoperative images at every follow-up visit to facilitate a comprehensive reassessment of patients

## Takeaways

**Question:** Septal extension grafts enable precise elongation of the nasal septum for facial harmony and aesthetic enhancement, emphasizing the need for meticulous surgical design to meet both functional and aesthetic objectives. Despite surgical advancements, achieving simultaneous septal alignment and long-term stability remains challenging.

**Findings:** This study introduces a systematic 4-step technique. The procedure encompasses caudal septum liberation, placement of the septum extension cartilage graft, positioning of an ethmoidal bone graft, and redefinition through an intermediate cartilage.

**Meaning:** The technique provides a systematic approach to integrate functional and aesthetic objectives, emphasizing septal stability and alignment while concurrently addressing tip projection and stability.

(Figs. 1–3). The Rhinoplasty Outcomes Evaluation questionnaire was utilized to explore and measure patient satisfaction with the rhinoplasty results.

## Surgical Technique

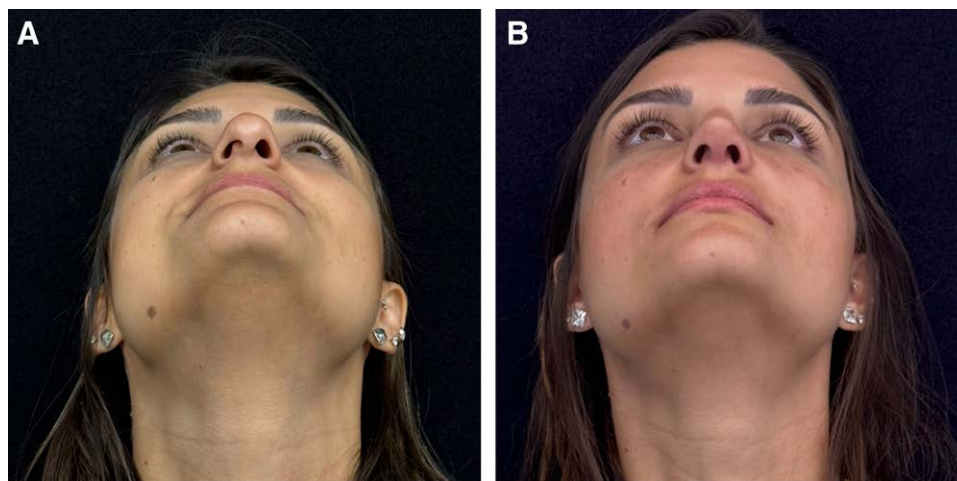
The technique described in this article was used by the senior author for all patients meeting the inclusion criteria. Intraoperative antibiotic prophylaxis with amoxicillin and clavulanate was consistently administered. General anesthesia with the open technique was used for all rhinoplasties, along with topically administered local anesthesia. To prevent edema and inflammation, a solution comprising ropivacaine, epinephrine, and triamcinolone was injected into the nasal tip. Both the nose and septum were infiltrated with ropivacaine and epinephrine for postoperative pain control and anatomical plane dissection.



**Fig. 1.** Comparative pre- and postoperative images. Frontal view: comparison of pre- (A) and 3-month postoperative (B) images.



**Fig. 2.** Comparative pre- and postoperative images. Lateral view: pairwise comparison of pre- (A) and 3-month postoperative (B) images.



**Fig. 3.** Comparative pre- and postoperative images. Basal view: comparative presentation of pre- (A) and 3-month postoperative (B) images.

The septum harvest was performed after bump removal and overall dorsum definition. Alar divarication was induced to expose the septum, which was then freed by perichondrium anteriorly and periosteum posteriorly. After exposure, a C-shaped septum resection was carried out to collect cartilage and simultaneously correct any potential deviation (Fig. 4). Anterior ethmoidal resection was performed to correct possible deviations and obtain a bone plate. Any residual deviations were addressed, and manual turbinectomy distraction was performed, with removal of the maxillary crest if necessary.

The technique can be summarized in 4 steps, as follows. (See Video [online], which details how after performing septoplasty, the ethmoidal bone fragment is thinned and drilled. The cartilage SEG is prepared using a mold,

placed over the caudal residual septum, and secured for stability with the bone plate. Residual asymmetries are corrected with a septal cartilage fragment, and the lateral cartilages are fixed over the septum to reconstruct the nasal dorsum.)

1. Caudal septum liberation and maxillary fixation: in the first step, the caudal septum is liberated from any fibrotic attachment to the maxillary crest. Then, it is fixated to the bone through direct fixation to the periosteum or, in the absence of available tissue, by drilling a hole in the anterior maxilla. In cases of severe basal columellar distortion, a wedge-shaped basal septum excision may be necessary to provide correct structural alignment.



**Fig. 4.** Illustration of lateral septal view: the resection area, covering both the septum and ethmoidal plate, is marked in blue. The SEG area is delineated in green, with the alar articulated cartilage in light blue, the ethmoidal graft in orange, and the intermediate cartilage in purple. The unused cartilage will be processed and utilized as diced cartilage.

2. Septum extension cartilage graft placement: the second step involves positioning the septum extension cartilage graft to enhance septal stability and provide tip support. To preserve and optimize cartilage harvest from the septum, a plastic mold is initially used and placed over the septum. After determining the correct dimensions and optimal positioning, the mold is marked, and its shape is reproduced over the cartilage. The extension graft structure is then positioned over the septum.

3. Ethmoid bone graft positioning: in the third step, the vertical plate of ethmoidal bone is applied to the nasal construct. Its sturdy plate stabilizes any bending tendency and improves septal alignment. To utilize the bone, prior plate preparation involves initial shaping through rough cutting, followed by planning with a ball end mill and subsequent drilling to enable wire fixation.
4. Intermediate cartilage redefining: in cases of residual misalignment, an intermediate cartilage, obtained from a spare part of the septum, can be positioned between the bone plate and septal graft to align the structure.

Once the septum is completed, attention is directed to the alar cartilages. Bilateral transdomal defining sutures are applied, followed by an interdomal suture. When indicated, articulated alar rim grafts are used to address potential external nasal valve collapse and prevent nasal contracture and retraction. Before suturing, diced cartilage and accurate suture technique are used to eliminate dead space and stabilize the result. Standard postoperative care involves the application of an external thermoplastic nasal splint, administration of oral isotretinoin, and subdermal corticosteroid injections as necessary.

## RESULTS

Since 2018, 753 patients (678 women and 75 men) have undergone rhinoplasty with septum augmentation and ethmoidal plate positioning. Clinical observations were documented during preoperative visits. Of the total, 615 (81.67%) underwent primary rhinoplasty, and 138 (18.33%) underwent secondary rhinoplasty without prior septoplasty. The mean age was 34.2 (ranging from 18 to 57). No major comorbidities were identified, with 16 (2.12%) patients having hypertension and 20 (2.66%) having diabetes. The minimum follow-up was 6 months (average 16 mo; range 6 mo to 4 y).

During follow-up visits, 13 (1.73%) cases exhibited residual columellar asymmetry; however, none required reoperation, as patients were satisfied with the achieved improvement. Five (0.66%) cases showed tip asymmetries during follow-up. Three minor deviations did not necessitate surgery, whereas 2 major deviations were reoperated with significant improvement and patient satisfaction. No cases of tip drop were identified during follow-up.

Patients reported pain ranging from none to mild, with paracetamol administered on demand in the first 3 postoperative days, providing successful pain control. The infection rate was 0.40%, with 3 patients exhibiting signs of infection. Oral antibiotic treatment resolved the complication without functional or aesthetic sequelae. All patients noted a significant improvement in respiratory capacities.

Rhinoplasty Outcomes Evaluation satisfaction questionnaires at 12 months reported a satisfaction rating of 9.3 (ranging from a minimum of 5 to a maximum of 10).

## DISCUSSION

In this article, we introduce our technique and describe the outcomes obtained through its application (Figs. 5–7). To optimize outcomes in rhinoplasty, septal



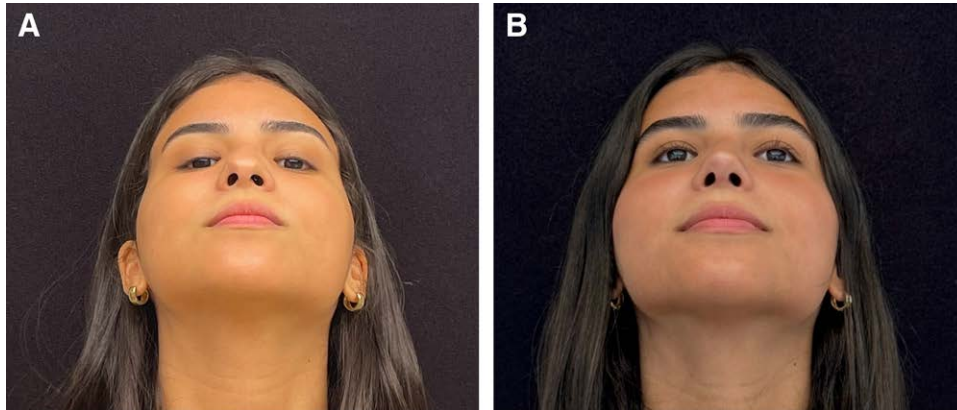
**Fig. 5.** Comparative pre- and postoperative images. Frontal view: comparison of pre- (A) and 1-year postoperative (B) images.



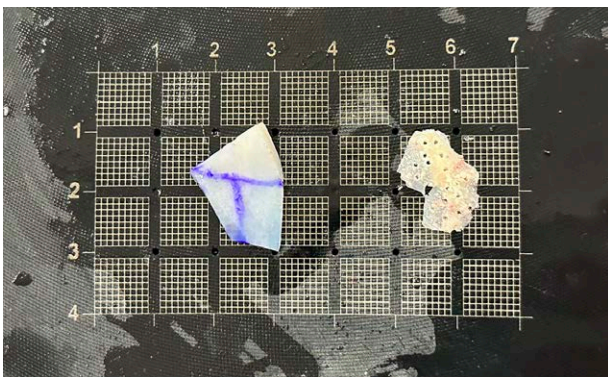
**Fig. 6.** Comparative pre- and postoperative images. Lateral view: pairwise comparison of pre- (A) and 1-year postoperative (B) images.

surgery must be meticulously designed to integrate both functional and aesthetic goals. In this regard, postoperative cartilaginous asymmetry is a common complication after septoplasty.<sup>12</sup> Similarly, in rhinoplasty, addressing the

caudal septum often presents challenges, particularly in managing recurrent columellar distortion and correcting issues with the nasal tip.<sup>12</sup> Correction and control of tip alterations such as excessive width and deviation from the



**Fig. 7.** Comparative pre- and postoperative images. Basal view: comparative presentation of pre- (A) and 1-year postoperative (B) images.



**Fig. 8.** Septal graft representation over the working plate: on the left, the SEG delineated for precise positioning over the septum; on the right, the processed ethmoidal plate.

midline can be demanding, especially in the context of concomitant septoplasty with septal extension. The septum is commonly utilized to supply cartilage for the SEG (Fig. 8). It is a reliable source of cartilage and enables correction of septal deviation simultaneously. Ensuring the maintenance of a 10- to 15-mm strut of cartilage is vital to support the cartilaginous dorsum. Various techniques such as scoring, excision, spreader grafts, spreader flaps, and extramucosal replacement of the septum have been used to achieve a straight dorsum.<sup>13</sup>

Addressing internal valve collapse and inferior turbinate hypertrophy is deemed essential for restoring proper airflow when required. Correction of caudal nasal deviation may involve excision, scoring, replacement, and repositioning of the septum on the anterior nasal spine.<sup>14,15</sup>

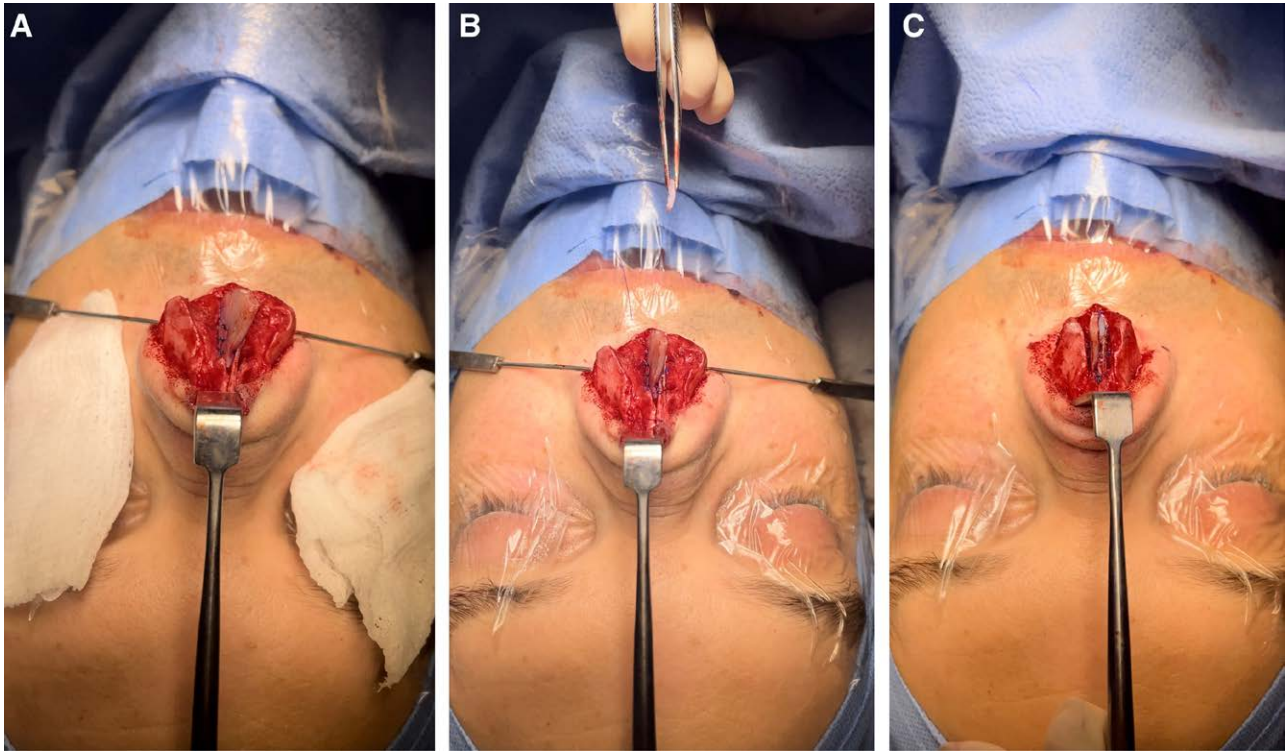
Postoperative cartilage distortion is a common occurrence and may result from various factors, including poor cartilage integrity, warping cartilage tendency, aberrant scar tissue retraction, and postoperative complications. An accurate septoplasty technique consents to minimize postoperative distortion. In addition, a precise remodeling of the caudal septum before SEG positioning can enhance the predictability of the process. The precise placement of the SEG is determined through detailed facial analysis. Specifically, if nasal

deviation is present, the positioning is guided by its observation, placing the SEG on the septum opposite the deviation, with the bone plate positioned adjacent to stabilize the septum. In this regard, the use of a mold allows for meticulous graft designing and increased precision. Accurate suturing, intraoperative irrigation, and obliteration of the third space promote correct wound healing and reduce complications. Our infection rate was 0.40%, consistent with the lower values (0.5%–12%) reported in the literature.<sup>16</sup>

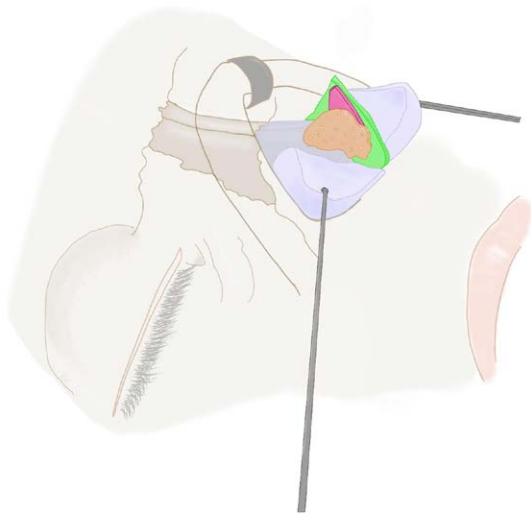
Exceptional care was taken before and during surgery to maintain antisepsis, with particular attention to minimizing graft contamination. Repeated antibiotic solution irrigation during the operation was used to achieve this goal. In addition, this rate may also be attributed to the low comorbidities within our patient group.

The senior author proposed the use of a bone graft to address the necessity to conserve septal cartilage while maintaining a stable construct. The septal cartilage is essential for creating the SEG; articulated grafts; diced cartilage; and possibly, the intermediate graft. To optimize the use of cartilage, we incorporate ethmoidal bone grafts, which allow us to effectively implement this technique. In cases where the septum is insufficient to provide for these structures, cartilage rib harvest is considered.<sup>17</sup> In our experience, the open approach provides superior visualization of structures, enabling precise positioning of the septum graft. Harvesting a bone graft from the perpendicular ethmoid plate may pose challenges and lead to complications such as rhinorrhea.<sup>7</sup> In our experience, no such occurrences or related complications were reported. To minimize this risk, we exercised utmost care during cephalic septal mucosal dissection, maintaining at least a 10-mm bone strut to support the integrity of the cribriform plate. The bone implant serves to enhance stability and as support to straighten the septum in case of residual asymmetries. Additionally, the use of an additional “intermediate” cartilage graft positioned between the bone and cartilage enables further enhancing the precision of the technique (Fig. 9).

Nose tip augmentation is achieved through the use of an SEG. The ethmoidal graft stabilizes the result and diminishes the typical issues of bending and tip fall (Fig. 10), as evidenced by the low incidence of tip drop. These



**Fig. 9.** Cranial intraoperative view illustrating key aspects of septal surgery. A, SEG positioning, showing the tilt resulting from diminished septal stability postseptoplasty. B, Ethmoidal plate placement on the right side of the septum, contributing to stability and alignment of the SEG. C, Intermediate cartilage, positioned between the bone plate and the SEG, improving septal straightening.



**Fig. 10.** Illustration of basal septal structure: the caudal residual septum has been reinforced and elongated with the SEG, emphasized in green. The ethmoidal plate, illustrated in orange, imparts support and stability to the structure, whereas the intermediate cartilage, highlighted in purple, contributes to straightening the septum.

characteristics makes this technique particularly suitable for short noses requiring elongation or for noses with a tendency toward a falling tip. It is fundamental to correctly

thin the ethmoid plate, as the insertion of a bony fragment that is not adequately reduced may cause an enlargement of the caudal dorsum. In our experience, the incorporation of bone grafts further strengthened the tip structure, particularly in the first postoperative months, providing additional support and stability during the critical initial healing phase. Although bone grafts are generally absorbable, with resorption rates varying from partial to total,<sup>18,19</sup> they play a crucial role in providing initial stability to the nasal tip construct, facilitating optimal healing and tissue remodeling. As bone resorption progresses, it is gradually replaced by fibrotic tissue, leading to decreased stiffness in the tip area over time. This gradual transition ensures that the initial rigidity provided by the bone graft diminishes, leading to a more natural feel. Articulated cartilage grafts, obtained from the residual septum harvest, enhance stability in the anterior valve and improve respiratory capacity.<sup>20</sup> Additionally, their positioning and fixation acts as a stabilizing force counteracting postoperative scar retraction. In our patient's records, residual visible columellar deviations were identified in 13 (1.73%) patients. Our experience indicates that patients often place less emphasis on the columellar nasal area, considering it a relatively hidden spot. Furthermore, the overall aesthetic and functional improvements achieved through rhinoplasty leave patients satisfied, minimizing concerns about residual or secondary alterations. As a result, no patient required surgical correction.

The primary concern typically revolves around tip dislocation, which occurred in 5 patients in our practice. Three cases were minor and did not necessitate corrective

surgery, whereas major deviations required tip revision. In such cases, reopening from the same inverted V columellar incision was performed, involving tip exposition and identification of the traction force. Scar retraction caused the tip dislocation in both cases, and resolution was achieved through scar lysis, tip-defining interdomal sutures, and meticulous suturing, with no recurrence. In this study, outcomes were assessed using satisfaction questionnaires completed by the patients. The absence of objective measurements, as well as the lack of a control group, may be limitations to the analysis. However, the low rate of reintervention supports the high satisfaction levels reported in the questionnaires. The questionnaire used assessed the overall satisfaction of the patients; no specific items were evaluated in the analysis. This lays the foundation for a more specific, point-to-point evaluation of the results. The minimum follow-up considered for this evaluation was 6 months, with an average of 16 months. Although the range of follow-ups is consistent with those reported in the literature, future studies with extended follow-up periods should be designed to comprehensively address the issue of long-term stability.

## CONCLUSIONS

Based on our observations, the correction of septum deviation may increase respiratory capacity but leave an incomplete structure prone to malformations and instability during tip surgery. In addition, an unstable septum structure may be unreliable in correcting nose deviations, leading to cartilage warping and eventual tip drop. The use of a bone graft in our experience enhances structural stability and stabilizes long-term results. This article aims to elucidate the principles, methodology, and potential advantages of this maneuver with each step thoroughly detailed. The technique offers reliable and stable long-term result, simultaneously addressing both the functional and aesthetic aspects of rhinoseptoplasty.

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## DISCLOSURE

*The authors have no financial interest to declare in relation to the content of this article.*

## PATIENT CONSENT

*Patients provided written consent for the use of their images.*

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