



Correspondence and Communications

# Stratified dorsal augmentation - A novel technique for dorsal reconstruction

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## KEYWORDS

Dorsal augmentation;  
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Nasal aesthetics;  
Structural rhinoplasty

**Summary** *Introduction:* Dorsal augmentation enhances nasal dorsum height and contour. Existing techniques face challenges like resorption, infection, and migration. This study introduces Stratified Dorsal Augmentation, a multi-layered cartilage grafting approach to improve stability and aesthetics.

*Methods:* A total of 68 patients (19 males, 49 females) underwent open structural rhinoplasty (2020-2023). Autologous costal cartilage was harvested (7th rib in females, 8th in males) using U-shape technique. Grafting involved: (1) diced cartilage for surface smoothing, (2) a solid 2 mm obliquely split costal cartilage graft for structure, (3) an additional diced cartilage layer for contouring, and (4) a perichondrium overlay for stability. The average follow-up was 29 months.

*Results:* All patients achieved the desired dorsum height. No cases of graft rejection, migration, or warping occurred. Two vestibular infections resolved with antibiotics, and two minor bleeding cases were managed conservatively. Three patients required minor secondary revisions.

*Conclusion:* The Stratified Dorsal Augmentation technique minimizes warping, migration, and resorption, while ensuring both long-term stability and a natural appearance, making it a safe and effective alternative for dorsal augmentation.

*Level of evidence:* IV

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Dorsal augmentation procedures aim to increase dorsum height and create a smoother and more contoured nasal dorsum. Since the 19th century, various techniques and grafts have been used for this purpose, including homo-grafts and autografs.<sup>1</sup> While alloplastic materials like

silicone and Gore-Tex are commonly used in Eastern countries, autografts are preferred in Western countries. Each approach has its advantages and disadvantages.<sup>2</sup>

Dorsal augmentation remains a challenging procedure due to complications such as resorption, infection, migration, palpability, and warping.<sup>3</sup> The ideal augmentation technique should provide sufficient dorsum height, a smooth and natural appearance, and long-term stability.

In this study, we introduced Stratified Dorsal Augmentation (SDA), a novel approach aimed at addressing these challenges.

## Materials and methods

This prospective study was conducted at a tertiary referral center with informed consent from the patients and approval from the local ethics committee. Between 2020 and 2023, 68 patients (19 males, 49 females) underwent open structural rhinoplasty performed by the same surgeon (Dr. Soyulu). The study included 28 patients with ethnic noses, 17 of Asian descent, and 23 revision cases. All procedures utilized SDA with autologous costal cartilage. The follow-up period ranged from 2 to 3 years, with an average of 29 months. An a priori power analysis ( $\alpha = 0.05$ , power = 0.80, large effect size) indicated that approximately 52 patients would be required. Since our study included 68 patients with a mean follow-up of 29 months, we consider the sample size adequate to evaluate the clinical outcomes of this novel technique.

## Technical details

All patients underwent open structural rhinoplasty. Costal cartilage was harvested from the 7th rib in females and the 8th rib in males using the U-shape costal cartilage harvesting technique.<sup>4</sup> The augmentation process involved:

Layer 1: Diced cartilage placed at the base to smooth the dorsum and prevent graft migration.

Layer 2: A 2 mm-thick costal cartilage graft, prepared using the oblique split technique, inserted as a central structural layer.

Layer 3: Additional diced cartilage applied to camouflage the structure.

Layer 4: A costal perichondrium overlay to enhance stability, support the skin, and provide a natural feel. For cases requiring greater augmentation, additional layers were added accordingly, as demonstrated in the supplementary animation (Video 1) and intraoperative recording (Video 2).

## Results

All patients achieved the desired dorsum height. No cases of dorsal abscess, warping, resorption or migration were

observed. Two vestibular infections were treated successfully with antibiotics. Two patients experienced minor bleeding, managed conservatively. Three patients underwent minor secondary revisions (alar base resection and tip modification) (Figures 1 and 2). During healing, the layered construct (diced-solid-diced-perichondrium) conforms tightly to the overlying skin and surrounding soft tissue. This natural compression further stabilizes the graft and prevents displacement (Figure 3).

## Discussion

Challenges in dorsal augmentation include migration, resorption, warping, and palpability.<sup>1</sup> To overcome these, we developed SDA, which we have found effective in clinical practice.

First, diced cartilage was used as the base to smooth the dorsum. Next, a 2 mm-thick solid costal cartilage graft provided a stable contour, followed by another diced cartilage layer for further camouflage. The centralized placement of the solid graft prevented migration and palpability. Additionally, the oblique split technique minimized the risk of warping. The superficial perichondrium layer offered soft tissue support, covered the underlying layers, and enhanced the natural tactile sensation.

Previous studies have used diced cartilage alone for dorsal augmentation,<sup>5</sup> but the absence of structural integrity often resulted in displacement, collapse, and contour irregularities during healing. Our method, incorporating a single solid graft, functions similarly to reinforced concrete, ensuring long-term stability.

Some studies have used diced cartilage within fascia or perichondrium.<sup>1,3</sup> However, this can lead to contour irregularities, compromised vascularization, resorption, and increased infection risk due to limited blood supply. Our layered technique facilitates blood flow between layers and reduces the risk of resorption and infection. Indeed, no dorsal infections were observed in our study. Two patients developed septal vestibular infections, which were successfully treated with antibiotics.

Studies using solid costal cartilage or cadaveric cartilage for augmentation have reported migration, warping, and palpability issues.<sup>1,2</sup> Our layered technique eliminates these risks by centralizing the solid graft within multiple layers, preventing shifting or visibility through the skin. Additionally, the natural adhesion between layers eliminates the need for suturing the graft to the dorsum.

Alloplastic materials like silicone and Gore-Tex, commonly used in Eastern countries, avoid donor-site morbidity but carry risks of rejection and infection.<sup>2</sup>

In this study, the four-layer configuration represents an optimal balance between structural stability and surgical feasibility. The diced cartilage layers function as a biological “mortar” that secures the costal cartilage graft and perichondrium, reducing the risk of migration,



**Figure 1** Postoperative photograph of the four-stage SDA technique.

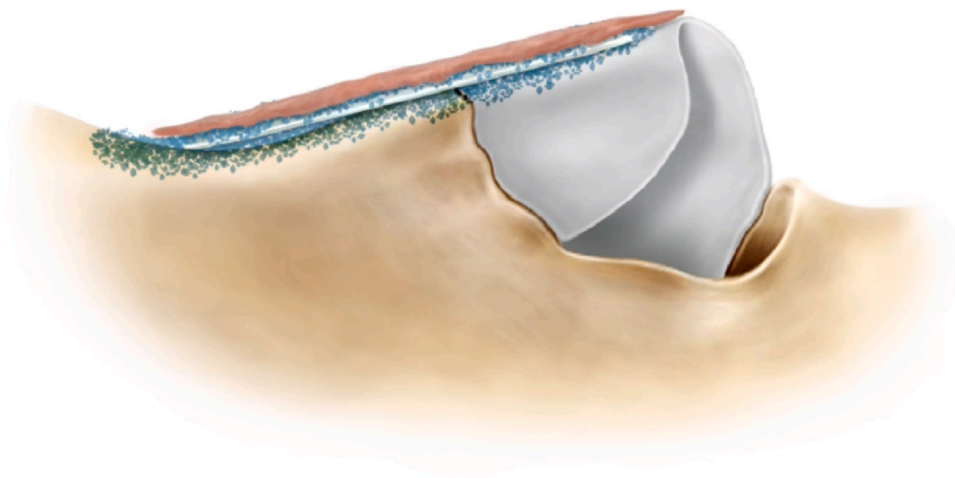
irregularities, and palpability, while the superficial perichondrium provides smoothness and camouflage, particularly in thin-skinned patients. During healing, the layered construct naturally conforms to the surrounding tissue, further stabilizing the graft. Although no formal pilot study was conducted, the technique has evolved through extensive surgical experience and was applied successfully in 68 patients between 2020 and 2023, consistently yielding satisfactory outcomes. Only three patients required minor secondary interventions, limited to alar base resection and tip modification, with no revisions involving the dorsal augmentation itself. Over a mean follow-up of 29 months, no clinical evidence of graft warping, migration, or resorption was observed;

however, objective quantitative imaging was not performed, and this has been acknowledged as a limitation. Outcomes were primarily assessed by the operating surgeon, supplemented by patient-reported satisfaction, yet the lack of blinded evaluators using validated aesthetic scales is another recognized limitation. Finally, the study design did not include a comparison group, and the sample size, although sufficient for detecting large effects, may be underpowered for smaller differences or rare complications. These points have been clearly addressed in the revised manuscript, and future prospective, blinded, and comparative studies with larger cohorts and quantitative analyses are planned to further validate the findings.





**Figure 2** Operating table photo of the four-stage SDA technique.



**Figure 3** Layered construct in the Stratified Dorsal Augmentation technique (cube-solid-cube-perichondrium).

## Conclusion

The SDA technique effectively addresses warping, migration, infection, and resorption in dorsal augmentation. This novel approach ensures both long-term structural stability and a naturally contoured appearance, making it a safe and reliable approach for rhinoplasty.

## Ethical approval

This study consisted of retrospective chart reviews of existing medical records and therefore did not require IRB approval. Written informed consent was obtained from all patients for the use of their photographs in the publication.

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None.

## Conflict of interest

None.

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## Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.bjps.2025.09.012](https://doi.org/10.1016/j.bjps.2025.09.012).

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