The External Strip and Internal Spreader Graft Combined with Dorsal Preservation Rhinoplasty

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Background: Rhinoplasty, particularly for the correction of dorsal hump deformities, has become increasingly common. Traditional methods, including hump resection, are frequently performed, and dorsal preservation techniques are gaining popularity. Septal deviation deformity is a common issue in rhinoplasty patients, significantly affecting both appearance and nasal function. Spreader grafts and flaps are essential components of traditional rhinoplasty to correct open-roof deformities, deviations, or dorsal aesthetic lines. This study combined internal spreader and external strip grafts with dorsal preservation rhinoplasty to enhance outcomes.

Methods: A retrospective analysis was conducted, assessing 152 patients who underwent dorsal preservation rhinoplasty for nasal hump deformity, with or without septal deviation, between July 1, 2019, and September 1, 2022. External strip and internal spreader grafts were used in 52 of 152 patients. Inclusion criteria were nasal hump deformity, cephalocaudal C-shaped septal deviation, no deviation, and a concavity at the upper lateral cartilage (ULC) and W-ASA segment (the area between the W-point and anterior septal angle). Patients were evaluated using the Rhinoplasty Outcome Evaluation questionnaire before and 12 months after surgery.

Results: The median patient age was 24.9 years. The postoperative follow-up period ranged from 16 to 26 months. Rhinoplasty Outcome Evaluation scores improved significantly, from a median score of 56.5 preoperatively to 92.5 postoperatively ($P < 0.001$). Patient satisfaction was excellent in 90% of cases. External strip and internal spreader grafts effectively addressed the deviation, ULC concavity, and W-ASA segment collapse without disrupting dorsum integrity.

Conclusions: Combining external strip and internal spreader grafts with dorsal preservation rhinoplasty techniques provides effective solutions for correcting dorsal hump and septal deviation deformities, improving ULC concavity, preventing W-ASA segment collapse, and preventing and improving nasal valve collapse. This approach yields superior cosmetic and functional outcomes, offering an advanced method for rhinoplasty surgeons. *(Plast. Reconstr. Surg.* 156: 655e, 2025.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IV.

The nose plays a vital role in daily life. Over the past few decades, rhinoplasty operations have increased significantly, making rhinoplasty one of the most performed procedures in aesthetic and plastic surgery.[1] Dorsal hump deformity is a common reason for individuals to seek rhinoplasty surgery. Dorsal hump deformity is more frequently observed in White patients, which can be attributed to the typical anatomic

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structure of their noses.[2] Traditional hump resection is a commonly performed intervention for hump deformities.[3] Recently, dorsal preservation techniques have become more popular for the management of dorsal hump deformity compared with traditional methods.[4] Septal deviation deformity is a common aesthetic and functional problem in the nose among patients seeking aesthetic and plastic surgery. The estimated rate of septal deviation was reported as 77% to 90% in the general population. Besides cosmetic issues, septal deviation was reported to be the most significant cause of obstructive nasal symptoms.[5]

Grafts and flaps are commonly used in rhinoplasty procedures. Spreader grafts, first defined by Sheen,[6] are used to enlarge nasal valves by placing the cartilage grafts into submucosal pockets between upper lateral cartilages (ULCs) and the nasal septum. The initial aim of spreader grafts was to improve the endonasal structure of patients with thin skin, weak ULCs, short nasal bones, and narrow middle vaults.[6] Recent indications for spreader grafts include improvement of nasal dorsal aesthetic lines, reconstruction of the dorsal nasal roof, enhancing the functions of the internal nasal valve, and correction of crooked nose deformity.[7] Spreader grafts are commonly autologous and can be obtained from septal, conchal, or rib cartilages. If needed, synthetic and alternative materials can be used as spreader grafts.[7] Spreader grafts and spreader flaps are essential for performing maneuvers to provide midvault support.[8]

In this article, we demonstrate the benefits of external strip and internal spreader grafts in patients undergoing dorsal preservation rhinoplasty operations.

PATIENTS AND METHODS

The records of patients who had received dorsal preservation rhinoplasty for nasal hump with or without septal deviation deformities in private practice were screened retrospectively. Having a nasal hump deformity as the base criterion, cephalocaudal C-shaped septal deviation, no deviation, and concavity at the ULC were inclusion criteria. Patients with insufficient records for the assessment, saddle-nose deformity, or no hump deformity were excluded.

Records of 152 patients (118 female and 34 male patients) who underwent preservation rhinoplasty were assessed. The median age of the patients was 24.9 years. All cases were primary rhinoplasty. Follow-up periods ranged between 16 and 26 months (median, 18.2 months). All procedures were performed by the same surgeon and were completed between July 1, 2019, and September 1, 2022. The study cohort comprised 52 patients (39 female and 13 male patients) selected from the initial pool of 152 who underwent dorsal preservation rhinoplasty. Among them, 31 patients had preoperative breathing issues. In terms of skin thickness, 5 had thin skin, 39 had medium-thickness skin, and 8 had thick skin. External strip grafts were used in 21 patients whose cases included deviations or ULC and W-ASA segment (the area between the W-point and anterior septal angle) concavity. Internal spreader grafts were used in 19 patients who had deviation. The grafts were applied to areas with a closed ULC–septum angle in nondeviated regions or to correct the nondeviated area toward the midline. Internal spreader grafts were used in 12 patients who did not have deviation. The grafts were used when lowering the upper septum to prevent the same-side ULC–septum angle from closing, as well as to prevent additional deviation. The sample size may appear moderate, but this cohort was carefully selected to ensure robust evaluation of the specific spreader graft techniques in dorsal preservation rhinoplasty. The remaining 100 patients underwent classic let-down or push-down procedures, where additional grafting was not required.

This study was performed according to the standards for biomedical research on human subjects set by the Declaration of Helsinki. Before the operations, all patients were informed that their photographs could be published for scientific purposes, and all patients whose records were used in the present study provided written informed consent.

Patients were evaluated using the Rhinoplasty Outcome Evaluation (ROE) questionnaire before and 12 months after surgery.

Surgical Procedure

General anesthesia was applied. An adrenaline injection at a dilution of 1:100,000 was given. Inner nasal hairs were cut. Closed-approach rhinoplasty was performed with the help of a video endoscope. The room concept was applied. Afterward, an infracartilaginous incision was made to reach the lower vault, and tip plasty was performed while the scroll ligament was left intact.[9] Following the unilateral transfixion incision, a short-back cut intercartilaginous incision was made to reach the middle and upper vaults of the dorsum.

Figure 1 illustrates the external strip graft method for the deviated septum in let-down dorsal preservation rhinoplasty, which can be used in both let-down and push-down preservation rhinoplasty operations. An external strip graft is placed on the dorsum of the nondeviated side to improve the deviation, ULC concavity, and W-ASA segment collapse.

The pyriform ligament, located between the ULC and the nasal bone, was released at the superior–lateral region, and the apex part of the pyriform ligament was left intact. A high septal incision was made with Kaplan scissors, the superior septum was pulled down onto the inferior septum, and 2 5-0 Prolene sutures were applied. Figure 2 demonstrates the surgical stage after these steps and the concavity at the right ULC and deviation. An external strip graft was placed on the ULC concavity, to improve the concavity and the deviation. The external strip graft was sutured to the right ULC with 6-0 polydioxanone suture (PDS).

Figure 3 describes the internal spreader graft method for the deviated septum in let-down preservation rhinoplasty, which can be used in the operations of let-down and push-down dorsal preservation rhinoplasty. An internal spreader graft was placed on the nondeviated submucosal subdorsal region to improve the deviation and ULC concavity and to improve or prevent W-ASA segment and internal nasal valve (INV) collapse.

The superior septum was pulled down onto the nondeviated side of the inferior septum after a high septal incision was made with Kaplan scissors (Fig. 4). An internal spreader graft was placed on the submucosal subdorsal region of the opposite side to improve the deviation. The internal spreader graft was sutured side to side to the superior and inferior septum, respectively, with 2 5-0 PDS loop sutures.

Figure 5 describes the internal spreader graft method for the nondeviated septum in let-down preservation rhinoplasty, which can be used both on let-down and push-down. The superior septum was pulled down onto the inferior septum. An internal spreader graft was placed on the submucosal subdorsal region of the opposite superior septum to prevent deviation. After this placement, the nondeviated inferior septum is between the superior septum and the internal spreader graft. The author aimed to prevent deviation, improve ULC concavity, and improve or prevent W-ASA segment and INV collapse.

The superior septum was pulled down to the side of the inferior septum after a high septal incision was made with Kaplan scissors (Fig. 6). An internal spreader graft was placed on the submucosal subdorsal region of the opposite

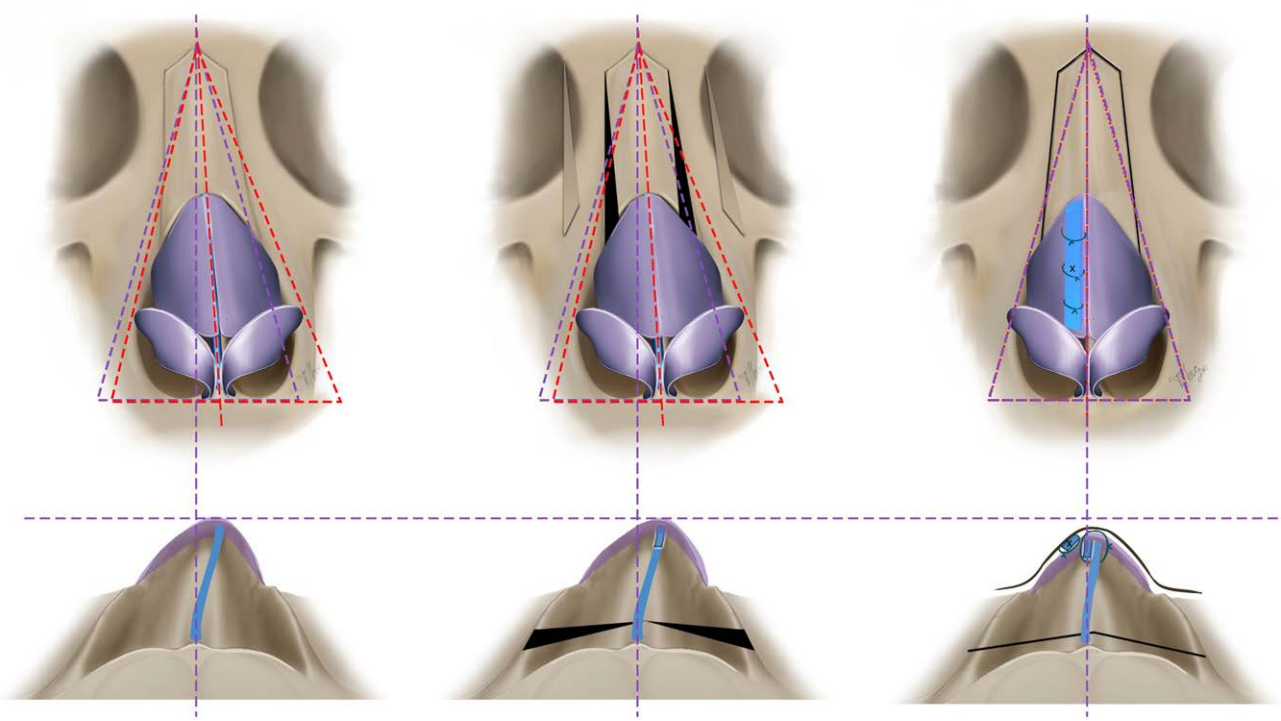

Fig. 1. External strip graft placement for deviated septum in let-down preservation rhinoplasty.

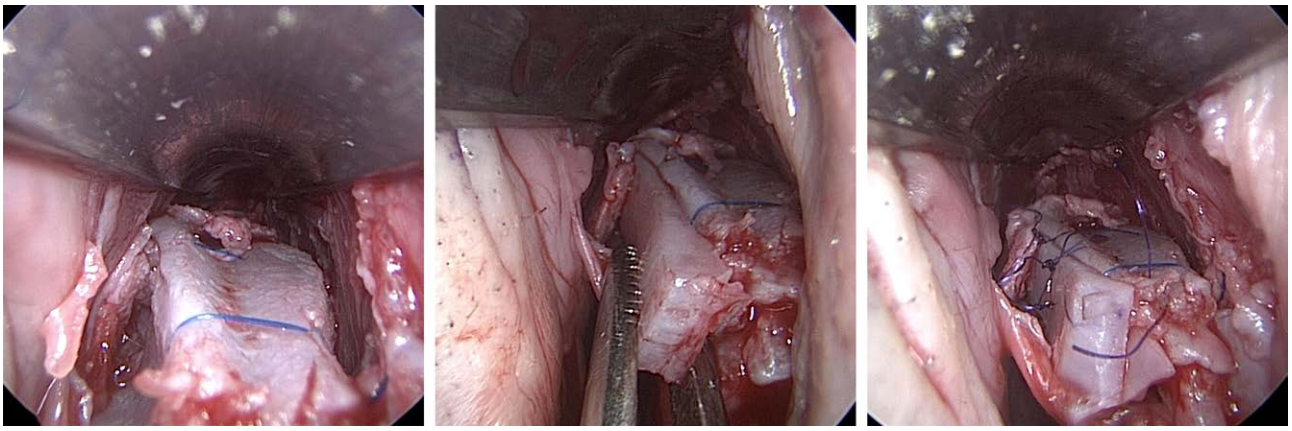

Fig. 2. (*Left*) The concavity at the right ULC and deviation after the high septal incision was made, the superior septum was pulled down onto the inferior septum, and 2 5-0 Prolene sutures were applied. (*Center*) An external strip graft was placed on the ULC concavity, to improve the concavity and the deviation. (*Right*) The external strip graft was sutured to the right ULC with 6-0 PDS.

superior septum to prevent deviation. The internal spreader graft was sutured side to side to the inferior and superior septum, respectively, with 2 5-0 PDS loop sutures.

An algorithm for applying the internal spreader and external strip grafts in dorsal preservation rhinoplasty was created (Fig. 7). (**See Video [online]**, which demonstrates the use of external strip and internal spreader grafts in dorsal preservation rhinoplasty operations on different patients, with preoperative and postoperative images shown after each segment.)

Imaging

The 3D Vectra device (Vectra XT; Canfield) was used to measure the height and degree of the hump and septal deviation. A digital camera and the 3D Vectra program were used as applications, which were used with the software-supported design program. The Vectra XT device allows surgeons to assess the patient's nose before surgery. This imaging tool provides information such as nasal arch height, projection, nasolabial angle, nasal asymmetry, nasofrontal angle, and vertical and horizontal proportions of the face. The software program can show the possible postoperative nose image through simulations.

Statistical Methods

Statistical analyses were performed with SPSS version 23.0. The Shapiro-Wilk test was used for normality. Descriptive data are given as medians and percentages. The ROE scores were found to be nonparametric; thus, the Wilcoxon test was used.

RESULTS

The median age of the patients was 24.9 years (range, 18 to 35 years). The postoperative results were considered satisfactory. Follow-up ranged between 16 and 26 months (median, 18.2 months). The ROE scores ranged between 80 and 100 points after 1 year. The initial median ROE score was 56.5, which increased to 92.5 by 12 months after surgery ($P < 0.001$). After external strip grafts in 21 patients, the ROE score was 91.7; for 19 with septal deviation and internal spreader grafts, 93.3; and for 12 without deviation, 92.9. Patient satisfaction was excellent in 90% of all included patients. Postoperative photographs from 7 angles were obtained for all patients, and Vectra 3D imaging was performed for 33 patients, demonstrating improvements in dorsal deviation, ULC concavity correction, and dorsal hump reduction. Figures 1 through 3 in the Supplemental Digital Content show preoperative and postoperative (12 to 20 months) images. (**See Figure, Supplemental Digital Content 1**, which shows front, superior, inferior, and lateral views of a patient with a deviated septum before and 20 months after let-down preservation rhinoplasty with external strip graft for deviated septum and ULC concavity, ***https://links.lww.com/PRS/I36***. **See Figure, Supplemental Digital Content 2**, which demonstrates front, superior, inferior, and lateral views of a patient with a deviated septum before and 12 months after let-down preservation rhinoplasty with internal spreader graft for deviated septum and ULC concavity, ***https://links.lww.com/PRS/I37***. **See Figure, Supplemental Digital Content 3**, which shows front, superior, inferior, and lateral views of a patient with a nondeviated septum before and 18 months after let-down preservation rhinoplasty

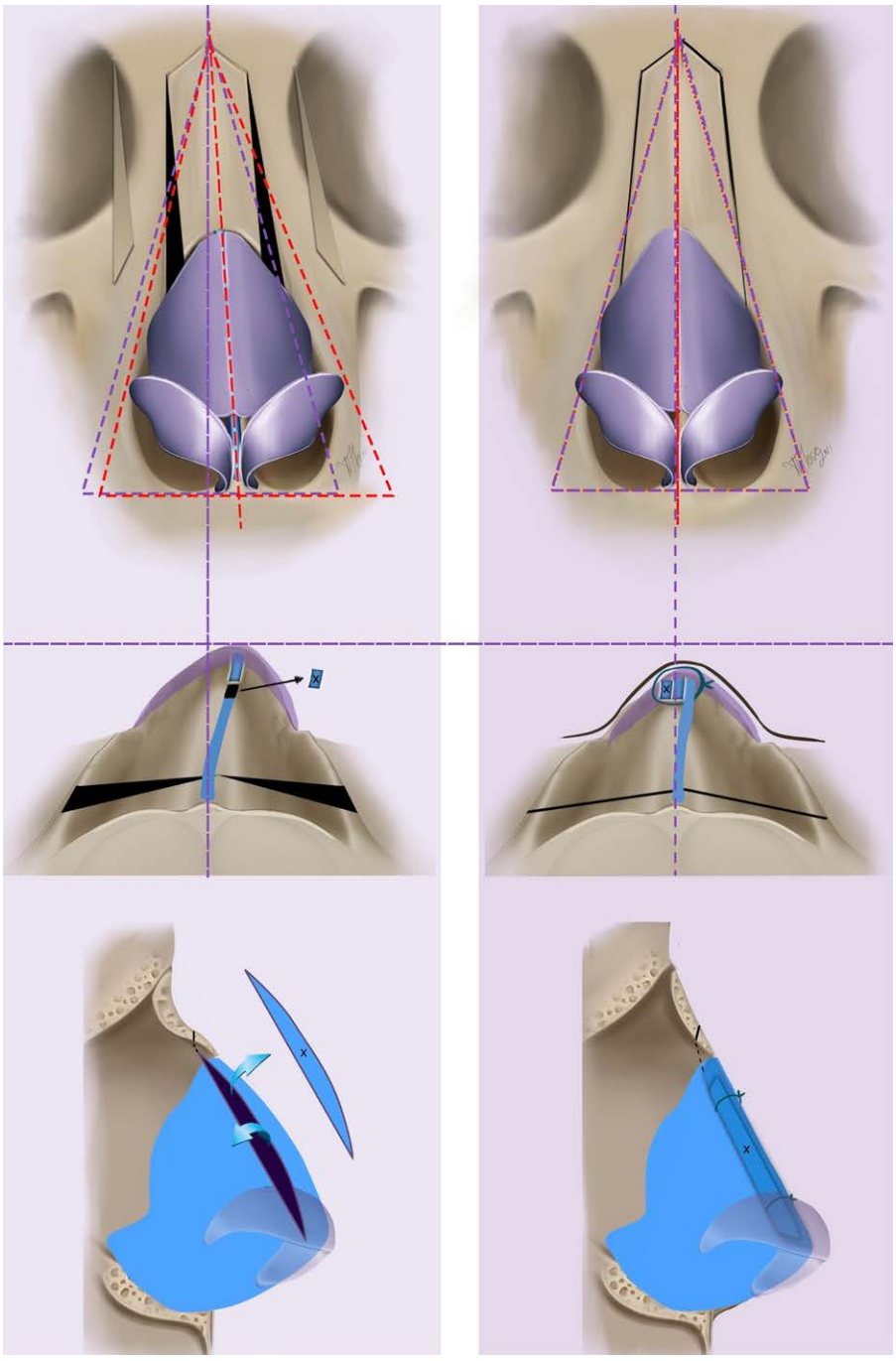

Fig. 3. The internal spreader graft method for deviated septum in let-down preservation rhinoplasty.

with internal spreader graft for nondeviated septum, ***https://links.lww.com/PRS/I38***.)

DISCUSSION

Aesthetic and plastic surgeons are highly interested in dorsal preservation techniques because they have positive aesthetic and functional outcomes.[10–12] Meanwhile, researchers aim to improve these techniques to obtain better results and decrease the possibility of postoperative complications. Grafting techniques are considered essential for performing dorsal preservation techniques in rhinoplasty operations. The subdorsal cantilever graft technique can elevate the nasal dorsum and middle vault, thereby enhancing it.

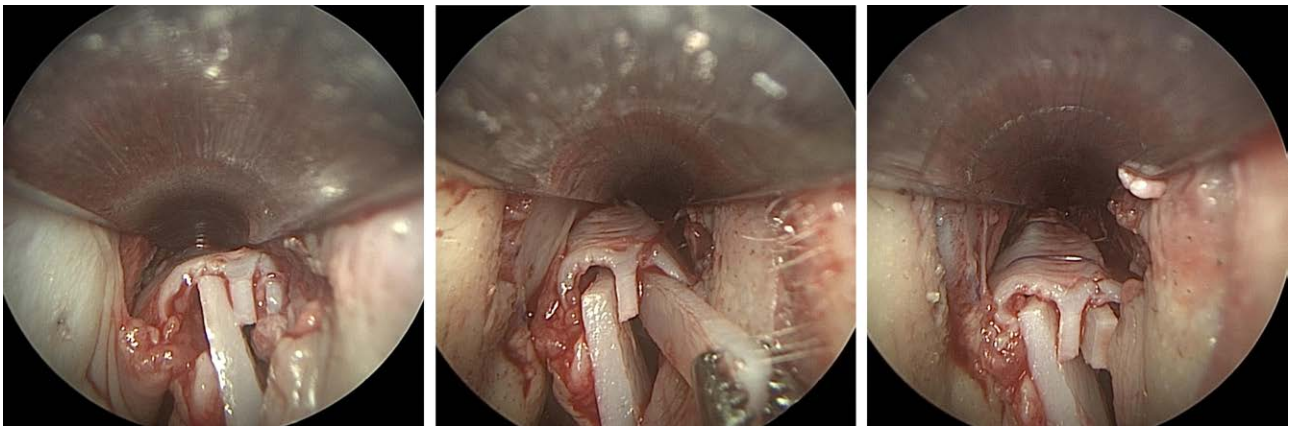

Fig. 4. (*Left*) The superior septum was pulled down onto the nondeviated side of the inferior septum after the high septal incision. (*Center*) An internal spreader graft was placed on the submucosal subdorsal region of the opposite side to improve the deviation. (*Right*) The internal spreader graft was sutured side to side to the superior and inferior septum, respectively, with 2 5-0 PDS loop sutures.

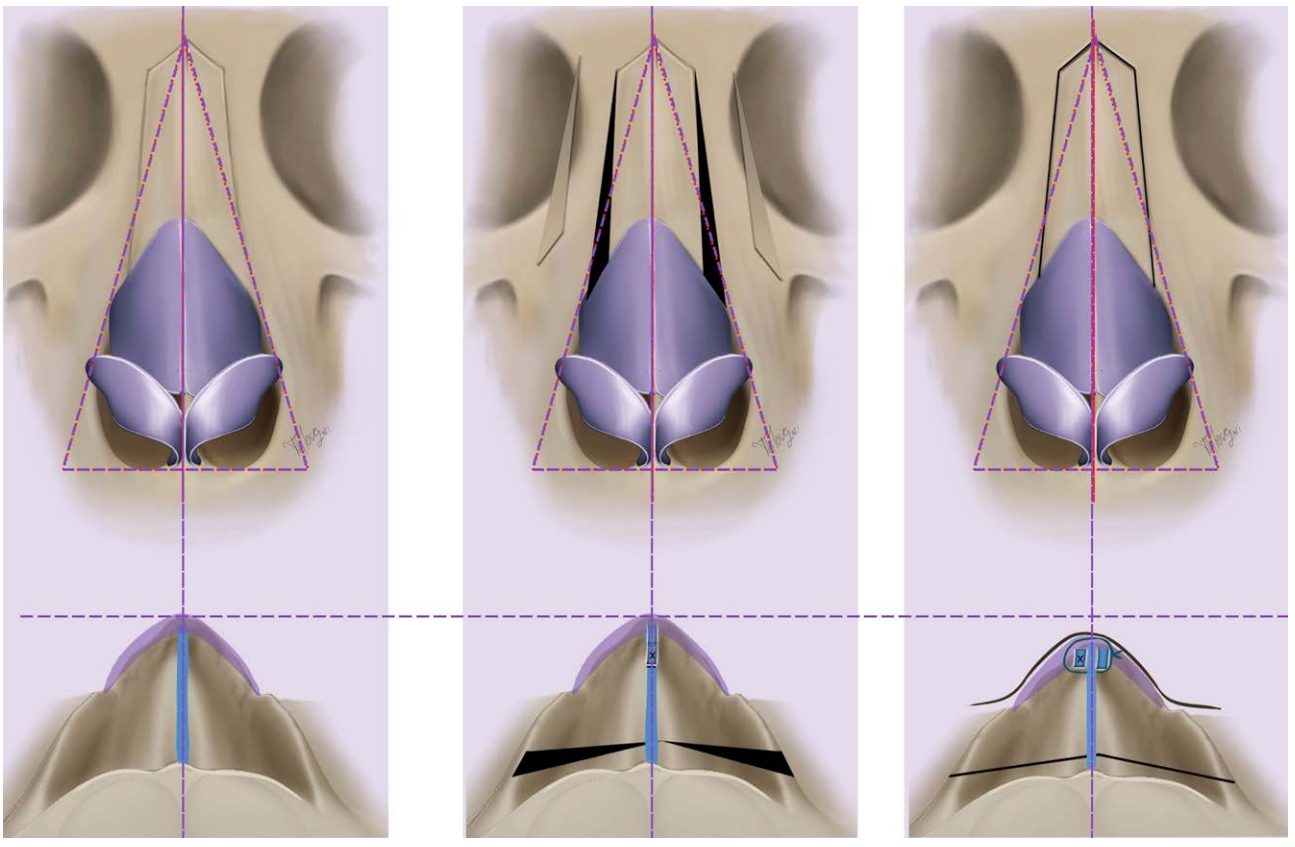

Fig. 5. Internal spreader graft placement for nondeviated septum in let-down preservation rhinoplasty.

This technique can even rescue a failed dorsal preservation surgery.[13]

Spreader graft use is common among surgeons and is frequently mentioned in the literature. However, if the spreader graft is not harvested from external sources and is obtained from any other nasal structure, such as the ULC, this method is called a spreader flap or autospreader graft. A spreader flap is beneficial while performing hump reduction and if there is a sizeable cartilaginous component of the hump. In the spreader flap technique, the cartilage part of the hump is not resected; moreover, it is used as a spreader graft.[7] The advantage of the spreader

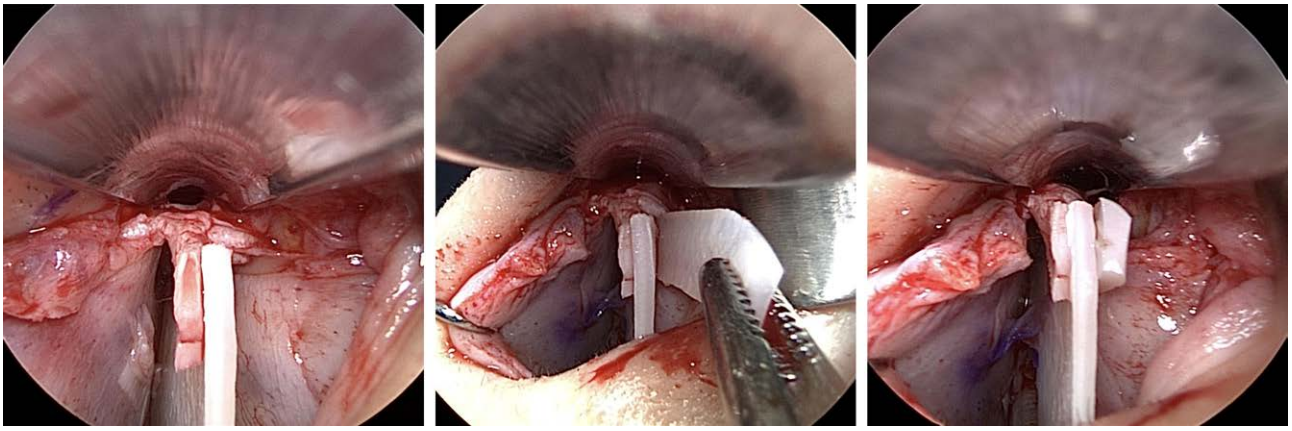

Fig. 6. (*Left*) The nondeviated septum after the high septal incision was made and the superior septum was pulled down onto the inferior septum. (*Center*) To prevent deviation, an internal spreader graft was placed on the submucosal subdorsal region of the opposite superior septum. (*Right*) The internal spreader graft was sutured side to side to the inferior and superior septum, respectively, with 2 5-0 PDS loop sutures.

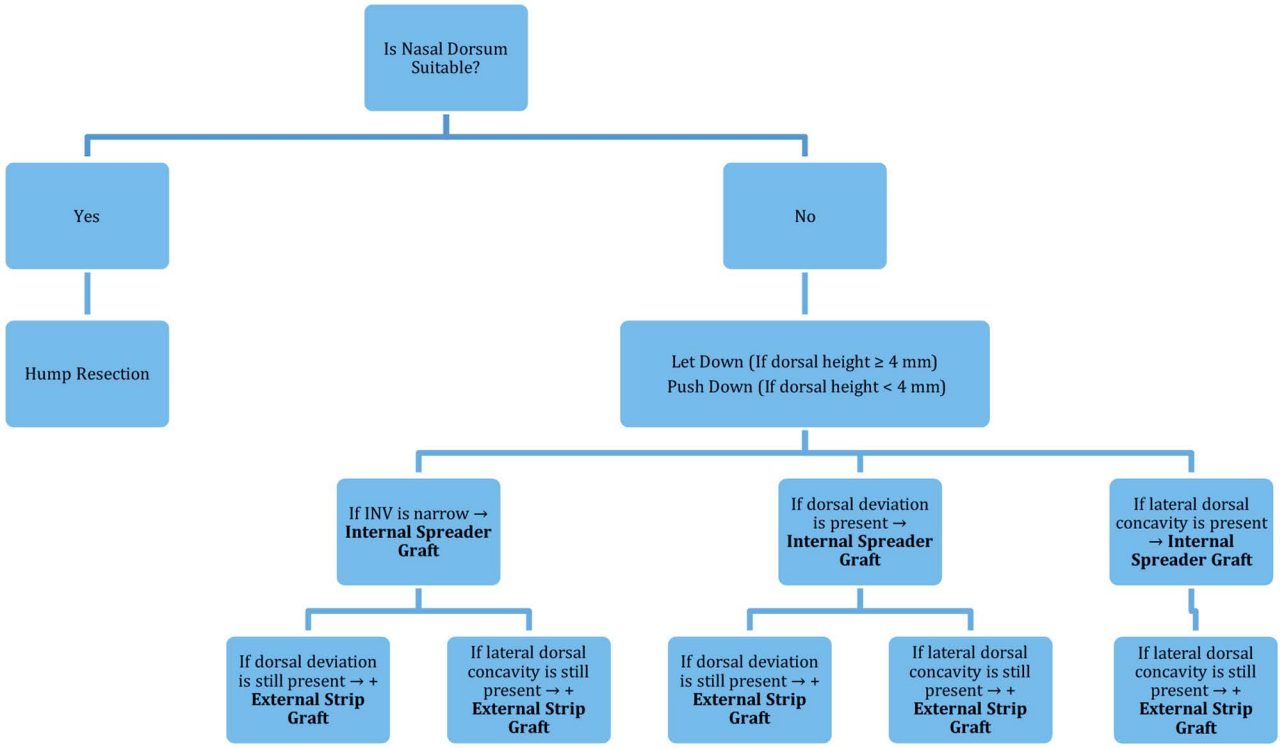

Fig. 7. Algorithm for applying the internal spreader and external strip grafts in dorsal preservation rhinoplasty.

flap is that it does not require donor cartilage, so it can take less time and prevent donor-site morbidity. Patients without a sufficient dorsal hump height might not benefit from the spreader flap technique because spreader flaps are commonly obtained from the ULC.[5] It has been reported that spreader flaps were adequate for preventing postoperative nasal airway obstruction in patients who underwent reductive cosmetic rhinoplasty.[5] A recent meta-analysis compared spreader grafts and flaps regarding surgical outcomes and complications, and the 2 methods were reported to be similar.[14]

Patients with both a hump and septal deviation deformity are considered challenging cases for rhinoplasty surgeons. Creating a method for solving this complex problem will be helpful in clinical practice. In the present research, the

author aimed to solve this complex issue with dorsal preservation techniques, including spreader graft methods. Whereas hump and deviation deformities can be fixed with dorsal preservation rhinoplasty, ULC concavities can be fixed with spreader grafts. These external strip and internal spreader graft methods can easily fix ULC concavities without splitting the dorsum, and can be used to prevent W-ASA segment collapse. In some cases, when the caudal part of the ULC is excised, the W-ASA segment may remain weak in the laterals and collapse, and concavity may occur. External strip and internal grafts may prevent this collapse and support the INV.

Combining external strip and internal spreader grafts can improve ULC concavity in dorsal preservation rhinoplasty. External strip grafts can be placed bilaterally or unilaterally and adjusted according to the severity of ULC concavity and the patient's needs. The internal spreader graft can support the INV and fix the concavity. These spreader graft methods suit the techniques reported by Cottle[15] and Saban et al.[4] Robotti and colleagues[16] reported a modified dorsal preservation technique in which thin, small, bilateral spreaders were often used as splints. This new internal spreader graft method differs from Robotti and colleagues'[16] work. It includes internal spreader and external strip grafts that support dorsum stability, prevent W-ASA segment collapse, and fix ULC concavity. Tas[17] also used a splint spreader flap in his dorsal roof technique. The main difference is that Robotti and colleagues[16] and Tas[17] do not preserve the dorsum wholly. This approach maintains a holistic preservation of the dorsal framework, which is imperative for functional and aesthetic outcomes. Toriumi[18] used submucosal spreader graft methods by placing the graft into the tunnel under the junction between the dorsal septum and ULC with a lower intermediate-level subdorsal strip below the spreader graft tunnel. On the contrary, the author used high-septal strips and submucosal internal spreader grafts in this study, enhancing the stability and functional integration of the dorsum. These distinctions, combined with a focus on precise dorsum preservation, represent a meaningful advancement over existing methods.

This study achieved results parallel to Öztürk's[19] proximal intact spreader graft technique. The proximal intact spreader graft method offers an effective solution for correcting dorsal humps using the let-down technique. It minimizes postreduction deviations in nondeviated septums, improves dorsal lines, and enhances INV function. This approach is suitable for patients with dorsal hump deformities, nasal deviations (C-shaped, straight, or nondeviated), INV or W-ASA segment collapse, or ULC concavity, delivering improved cosmetic and functional outcomes.

The present technique includes an algorithm for surgeons in terms of using the external strip and internal spreader grafts during rhinoplasty procedures for correction of hump and septal deviation deformities and preventing or improving W-ASA segment and INV collapse in dorsal preservation rhinoplasty. In long-term follow-up, there have been no cases of graft resorption or displacement, highlighting the effectiveness of the graft materials and surgical technique. Proper fixation and material selection are key to these stable outcomes.

After performing let-down or push-down procedures, an internal spreader graft could be used if there is a narrowing in the INV. If there is a deviation on the dorsum, the first choice could be an external strip graft. If the deviation continues after using the external strip graft, an additional internal spreader graft could be used. External strip and internal spreader grafts could be used if there is ULC concavity or W-ASA segment collapse. These methods can be used on patients who have dorsal hump deformity, cephalocaudal C-shaped deviation, straight deviation, nondeviated septum, W-ASA segment collapse, or ULC concavity. However, these methods are not suitable for patients who do not have hump deformities or for patients who have saddle-nose deformities. If an internal spreader or external strip graft is going to be used, there is no restriction on hump height; either push-down or let-down techniques can be used. The presented method is used to enhance the dorsal aesthetic line. An internal spreader graft can be used to widen a narrow INV after high or midseptal strip let-down and push-down technique or low septal Cottle technique.

The internal spreader graft primarily functions by maintaining the stability and patency of the internal nasal valve. Its stenting effect is considerable, but its role extends beyond holding the valve open. During the surgery, as demonstrated in the videos and figures, the internal nasal valve is observed to open after the placement of the internal spreader graft. This suggests that the graft not only supports the valve structurally but also optimizes its functional dynamics by stabilizing the ULC–septum relationship.

This observed improvement supports the hypothesis that the internal spreader graft enhances airflow by creating a favorable configuration for the internal nasal valve without requiring complete separation of the ULC from the septum.

The external strip and internal spreader graft methods combined with dorsal preservation

rhinoplasty preserve the internal structure. The width and length of the spreader graft are measured according to the patient's needs and placed on the superior or inferior side of the dorsum with minimal disturbance to the structure. The positioning ensures that the graft supports the nasal framework while maintaining the desired outcome. Spreader grafts have been used as instruments in traditional rhinoplasty, and with this study, the author adapted them to preservation rhinoplasty.

This study underscores the importance of combining preservation techniques with the selective use of spreader and strip contour grafts. Preservation minimizes disruption to the native anatomy, and these grafts are essential for correcting deviations, reinforcing structural stability, and optimizing functional outcomes. This integrative approach provides the flexibility to adapt the surgical plan to individual patient needs and intraoperative findings, ensuring more precise and effective results.

The retrospective nature of this study may be seen as a limitation. In addition, the number of participants could be considered insufficient to draw general conclusions.

CONCLUSIONS

This study demonstrates internal spreader and external strip graft methods in dorsal preservation rhinoplasty that are easy and suitable approaches for rhinoplasty surgeons for correcting dorsal hump and septal deviation deformities, correcting ULC concavity and preventing or improving W-ASA segment and INV collapse. These methods will also lead to better aesthetic and functional outcomes.

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DISCLOSURE

The author has no financial relationships or conflicts of interest to disclose.

REFERENCES

1. Fallahi HR, Keyhan SO, Dastgir R, Jahanbani M, Ramezanzade S, Yousefi P. Complications associated with spreader grafts and spreader flaps: a systematic review. *Aesthetic Plast Surg.* 2022;46:1831–1847.
2. Santos M, Monteiro D, Coutinho M, Sousa CAE, Ferreira MG. Caucasian Mediterranean patients seeking rhinoplasty-anthropometric measurements and prevalence of major deformities. *Clin Otolaryngol.* 2019;44:581–587.
3. Abdelwahab MA, Neves CA, Patel PN, Most SP. Impact of dorsal preservation rhinoplasty versus dorsal hump resection on the internal nasal valve: a quantitative radiological study. *Aesthetic Plast Surg.* 2020;44:879–887.
4. Saban Y, Daniel RK, Polselli R, Trapasso M, Palhazi P. Dorsal preservation: the push down technique reassessed. *Aesthet Surg J.* 2018;38:117–131.
5. Gruber RP, Melkun ET, Woodward JF, Perkins SW. Dorsal reduction and spreader flaps. *Aesthet Surg J.* 2011;31:456–464.
6. Sheen JH. Spreader graft: a method of reconstructing the roof of the middle nasal vault following rhinoplasty. *Plast Reconstr Surg.* 1984;73:230–239.
7. Kim L, Papel ID. Spreader grafts in functional rhinoplasty. *Facial Plast Surg.* 2016;32:29–35.
8. Keyhan SO, Fallahi HR, Cheshmi B, Jafari Modrek M, Ramezanzade S, Sadeghi E. Spreader graft vs spreader flap in rhinoplasty: a systematic review and meta-analysis of aesthetic and functional outcomes. *Aesthet Surg J.* 2022;42:590–602.
9. Ozturk G. Scroll ligament preservation and improvement in nasal tip with the room concept. *Aesthetic Plast Surg.* 2020;44:491–500.
10. Ozturk G. Combination of the push-down and let-down techniques: mix-down approaches. *Aesthetic Plast Surg.* 2021;45:1140–1149.
11. Patel PN, Abdelwahab M, Most SP. A review and modification of dorsal preservation rhinoplasty techniques. *Facial Plast Surg Aesthet Med.* 2020;22:71–79.
12. Ozturk G. New approaches for the let-down technique. *Aesthetic Plast Surg.* 2020;44:1725–1736.
13. Toriumi DM, Kovacevic M. Subdorsal cantilever graft: indications and technique. *Facial Plast Surg Clin North Am.* 2023;31:119–129.
14. Buba CM, Patel PN, Saltychev M, Kandathil CK, Most SP. The safety and efficacy of spreader grafts and autospreaders in rhinoplasty: a systematic review and meta-analysis. *Aesthetic Plast Surg.* 2022;46:1741–1759.
15. Cottle MH. Nasal roof repair and hump removal. *AMA Arch Otolaryngol.* 1954;60:408–414.
16. Robotti E, Chauke-Malinga NY, Leone F. A Modified dorsal split preservation technique for nasal humps with minor bony component: a preliminary report. *Aesthetic Plast Surg.* 2019;43:1257–1268.
17. Tas S. Dorsal roof technique for dorsum preservation in rhinoplasty. *Aesthet Surg J.* 2020;40:263–275.
18. Toriumi DM. My first twenty rhinoplasties using dorsal preservation techniques. *Facial Plast Surg Clin North Am.* 2023;31:73–106.
19. Öztürk G. Proximal intact spreader graft in let-down dorsal preservation rhinoplasty. *Ann Plast Surg.* 2025;94:10–16.