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Original Article

Septocolumellar strut technique: Tip stability and aesthetic outcomes in rhinoplasty

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ABSTRACT

Background: The septocolumellar strut (SCS) technique has been proposed as an additional support element to enhance tip stability when used alongside a traditional columellar strut in open rhinoplasty. Evidence on its early and long-term effects remains limited.
Methods: A retrospective analysis was conducted on 40 patients (mean age 34.1 years; 80% female) who underwent open rhinoplasty with combined SCS and columellar strut placement. Outcomes assessed at postoperative 3 and 12 months included Goode's ratio, nasal length, tip rotation (nasolabial angle), and tip projection.
Results: Significant improvements were observed at both 3 and 12 months in Goode's ratio (0.59→0.61→0.61, $p < 0.001$), nasal length (58.0→54.0→53.5 mm, $p < 0.001$), and tip rotation (88.0°→98.5°→96.0°, $p < 0.001$). Tip projection remained stable throughout follow-up. From month 3 to month 12, percent change was 0.0% for Goode's ratio, 0.0% for nasal length, −1.8% for tip rotation, and 0.0% for tip projection. No significant differences were detected between 3rd- and 12th-month values except for a minor decrease in tip rotation ($p < 0.001$).
Conclusions: The combined SCS–columellar strut technique yields durable aesthetic and structural outcomes in open rhinoplasty.

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Gains in Goode's ratio, nasal length, and tip rotation are well maintained over 12 months, with tip projection remaining preserved.

Introduction

Rhinoplasty remains one of the most demanding procedures in plastic surgery, requiring careful analysis and long-term planning to achieve stable aesthetic and functional outcomes.[1–3] The nose's central position makes it a key determinant of facial harmony, and long-term control of nasal tip projection and rotation is essential for successful results.[4–7]

Common objective measures used to evaluate rhinoplasty outcomes include Goode's ratio, nasal length, tip projection, and tip rotation.[4,8–10] Among the numerous grafting techniques described to support the nasal tip, the columellar strut and the septal extension graft (SEG) are the most widely used.[2,4,5,7] The columellar strut is placed as a "floating" graft between the medial crura, whereas the SEG is rigidly fixed to the caudal septum to provide stronger but less flexible support.[2,4] Both techniques have well-recognized limitations, including variability in long-term stability for the columellar strut and increased rigidity, deviation, or projection loss associated with the SEG.[5–7,11–14] Existing modifications have not fully resolved these issues.[14–17]

The lack of fixation of the columellar strut to a stable structure is considered a major reason for its inconsistent long-term behavior.[2,18,19] To address this, we developed a simple, cartilage-sparing support graft positioned between the septum and columella, termed the septocolumellar strut (SCS). When combined with a traditional columellar strut, we hypothesized that SCS could enhance the reliability of long-term tip projection and rotation.

This study evaluates early (3 months) and late (12 months) postoperative outcomes of open rhinoplasty using the combined SCS–columellar strut technique, focusing on Goode's ratio, nasal length, tip rotation, and tip projection.

Material and method

Study population

This retrospective study included 40 patients (mean age 34.1 years; 80% female) who underwent open rhinoplasty with the combined septocolumellar strut (SCS) and columellar strut technique, performed by the senior author between 2019 and 2023. Patients requiring dome excision for pathological alar cartilage asymmetry were excluded. The technique is broadly applicable but was particularly used in patients with thick skin and weak alar cartilage. The study adhered to the Declaration of Helsinki and received institutional ethics approval.

Assessments

Demographics and postoperative measurements at 3 and 12 months were recorded, including Goode's ratio, nasal length, tip rotation (nasolabial angle), and tip projection.

SCS technique

The SCS is a cartilage-sparing support graft placed between the septum and columella to improve long-term stability of tip projection and rotation. It widens the upper columellar segment and, together with a small infratip graft, enhances tip definition. When combined with a traditional columellar strut, it reinforces the medial crural complex according to the tripod concept (Figure 1).

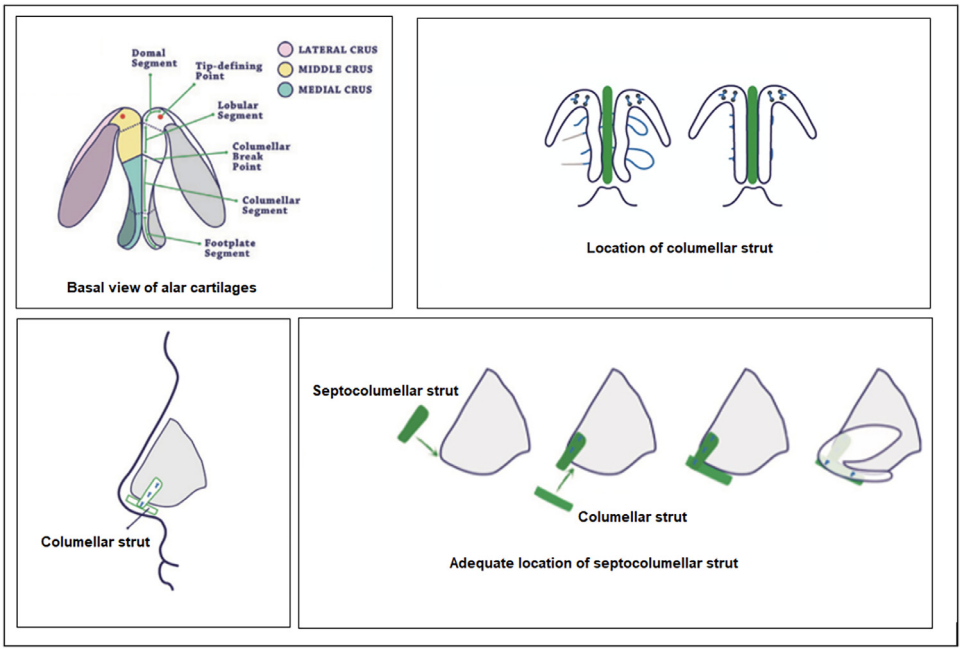

Figure 1. Design and adequate location of the septal columellar strut. The tip and columella are connected by suturing the graft in between. It provides long term tip stability and the most support for nasal tip projection. Because the septum is extended by using this graft, it is much easier to protect the projection of the nasal tip.

Surgical technique

Open rhinoplasty was performed under general anesthesia using a trans-columellar incision. After hump reduction, septal cartilage was harvested. The SCS (10–15 mm × 3–4 mm) was fixed to the anterior caudal septum at two points and extended between the medial crura, where it was secured to the columellar strut using absorbable 5–0 PDS sutures. Follow-up occurred at 3 and 12 months.

Postoperative measurements

Standardized studio photographs (1:1 scale, full-frame SLR with 105-mm macro lens) were used for anthropometric analysis at all time points by a single blinded observer. Variables included nasal length (radix–pronasale), tip rotation (nasolabial angle), tip projection (piriform–pronasale), and Goode's ratio (projection/length) (Figure 2).

Statistical analysis

Analyses were performed using SPSS v22. Repeated Measures ANOVA with Bonferroni correction or the Friedman test was used as appropriate. Data were expressed as mean ± SD, median (min–max), and percentage. Significance was set at $p < 0.05$.

Results

A total of 40 patients (mean age 34.1 years; 80% female) who underwent open rhinoplasty with the combined SCS and columellar strut technique were followed for an average of 18.5 (SD 3.1) months.

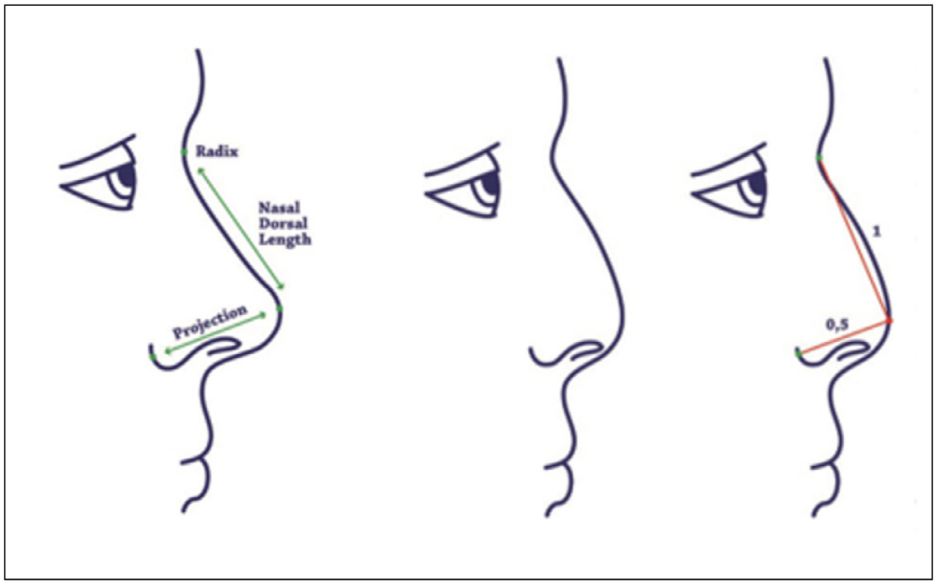

Figure 2. Goode's method involves measurement of the nasal dorsal length from the radix to the tip-defining point and the projection from the alar crease to the tip defining point. The projection should be between 0.55 and 0.6 of the nasal dorsal length.

Goode's ratio

Compared with preoperative values, both early (3rd month) and late (12th month) postoperative measurements showed a significant increase in Goode's ratio (median [min–max] 0.59 [0.48–0.70] vs. 0.61 [0.50–0.71] at 3 months and 0.61 [0.50–0.70] at 12 months; $p < 0.001$ for each) (Table 1, Figure 3).

The percent change between the 3rd- and 12th-month measurements was a median of 0.0% (range −9.8–3.5%), with no significant difference between postoperative 3- and 12-month values (Table 1).

Nasal length

Compared with preoperative values, both early and late postoperative measurements demonstrated a significant decrease in nasal length (58.0 [50.0–73.0] mm vs. 54.0 [44.0–70.0] mm at 3 months and 53.5 [44.0–70.0] mm at 12 months; $p < 0.001$ for each) (Table 1, Figure 3).

The percent change between the 3rd and 12th months was a median of 0.0% (range −3.7–9.1%), with no significant difference between these postoperative intervals (Table 1).

Nasolabial angle (tip rotation)

Compared with preoperative measurements, both early and late postoperative values showed a significant increase in tip rotation (88.0 [66.0–107.0]° vs. 98.5 [70.0–115.0]° at 3 months and 96.0 [70.0–115.0]° at 12 months; $p < 0.001$ for each) (Table 1, Figure 3).

At 12 months, the absolute and percent median (min–max) changes from the 3rd month were −2.0 (−5.0–0.0)° and −1.8% (−4.9–0.0%), respectively, indicating a significant decrease in tip rotation from the 3rd to the 12th postoperative month ($p < 0.001$) (Table 1).

Table 1
Comparative preoperative and postoperative (3rd and 12th month) outcomes of Goode's ratio, nasal length, tip rotation, and tip projection with corresponding statistical analyses.

			Preoperative (A)	Postoperative 3rd month (B)	Postoperative 12th month (C)	*p* value			
						Overall	A vs. B	A vs. C	B vs. C
Goode's ratio	Mean ± SD		0.58 ± 0.05	0.61 ± 0.04	0.60 ± 0.04	**<0.001**[1]	**<0.001**	**<0.001**	0.031[2]
	Median(min-max)		0.59 (0.48–0.70)	0.61 (0.50–0.71)	0.60 (0.50–0.70)				
	*Change from 3rd mo, median(*min-max*)*	*Absolute*	-	-	0.0 (−0.06–0.02)				
		Percent	-	-	0.0 (−9.8–3.5)				
Nasal length (mm)	Mean ± SD		58.2 ± 5.5	54.1 ± 5.5	54.5 ± 5.3	**<0.001**[1]	**<0.001**	**<0.001**	0.028[2]
	Median(min-max)		58.0 (50.0–73.0)	54.0 (44.0–70.0)	53.5 (44.0–70)				
	*Change from 3rd mo, median(*min-max*)*	*Absolute*	-	-	0.0 (−2.0–4.0)				
		Percent	-	-	0.0 (−3.7–9.1)				
Nasolabial angle (tip rotation) (°)	Mean ± SD		88.1 ± 9.1	97.8 ± 8.6	96.2 ± 8.1	**<0.001**[1]	**<0.001**	**<0.001**	**<0.001**
	Median(min-max)		88.0 (66.0–107.0)	98.5 (70.0–115.0)	96.0 (70.0–115.0)				
	Change from 3rd *mo, median(*min-max*)*	*Absolute*	-	-	−2.0 (−5.0–0.0)				
		Percent	-	-	−1.8 (−4.9–0.0)				
Tip projection (mm)	Mean ± SD		19.7 ± 2.5	20.3 ± 2.2	20.2 ± 2.1	0.066[3]	0.334	0.396	0.740
	Median(min-max)		20.0 (15.0–25.0)	21.0 (17.0–25.0)	21.0 (17.0–25.0)				
	Change from 3rd *mo, median(*min-max*)*	*Absolute*			0.0 (−1.0–1.0)				
		Percent			0.0 (−4.8–5.0)				

Bold values represent statistically significant pairwise and overall comparisons between preoperative and postoperative measurements ($p < 0.05$).
[1] Repeated Measures ANOVA.
[2] Not statistically significant according to Bonferroni Correction.
[3] Friedman t.

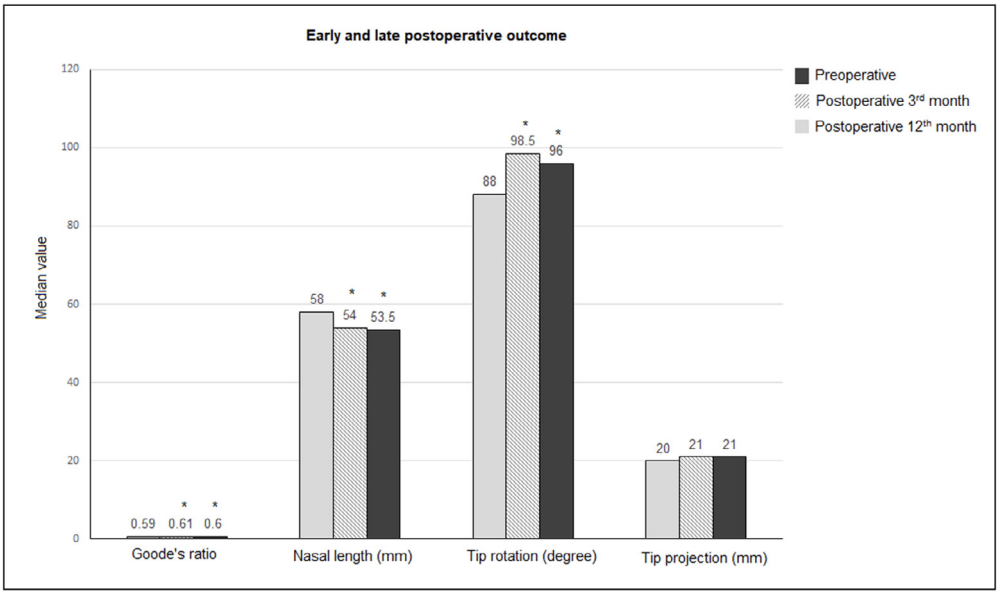

Figure 3. Early and late postoperative outcome on Goode's ratio, nasal length, nasal tip rotation and nasal tip projection, $^{*}p < 0.001$ compared to preoperative values.

Tip projection

Compared with preoperative values, both early and late postoperative measurements showed no significant change in tip projection (Table 1, Figure 3).

The percent change between the 3rd and 12th months was a median of 0.0% (range −4.8–5.0%), with no significant difference between the postoperative intervals (Table 1).

Figures. 4 and 5 illustrate clinical examples demonstrating early and long-term outcomes of patients who underwent rhinoplasty using the combined SCS and columellar strut technique.

Discussion

Our results indicate that combining the SCS technique with a columellar strut provides stable early and late postoperative outcomes, maintaining improved Goode's ratio, nasal length, and tip rotation over 12 months while preserving tip projection. Postoperative tip descent is common after open rhinoplasty due to edema resolution, graft behavior, and soft-tissue adaptation, often resulting in deprojection and derotation.[18,20–22] Although a slight decrease in rotation occurred in our patients (median 2° from 3 to 12 months), rotation and projection remained significantly improved from baseline, consistent with only minor settling of soft tissues or suture relaxation.[7,23,24]

Studies on columellar strut–based rhinoplasty frequently report early rotational gains followed by measurable derotation over time.[23–25] In contrast, our preoperative, 3-month, and 12-month angles (88.0°, 98.5°, 96.0°) suggest more effective preservation of rotation with the addition of the SCS. Prior work has shown increased risk of ≥5° rotation loss and modest long-term decreases in projection with columellar struts alone.[2,26] Greater derotation seen in columellar strut groups compared with SEG techniques has been attributed to the absence of fixation to a stable structure.[2,18,19] By securing one end of the SCS to the anterior caudal septum and attaching the other to the columellar strut, our technique creates a more stable construct that improves control of rotation and projection while avoiding stiffness.[2,5,12,27,28]

Long-term nasal tip stability depends on balanced modification of major and minor support mechanisms and on both intrinsic and extrinsic determinants of rotation.[1,26,29–31] Within the framework

Figure 4. Preoperative, early postoperative and late postoperative views of a patient: Changes in nasal tip projection, nasal tip rotation, nasal length, and Goode's ratio over time with septal columellar strut (SCS) technique.

of the tripod concept, the SCS–columellar strut assembly effectively reinforces the medial leg, compensates for ligament disruption in open rhinoplasty, and supports predictable tip position.[1,29,32,33] The technique also provides additional definition to the infratip lobule and maintains a favorable divergence angle.

The SCS requires only 10–15 mm of septal cartilage, making it advantageous in patients with limited cartilage, thick skin, weak medial crura, or in revision cases—groups at higher risk for tip derotation and deprojection.[34–36] Compared with techniques such as SEG, tongue-and-groove, extensive harvest approaches, or extended spreader and batten grafts, the SCS offers reduced risk of tip rigidity, septal thickening, and nasal valve compromise.[2,4–7,14–17,25] Its main limitation—lack of ability to independently increase projection or rotation—can be compensated using suture-based maneuvers.[29]

Our intention was not to claim definitive superiority or exclusive causality, but rather to report observed stability over time within a consistent surgical framework. It is known that in cases where a columellar strut is placed, especially in patients with thick skin, loss of rotation and projection occurs over the years due to the weight in the nasal tip region. Within the limitations of a retrospective design, our findings suggest that the addition of the SCS may contribute to minimizing postoperative loss of rotation and projection, particularly in patients with thick skin. However, we acknowledge that this observation cannot be isolated from other factors such as surgical technique or patient selection.

The SCS–columellar strut construct is a promising adjunctive stabilization technique that demonstrates encouraging early-to-midterm stability and warrants validation in prospective, controlled comparative studies.

Figure 5. Preoperative, early postoperative and late postoperative views of a patient: Changes in nasal tip projection, nasal tip rotation, nasal length, and Goode's ratio over time with septal columellar strut (SCS) technique.

This study has several limitations that should be acknowledged. The retrospective design, relatively small sample size, and absence of a control group limit the ability to draw causal inferences or to conclude superiority over established techniques such as columellar strut or septal extension grafts. Accordingly, the findings should be interpreted as exploratory and hypothesis-generating. Further validation through prospective, controlled studies with larger and more diverse patient populations is required.

Conclusion

The SCS combined with a columellar strut appears to provide reliable early-to-midterm control of nasal tip projection, rotation, and position with minimal graft requirement and a reduced risk of derotation. Larger prospective, controlled studies are required to validate the long-term performance of this technique.

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Consent to participate

Informed consent was obtained from all individual participants included in the study.

Consent to publish

The participants provided informed consent regarding publishing their data and photographs.

Ethics approval

Our study was conducted at Haseki Training and Research Hospital, Department of Otorhinolaryngology Head and Neck Surgery, and adhered to the principles of the Declaration of Helsinki and Good Clinical Practices Guide. Ethical approval was obtained from the Haseki Training and Research Hospital Clinical Research Committee (reference number 89-2023).

Declaration of competing interest

The authors declare that they have no known competing financial or nonfinancial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi: 10.1016/j.jpra.2026.01.024.

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