



COLUMELLAR GRAFT VERSUS SEPTAL EXTENSION GRAFTS IN OPEN RHINOPLASTY FOR NASAL TIP POSITION CONTROL. A COMPARATIVE CLINICAL STUDY

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Abstract

Background: Rhinoplasty is considered one of the most difficult facial plastic surgeries in which the surgeon is expected to achieve simultaneous nasal coordination and alignment with other parts of the face and enhance the strength and support of the nose. The aim of this work was to compare the tip projection and rotation upon using columellar strut graft (CS) and septal extension graft (SEG) to predict the amount of tip changes aiming to reach a more predictable pre-operative planning. **Methods:** This prospective comparative clinical study was carried out on 40 patients seeking for aesthetic primary rhinoplasty and were considered for open rhinoplasty. Patients were divided into two groups with flipping a coin as a method of randomization: group A: CS and group B: SEG. **Results:** Both groups exhibit similar changes in tip projection and rotation with no significant differences when followed up for 6 months postoperative. There was no significant difference regarding surgeon or patients' satisfactions between the two studied groups. **Conclusions:** Nasal tip projection and rotation appear to decrease from the immediate postoperative position. Both groups exhibit similar changes in tip projection and rotation with no significant differences between both groups when followed up for 6 months postoperative.

Keywords: Nasal Tip Position, Columellar Graft, Septal Extension Grafts, Open Rhinoplasty.

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Introduction:

One of the trickiest facial plastic surgery procedures is rhinoplasty, where the surgeon must coordinate and match the nose with the rest of the face while also enhancing the nose support and strength. One of the challenging tasks for surgeons is to achieve these results over the long term(1)

The nasal tip appearance is influenced by three different factors. Which are definition, projection, and rotation. Any of these measures may be aberrant in any given combination in any patient requiring nasal tip surgery(2).

A number of cartilage grafts might efficiently change how the nasal tips projects and rotates and the extent to which each of these alters nasal tip projection and rotation is dependent on the composition of the underlying structures and the desired effect(3).

The columellar strut (CS) and septal extension grafts (SEG) are the two most often used techniques to build the lower limb and act as an anchor for the new tip position. (4).

Columellar strut and septal extension grafts establish tip projection and rotation by defining the tip of the nose and the interaction between the tip cartilage and septum however the graft may resorb, shrink, or move over time, changing the initial appearance.(5).

The aim of this work was to compare the tip projection and rotation upon using Columellar Strut and Septal Extension Graft.

Patients and Methods:

This prospective comparative clinical study was carried out on 40 patients seeking for aesthetic primary rhinoplasty and were considered for open rhinoplasty. The study was done after approval from the Ethical Committee Beni-Suef University Hospitals, Egypt. From October 2020 to October 2022. An informed written consent was obtained from every patient.

Exclusion criteria were secondary or revision rhinoplasty, and patient with congenital anomalies (cleft lip, palate).

Patients were divided into two groups: group A: submitted to columellar strut graft and group B:

submitted to septal extension graft. They were allocated randomly by flipping a coin. Open rhinoplasty was the technique of choice.

All patients were subjected to history review, physical examination following the 10-7-5 method for nasal analysis including Cottle test (3, 6) and routine lab investigations.

Standard rhinoplasty views were taken including the front, basal, right and left oblique, and right and left lateral. They were taken with the patient in the

Frankfort horizontal position(7). A fixed 60 cm distance between the photographer and the patient was kept.

Both tip projection and rotation were evaluated in 4 timings: pre-operative, intra operative, 3 months and 6-month post-operative . Regarding evaluation of **Tip Projection**, it was done by

1. A calliper where the caliper blades were placed directly between alar cheek groove to tip defining point in the lateral view (Fig 1)



Figure 1 : caliper blades were placed directly between alar cheek groove to tip defining point in the lateral view

2. **Syringe:** A 60-ml plastic syringe manufactured according to Zhang (8)
3. **Rhinobase:** Because millimetric measurements on the images were not always available or objective, this software for Windows (Inprise Corp., Scotts Valley, California, United States) was utilized for calculations(9).
4. **Adobe Photoshop version 13.0.1**(Adobe Systems Inc, San Jose, California) was utilized (10).

Considering evaluation of **tip rotation**, both Rhinobase and Adobe Photoshop software were utilized for measuring the nasolabial angle.

post-operative surgeon satisfaction was done during outpatient consultations 3 and 6months following surgery where independent consultants were asked to rate the postoperative nasal look on a visual analogue scale (VAS) ranging from 0 ("extremely ugly") to 5 ("very nice").

Post-operative patient satisfaction was measured by the 'Rhinoplasty Outcomes Evaluation' (ROE), A validated Questionnaire instrument that was modified for the nasal-tip surgery and translated into Arabic to evaluate patient satisfaction (11)

Surgical technique:

An open approach was used with separation of components. Dorsal reduction and mucoperichondrial flaps were elevated to allow for septal harvest, which was used as the source of cartilage graft. Cases in which columellar strut grafts were used (Group A): A strut graft about 20 mm long and about 4 mm wide was placed into a web created between the two medial crura, secured in a pocket inferiorly toward the anterior nasal spine, and affixed to the medial crus of the lower lateral cartilages using 5-0 polypropylene sutures with the aid of a needle passing through vestibular skin, both medial crura, and columella strut.

Cases involving the use of septal extension grafts (Group B): the graft was usually 15 mm by 15 mm in shape. It spanned 5-8 mm over the caudal septum for maximum support (Fig2). The graft was secured by horizontal mattress sutures made from 5-0 polypropylene at the anterior septal angle, the caudal septum, and the medial crura of the caudal edge of the graft (Fig3).



Figure 2 : A Columellar Strut, B Septal extension graft



Figure 3 Septal extension graft before suturing overlapping the caudal septum by roughly 5-8 mm.

Statistical analysis

Statistical analysis was done by SPSS v23 (IBM Inc., Chicago, IL, USA). Quantitative variables were presented as mean and standard deviation (SD). Qualitative variables were presented as frequency and percentage (%). A two tailed P value < 0.05 was considered significant.

Results:

Among all studied cases, the majority of cases 21 (52.5%) were presented with deviated dorsum septum followed by 7 (17.5%) cases presented by the over projecting tip.

Table 1: age and sex demonstration in the studied groups

		CS group	SEG group	P value
Age (years)		26.55± 5.708	27.45± 7.674	0.676
Sex	Female	9(45%)	7(35%)	0.519
	Male	11(55%)	13(65%)	

Data are presented as mean ± SD or frequency (%). No significant difference between both groups regarding demographic data.

Table 2: Postoperative Changes between Preoperative, Early Postoperative, and Late Postoperative Changes in tip projection. Measuring tools were Rhinobase software, Adobe Photoshop, Caliper, and Syringe.

Timing		CS	SEG	P value
Rhinobase software in mm	T0	29.35± 3.34	29.92±4.55	NS
	T2	28.73±2.57	29.39±3.2	NS
	T3	28.12±2.48	28.99±3.15	NS
	T2 vs T3	0.61	0.4	NS
	Percent of change between T3 vs T2	-2.11	-1.34	0.12 (NS)
Adobe Photoshop in mm	T0	29.36±3.12	29.63±3.5	NS
	T2	28.79±2.08	29.43±2.94	NS
	T3	28.16±1.9	28.93±2.93	NS
	T2 vs T3	0.63	0.5	NS
	Percent of change between T3 vs T2	-2.15	-1.7	(NS)
Syringe in cubic centimeters	T0	20.55±2.44	20.35±2.6	NS
	T2	19.85±1.226	20.30±1.73	NS
	T3	19.5±1.27	20.0±1.83	NS
	Ts vs T3	0.35	0.3	NS
	Percent of change between T3 vs T2	-1.75	-1.50	0.12 (NS)
Caliper in mm	T0	29.75±3.06	29.25±3.87	NS
	T2	28.63±1.99	29.15±2.87	NS
	T3	27.85±1.92	28.8±3.0	NS
	T2 vs T3	0.78	0.35	NS
	Percent of change between T3 vs T2	-2.64	-1.24	0.132 (NS)

Data are presented as mean ± SD. T0=pre-operative, T2=3-month post-operative, T3= 6-month post-operative. CS, columellar strut; SEG, septal extension graft; NS, not significant. All changes during the postoperative period were not statistically

significant between both groups. Nasal tip projection decreased, from early postoperatively to later postoperatively These changes occurred in both columellar strut and septal extension graft groups.

Table 3: Postoperative Changes between Preoperative, Early Postoperative, and Late Postoperative Changes in tip rotation measured in degrees. Measuring tools were Rhinobase software, Adobe Photoshop.

Timing		CS	SEG	P value
Rhinobase software	T0	94.5±5.24	93.8±6.34	0.7 NS
	T2	98.85±5.18	97.45±4.37	0.23 NS
	T3	98.54±5.37	97.24±4.29	0.4 NS
	T2 vs T3	0.31	0.21	0.36 NS
	Percent of change between T3 vs T2	-0.33	-0.21	0.39 (NS)
Adobe Photoshop	T0	95.17±7.79	92.53±5.99	0.23 NS
	T2	99.2±6.19	96.3±4.52	0.09 NS
	T3	98.91±6.02	96.17±4.62	0.11 NS
	T2 vs T3	0.29	0.13	0.25 NS
	Percent of change between T3 vs T2	-0.28	-0.14	0.3 (NS)

Values are presented as degrees. Data are presented as mean ± SD. T0=pre-operative, T2=3-month post-

operative, T3= 6-month post-operative TR=tip rotation. All changes during the postoperative period

were not statistically significant between both groups. Nasal tip rotation decreased, from early postoperatively to later postoperatively. These changes occurred in both columellar strut and septal extension graft groups.

Morphometric results from tables 2,3 revealed a decrease in both tip projection and rotation in both study groups from early to late postoperative, however these changes were not statistically significant when comparing between both groups, hence we could say that both columellar strut and septal extension graft can preserve tip rotation and projection equally with no advantage among them.

Table 4: Patient and surgeon satisfaction with both techniques.

	CS	SEG	P value
Surgeon satisfaction	4.55±0.51	4.60±0.50	0.757
Patient satisfaction (%)	91.06±3.99	91.35±3.24	0.894

Values of surgeon satisfaction are presented as a score from 0 to 5 where 5 is the greatest satisfaction and 0 is the lowest value. No significant difference between both groups as shown by P value.

Case 1: 34 years old male patient, history of blunt trauma 4 years ago, mainly complained of aesthetic look. Rhinoplasty was done and CS was used.

Preoperative Rhinobase measuring of tip projection was 36.8mm while the normal range was (32.6-34.5). 6 months postoperative Rhinobase value of tip projection was 33mm. regarding tip rotation it was 78 degrees measured by photoshop while its 6 months' postoperative value was 92.3 degrees. Figure 4



Figure 4: Case 1 (A) Frontal views, (B) Left Oblique, (C) Basal, (D) Calibrated right lateral views with the patient holding the ruler in front of his face.

Case 2: 23 years old male patient, presented with crooked nose with the dorsum deviated to the right side, bilateral nasal obstruction with more on the left side. Rhinoplasty was done and SEG was used. the tip projection preoperative was 35.1mm measured

by Photoshop while the normal range was (29.2-32.5) while its 6-month postoperative was 29.7. Regarding tip rotation, it came preoperative and 6 months postoperative with the same value 100 degrees by Rhinobase. Figure 5

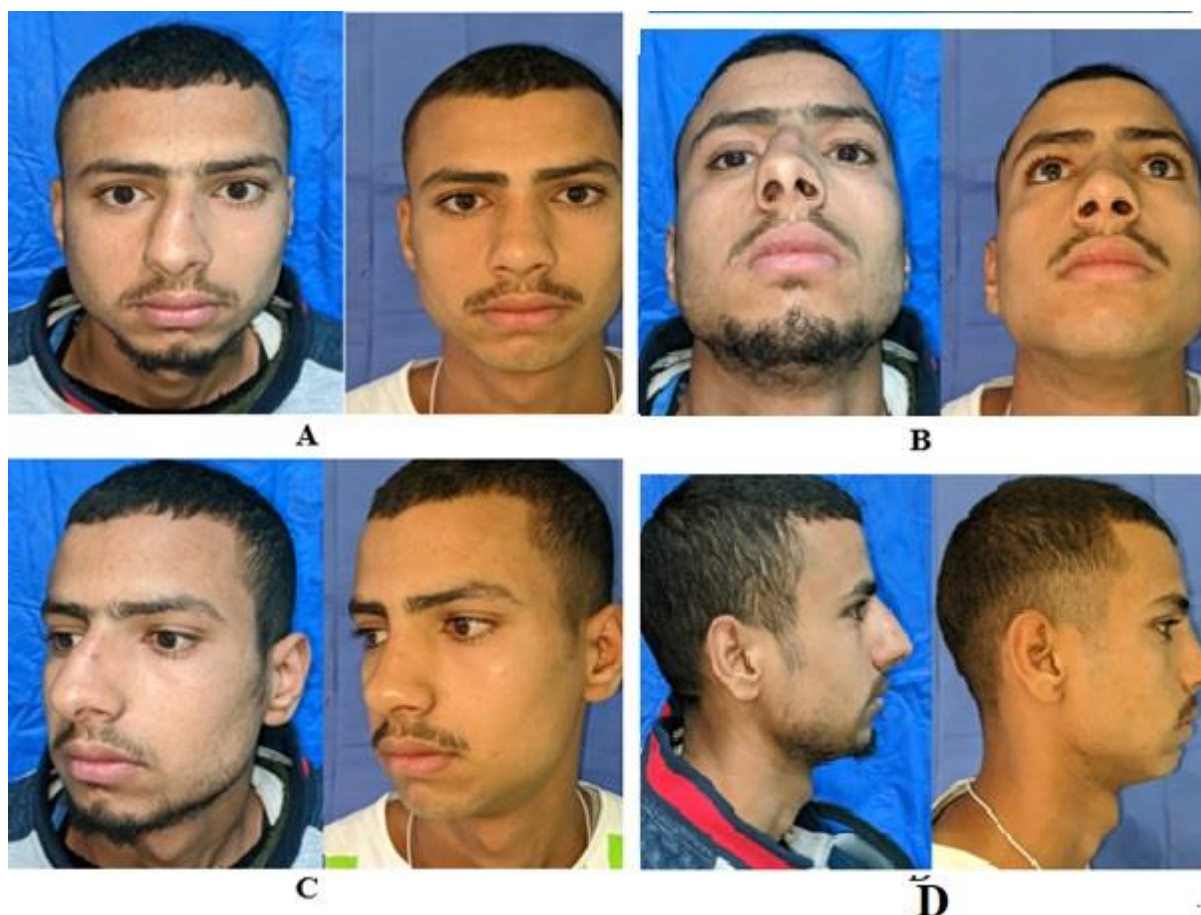


Figure 5: Case 2 (A)Frontal views, (B)Basal, (C) Right oblique, (D) left lateral views preoperative and 6 months postoperative

Discussion

This study was conducted at Beni-Suef university hospital, Egypt to compare the tip projection and rotation upon using columellar strut graft and septal extension graft. In our study there was no significant difference between the two studied groups regarding age and gender. Şirinoğlu et al., showed in their study about floating columellar strut graft that 35 were females and 9 were males with an average age of 25.4 years ranging from 18 to 42 years (12)

The study of Sawh-Martinez et al., agreed with our study in that both septal extension graft and columellar strut exhibit similar changes in tip projection with time, although they stated that the septal extension graft is better able to preserve tip rotation compared with the columellar strut(4).

The study of Bilgili and Çerçi revealed a statistically significant difference between the measurements of tip projection preoperative and 1-year follow up post-operative in patients with septal strut graft(10). Bucher et al., concluded in their study that Columellar Strut without any additional surgical step is able to improve both nasolabial angles as well as nasal tip projections and rotation(13). Alghonaim et al., found that the mean Naso Labial Angle increased from 91.44° preoperatively to 108.84° directly postoperatively then decreased to 97.2°

three months postoperatively(14). Ahmed et al., reported that using Columellar Strut caused a decrease in nasal tip projection and minor increase in naso-labial angle. It was about 99 preoperatively to 99.5 postoperatively(15). Post-operative satisfaction was evaluated by both the surgeons and the patients and there was no significant difference regarding surgeon or patients' satisfactions between the two studied groups. Lathif et al., reported that patients managed by Columellar Strut reported inferior cosmeses than Septal Extension Graft patients(16). The study of Wang et al., about Septal Extension Graft showed that all patients were satisfied with the aesthetic results, and no serious complications occurred(17)

Hacker et al., in their study about primary and revision rhinoplasty reported that the most common indications for rhinoplasty were difficulty with breathing, septal deviation, hypertrophy of inferior turbinate and dorsal hump. Our study included only patients with primary rhinoplasty and most of them were traumatic not disease related(18).

We recommend that both Columellar Strut and septal extension graft are effective in controlling nasal tip position. So, surgeons should evaluate the patients and choose any technique according to their preferences. Rhinobase software and Photoshop programs are highly recommended for evaluation of

patients undergoing rhinoplasty pre and postoperatively. Further studies should be applied on a larger sample size and for high-risk patients. Follow-up of the patients for longer duration to detect any deformity or complications is also recommended.

Conclusions:

Nasal tip projection and rotation appear to decrease from the immediate postoperative position to late postoperative in both techniques. When we compared both groups to show if there is any prevalence from one over the other, we've reached to the fact that both techniques exhibit similar changes in tip projection and rotation with no significant differences between both groups when followed up for 6 months postoperative.

Disclosure: All authors have no financial interests to disclose especially with any of the programs used in evaluation such as Rhinobase v4.0 for Windows (Inprise Corp., Scotts Valley, California, United States) or Adobe Photoshop version 13.0.1 was utilized (Adobe Systems Inc, San Jose, California). No funding was received for this article. There was no conflict of interests.

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