Original Article

Columella-Labial Angle Changes Following Septocolumellar Suture and Lateral Crural Overlay Methods in Rhinoplasty

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ABSTRACT

Background: One of the most important stages in rhinoplasty is the control of nasal tip rotation. Different techniques have been proposed to achieve this goal. We aimed to compare the effects of two methods of Septocolumellar Suture (SCS) and Lateral Crural Overlay (LCO) on nasal tip rotation by measuring of Columella-Labial angle.

Methods: In a single-blinded clinical trial, 148 patients were selected among the patients who were candidates for rhinoplasty in Sina Hospital in Tehran, Iran 2024. The patients were randomly divided into two groups (each group contained 74 subjects). The patients in the first group were operated on using LCO technique, and the patients in the second group were operated on using SCS technique. Columella-Labial angle of the samples were evaluated using the photographs of the samples before and six months after surgery. The obtained results were compared using SPSS software and t-paired and Mann-Whitney statistical tests.

Results: The mean Columella-Labial angle in both groups was more than that before surgery (P<0.001). The mean Columella-Labial angle before surgery in the SCS group were higher than that in LCO group and this difference was significant (P<0.001). The Columella-Labial angle difference was also significant between the two groups after surgery (P = 0.005), and Columella-Labial angle in LCO group was higher than that in SCS group (P <0.001).

Conclusion: LCO technique increase Columella-Labial angle more than SCS technique. Therefore, it is recommended that LCO technique to be used in patients with who need greater Columella-Labial angle change.

KEYWORDS
Rhinoplasty; Nasal septum cartilage; Lateral nasal cartilage; Nasal tip rotation; Columella-labial angle

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INTRODUCTION

The human nose is a central feature of the face, playing a crucial role in defining an individual's aesthetics and facial identity. Rhinoplasty, a historically significant and intricate surgical procedure, seeks to enhance both the functional performance and the cosmetic appearance of the nose [1]. One of the factors that can enhance facial aesthetic when

combined with rhinoplasty is genioplasty. The position of the chin plays a pivotal role in achieving a more harmonious and attractive facial appearance [2].
Success in rhinoplasty surgery largely depends on successful control of the nasal tip [3]. The size of nose tip account for 80% of the demands for rhinoplasty. However, any intervention in the lateral cartilages can cause significant changes in the nasal tip [4]. Thus, taking into account the ideal criteria in a community (which may be different depending on the race and culture of the community), therapeutic and aesthetics priorities, and satisfaction of patients, surgeons should maintain nasal tip position and stabilize it.
The change in nasal tip depends mainly on the degree of change in nasal tip projection or rotation [5, 6]. Nasal rotation is defined as the movement of the nasal tip in the direction of a circular arc, which its radius from the face plate remains constant. Over-projected nasal tip is a common problem, which is often not estimated precisely in pre-surgical analyses, especially when the problem is not merely nasal tip [7-9].
Several reconstructive techniques have been introduced to shape the nasal tip, which the most important of them is suture techniques. Some of these techniques are very precise and are associated with predictable results, but others are not so precise [10]. The superiority of suture techniques compared to resection techniques has been proven and it has been found that the use of suture methods maintains the anatomical structure of the nasal tip and its results are immediately visible [11]. Various suture methods have been proposed for the reconstruction of the nasal tip and nasal projection control, which two of them, both in terms of appearance and function, have been able to provide some level of recovery for patients. One of these methods is Septocolumellar Suture (SCS) [12, 13]. While this method has been introduced with different names in different studies [14-16], the nature of technique is same. In this method, a loop clamp is placed between the middle crura and the caudal septum. In order to reduce the nasal tip projection, the level of suture's entry in the septum should be lower than its entry point to median crura, and in some cases, resection of the caudal part (foot plate) might be required. However, this method can reduce the nasal tip projection by 4-5 mm, but to avoid alar flaring, it is necessary to avoid excessive stretching [16]. This technique is commonly used in open rhinoplasty, but some studies have reported that this method has been used in close rhinoplasty [13, 14, 17].
Lateral crural overlay (LCO) is one of alar cartilage modifying techniques, introduced to modify nasal tip projection and rotation [18, 19]. The lower lateral and medial cartilages of the nose form two cartilage arcs that support the nasal tip anatomically. In this method, part of this cartilage arc is removed, leading to reduced nasal projection [18, 20-22]. Given the importance of nasal tip modification and nasal projection in the aesthetic results of the rhinoplasty surgery, selecting the appropriate technique with the highest effect is important in resolving the nasal problems. Moreover, despite the publication of many articles on nail tip modification, a few studies have evaluated the effects of various techniques on the nasal tip objectively [23].
Thus, we aimed to evaluate and compare the two methods of SCS and LCO in a clinical trial to find which of these two methods is more effective in reducing the nasal tip projection and rotation.

MATERIALS AND METHODS

The present study was a single-blinded clinical trial and the statistical population included all patients who were candidate for nasal tip projection modification, admitted to Sina Hospital in Tehran City, Iran in 2024. Convenient sampling was used in this study. Minimum sample size was calculated to be 148 using power and sample size software 2.2.31 (Vanderbilt University) and according to Korkmaz et al. [24], study and with assuming power = 80%, m = 1 and p0-p1 = 20%. They were randomly divided into two groups (each group contained 74 subjects). After receiving informed written consent of the patients, they were divided into two groups. The patients in the first group were operated on using Lateral Crural Overlay (LCO), and the patients in the second group were operated on using Septocolumellar Suture (SCS). Patients in this study were healthy in terms of systemic status and they had no bone and cartilage defects in the nose. Evaluation criterion in this study was photography before and 6 months after the surgery. The height, nose length, and Columella-Labial angle were measured in samples using ruler and conveyor. The data were analyzed by SPSS 16 software (Chicago, IL, USA) using Chi-square, independent T, and Levene tests if data were normal and Mann-Whitney U test was

used if data were not normal (based on Kolmogorov-Smirnov test). Paired t-test or non-parametric test of Wilcoxon was used to compare the results before and after surgery in both groups. The significance level was considered 0.05 in this study.

RESULTS

To examine the normal distribution of the variables in this study, Kolmogorov Smirnov test was used. The distribution of the Columella-Labial angle (P = 0.329) was normal before (P=0.329) and after surgery (P=0.693), but the angle variation variable did not have normal distribution (P=0.002). The surgery had a significant effect on the level of Columella-Labial angle in the two groups of LCO and SCS, so that the mean Columella-Labial angle was higher after surgery than that before surgery in both groups (Paired -Samples T-Test, P<0.001). Columella-Labial angle before the surgery was 98.26 degree in SCS group and 92.59 degree in LCO group and this difference was statistically significant (Paired-Samples T-Test, P<0.001). After surgery, the difference of Columella-Labial angle in two groups was also significant (Paired-Samples T-Test, P=0.005). The mean Columella-Labial angle was 104.70 degree in LCO group and 109.33 degree in SCS group after surgery. In addition, a significant difference was found between the two groups in terms of rate of change in Columella-Labial angle (Mann-Whitney Test, P<0.001), so that the mean change of Columella-Labial angle in LCO group was greater than that in SCS group (Table 1, Figures 1 and 2).

DISCUSSION

In this study, Columella-Labial angle was examined and the results showed that the surgery had a significant effect on the Columella-Labial angle in the two groups of LCO and SCS, so that the mean Columella-Labial angle in both groups was more after surgery than that before surgery (P<0.001). Columella-Labial angle before surgery was more in the SCS group that that in LCO group (P<0.001), but after surgery, it was more in the LCO group than that in SCS group (P=0.005). The change in Columella-Labial angle was more in the LCO group than that in SCS group (P<0.001). In a study, to compare 3 techniques of lateral crural overlay, lateral crural steal, and tongue in groove for the treatment of nasal noses in open rhinoplasty, they concluded that results were quite satisfactory in 85% of patients and the LCO method was the best technique in treatment of these patients. According to their study, the LCO technique significantly increased the tip rotation and significantly decreased tip projection, and these changes were statistically significant (P<0.001). In fact, LCO method was an appropriate method for severe nasal rotations before the surgery [5], which these results are consistent with the results of this study. LCO method significantly increased nasolabial angle and rotation angle and decreased nasofacial angle compared to preoperative time.

Table 1: Comparison of the Columella-Labial angle before surgery and that after surgery using the LCO and SCS methods

			Before	After	Angle diffrence	*P*-value[a]
Group	Lateral crural overlay	Count	74	74	74	<0.001
		Mean	92.59	109.33	16.87	
		Standard Deviation	9.09	9.92	7.58	
		Percentile 25	88.00	102.00	11.00	
		Median	93.00	110.00	15.00	
		Percentile 75	99.00	117.00	23.00	
	Septocolumellar suture	Count	74	74	74	<0.001
		Mean	98.26	104.70	6.31	
		Standard Deviation	9.84	9.90	3.27	
		Percentile 25	90.10	99.00	4.00	
		Median	99.00	105.00	6.00	
		Percentile 75	105.00	110.00	8.00	
P-value[b]			<0.001[c]	0.005[c]	<0.001[d]	

[A] Comparison between before and after (Paired-Samples T-Test)

[B]comparison between Groups([c] Independent Samples T-Test and [d] Mann-Whitney Test).

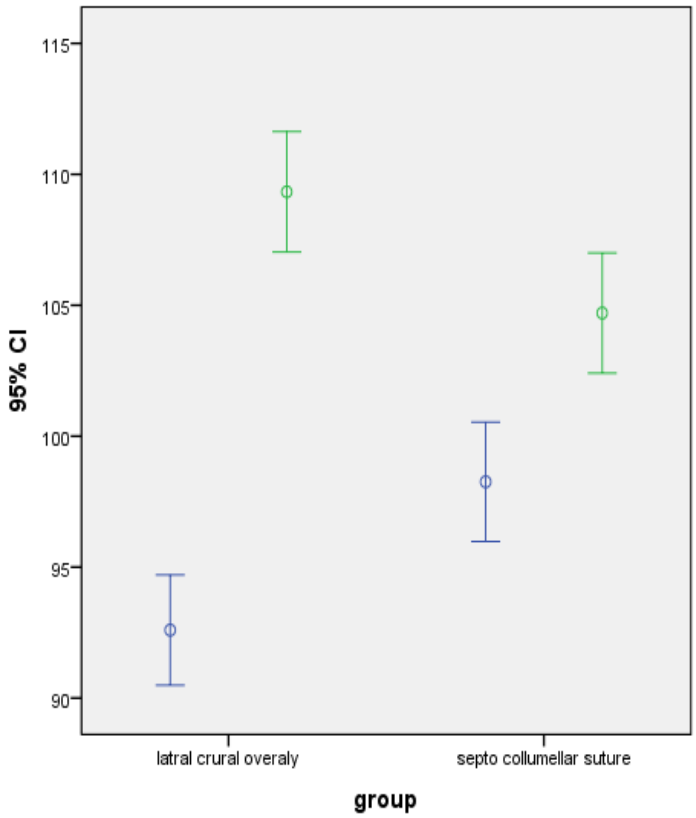

Figure 1: The mean of Columella-Labial angle before and after surgery according to the study groups with a 95% confidence interval

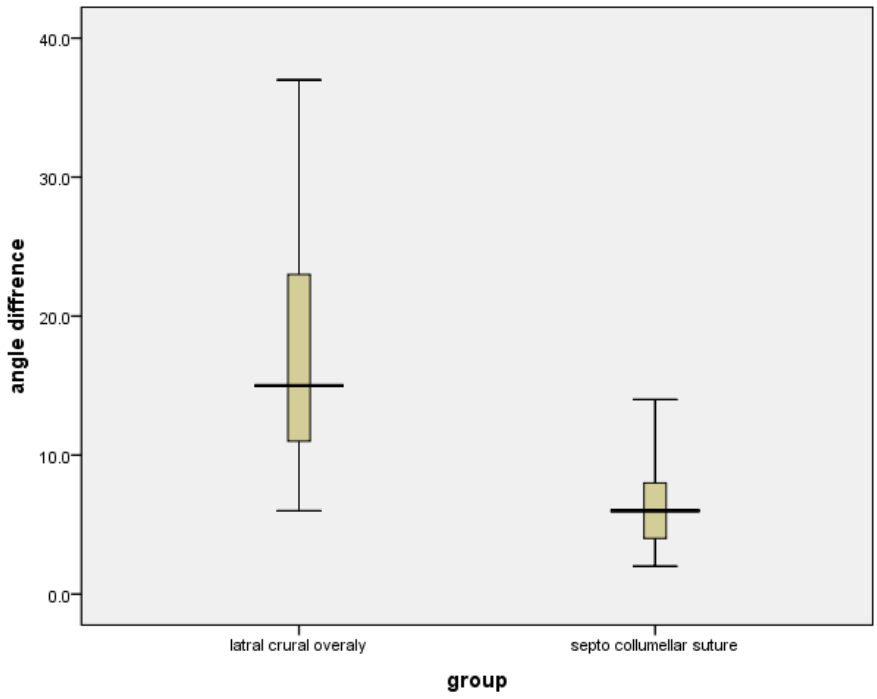

Figure 2: Rate of change in Columella-Labial angle according to the study groups

This method also reduced tip projection to length of nose, which was statistically significant. On the other hand, the Septocolumellar method reduced the nasofacial angle and tip projection to length of nose significantly and increased nasolabial angle and rotation angle significantly, compared to the preoperative time [7], which it was in line with this study with regard to the evaluated variable. Septocolumellar suture is one of the methods, described as a circular suture between septum and middle crura [16]. This suture connect middle crura and the septum tautly. Some studies have reported that this technique is considered as an alternative for open method in many cases. It method can be also expanded to closed surgery. It also allows us to manipulate the nasal tip and Columella easily with closed rhinoplasty [24]. The most important study in this regard might be the study conducted by Tezel et al. By reporting the advantages of ease of use, lack of leaving scar, and observation of results during the surgical process and the permanence of the results, SCS method in closed rhinoplasty can act as an alternative to open rhinoplasty in many cases and may lead to the development of closed surgeries [16].

The SCS method has the potential to reduce or increase nasal projection by 3 to 4 mm without using any other maneuver [13]. In a study conducted to compare two methods of shortening the alar cartilage and Septocolumellar suture in the nasal tip rotation, 50% of patients were satisfied with the first method and 72% of patients were satisfied with Septocolumellar method fully [24]. The results of the above studies were consistent with the results of the present study.

One of the limitations of the study was the follow-up of patients in one stage. However, this approach was taken according to similar studies because the study conducted by Foda and Kridel, who followed-up patients for 6 and 24 months after the intervention, did not show change between the results of 6 months and those of 24 months [5]. The nasal tip rotation and projection was studied and followed up the patients for 6 and 12 months, and results also did not show a significant difference in results in these two times (P=0.75) [25].

CONCLUSION

Change in Columella-Labial angle of lateral crural overlay group was greater than that of Septocolumellar suture group. Therefore, it is recommended that LCO technique to be used in patients with who have greater Columella-Labial angle and DCS technique to be used in lower angles, given the aesthetic criteria and patients' satisfaction.

CONFLICT OF INTEREST

There is no conflict of Interest to declare.

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