

Investigation of the Changes in Nasal Tip Projection with L- shape Strut Graft

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Abstract

Background: Knowing the long-term consequences or side effects induced by various types of strut and septal extension grafts following rhinoplasty are essential and aid in estimating and predicting difficulties later. The purpose of this study is to look at how the projection of the nose tip changes following rhinoplasty with the L-shape strut, a new type of septal extension.

Aim: We aimed to determine the changes in nasal projection in patients who received an L-shaped strut at 6 and 12 months' post-operation.

Methods: Following inclusion and exclusion criteria, an L-shape strut was prepared from the patient's septal cartilage and used in the surgery. We objectively assess the results of the L-shape strut with standard images. These standard images were taken before surgery and on the day of the nasal splint off, six- and twelve-months after surgery. Then the nasal projection was calculated using Goode's ratio.

Results: Thirty patients were included. The mean Goode's ratio was 0.573 ± 0.014 shortly after surgery, all participants had a ratio between 0.55 and 0.60. After 6 and 12 months of follow-up, the measured Goode ratio of the participants was 0.556 ± 0.024 and 0.550 ± 0.027 , respectively. Thus, the observed ratio declined by 2% during the first six months, and 1 % during the second six months. This decreasing pattern was statistically significant. After twelve months of follow-ups, Goode's ratio of all included cases was in the optimal range of 0.55 to 0.6.

Conclusion: The findings of this study demonstrate that the L-shape strut, a new type of septal extension, can help to keep the optimal Goode's ratio after a year follow-up.

Conflicts of Interest: The Authors declare no conflicts of interest.

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Introduction

The main change in the form of the nose is made by increasing or decreasing the three-dimensional cartilage structure. For this purpose, a nasal cartilage graft is used. Nearly all patients receive a graft or cartilage transplant (1). So many graft types have been produced so far. For noses that require less graft, a shield-

shaped graft strut, and spreader graft are utilized to stabilize the nose's tip and treat breathing problems (1). There are several approaches for making the nose's base more stable. These approaches include Free Floating Columellar Strut Graft, Columellar Strut (CS), and Caudal Septal Extension Graft (CSEG). All

these grafts can help enhance the nasal projection. However, there have many disadvantages like inability to rectify tip rotation or the nasolabial angle (Free Floating Columellar Strut Graft), limited projection (CS), and iatrogenic problems such as septum loss and a significant reduction in the nasolabial angle (CSEG) (1-4).

Consequently, finding a more effective procedure with fewer challenges is crucial. Furthermore, evaluating the long-term consequences caused by all types of struts and Septal Extension Graft (SEG) following rhinoplasty is critical.

In this study, we aimed to determine the changes in the nasal projection in patients who received an L-shape strut, a new type of septal extension, in 6- and 12-months post-operation.

Methods

This research was conducted between 2020 and 2021 on patients seeking rhinoplasty with L-shape strut grafts. Patients were chosen through non-random selection and by census method. Each patient was given a thorough explanation of the research process and goals, and informed consent was obtained from all participants. All procedures followed the Declaration of Helinski, and the ethics committee approved this survey. Informed consent was obtained from all included patients.

This study included patients over 18 who were candidate for L-shape strut grafts or had a nasal projection of less than 0.55 based on Goode's ratio in pre-surgery photographs.

Standard photos were taken before surgery, on the day of splint removal, and six- and twelve-months post-operation. The single expert photographer took the images in a trusted studio. Nose projection was objectively evaluated via Goode's ratio, and the resulting values were analyzed. The L-shaped strut was made from the patient's cartilage and used in an open approach. The graft size varied based on the case's demand, with a mean size of 25-30 millimeters for extension-strut and extension-

spreader components in the right-angle shape. The apex of this strut was placed toward the nasal tip (Figure 1). The L-strut graft was placed along the caudal margin of the nasal septum in a cephalo-caudal direction to achieve optimal nasal balance for nasal length and tip protrusion (as shown in Figures 1). Once the desired position was determined, the graft was sutured with non-absorbable nylon or PDS 0.4 sutures. Ideally, the suturing was done with three stitches.

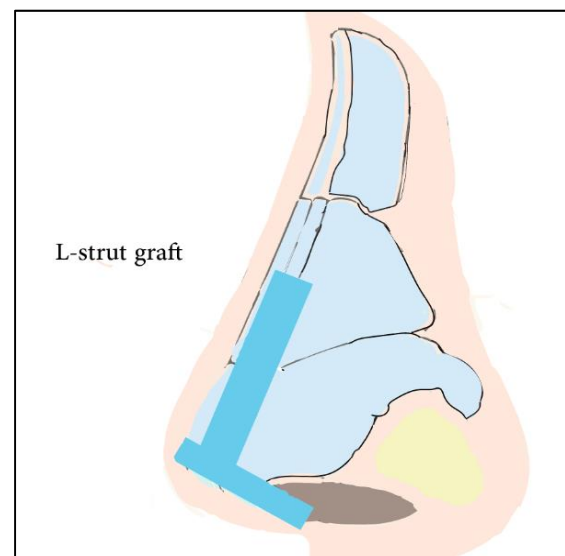


Figure 1. The position of the graft.

The L-graft is initially fixed, and then the lower lateral cartilages are secured with two or three of 5/0 or 6/0 tongue-in-groove (TIG) sutures. The positioning of these sutures allows for precise control of the nasolabial angle and double columellar fracture. The strut component of the L-graft can be extended between the domes for maximum tip support or as a spacer between the domes to provide adequate volume in patients with compressed nasal tips. If desired, the base can be trimmed 2-3 mm below the final position of the tip markers to achieve a softer look. Statistical analysis was conducted using Rstudio. The Mann-Whitney U test was performed to compare non-parametric data, while the Paired T-test was used to compare parametric variables. In addition, a multiple regression test was performed to compare the

nasal protrusion, which was calculated based on Goode's ratio.

Results

This study included 30 individuals from April 2019 to April 2021. The average age of the participants was 29.73 ± 6.54 years, ranging from 25 to 34 years. Of the 30 participants, 3 (10%) were male, and 27 (90%) were female. Before the operation, the mean of nasion to tip (NT) to alar groove to tip (AT) was 0.657 ± 0.029 .

The mean of Goode's ratio of 0.573 ± 0.014 in the operation room. The patients were followed

up at three intervals, and their proportions were measured at the start and throughout the follow-up period (Table 2). The measured criteria decreased by 2% and 1% in six- and twelve-months post-operation, respectively, and the results were statistically significant (P -value < 0.05). Though statistically significant, the Goode ratio remained between 0.55 and 0.60 after twelve months of follow-up. Despite the decrease in nasal projection, Goode's ratio of included patients remained stable between 0.55 to 0.6. Figure 2 shows the pattern of Goode's ratio changes.

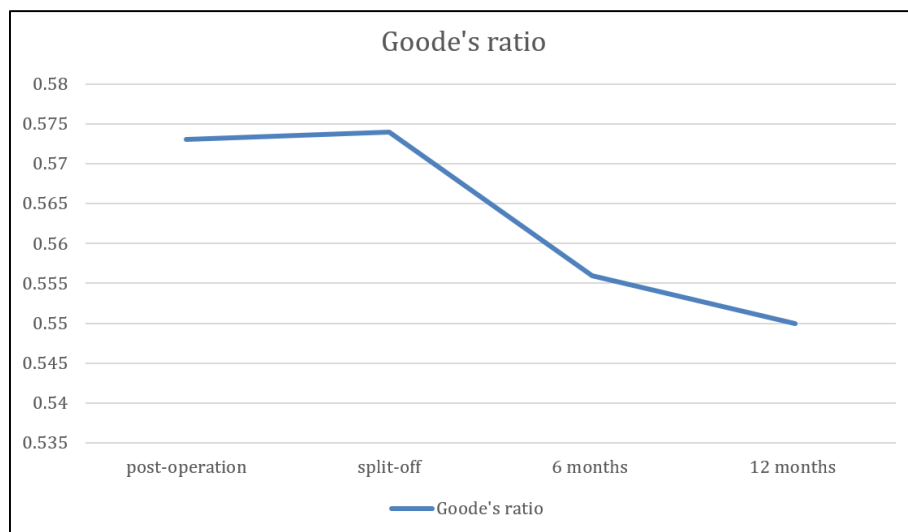


Figure 2. The pattern of Goode's ratio changes.

Discussion

Despite of this high prevalence, rhinoplasty still remained as one of the trickiest plastic surgeries (5). In rhinoplasty, managing the nasal tip is one of the most challenging and precise part. In 1929, Rethi et al. introduced open approach with extensive exposure for better nasal tip management(6). Since then, this technique was used and recommended by many authors and surgeons (7-10).

The management of nasal tip in rhinoplasty is complicated and varies based on ethnicity. Various factors such as behavior, scarring, beauty concept, symmetry, and post-operative assessments affect the nasal tip (9-11). Goode's ratio is one of the common ways of evaluating

the nasal tip projection. It is calculated by dividing the length of the nose (line from root to the tip) to the height (line from ala to the tip). The ideal range of Goode's ratio is considered between 0.55 to 0.60.

Nearly all surgeons utilize interdomal and dome shaping sutures especially in open approaches to obtain the appropriate nasal projection (12). Sheen introduced a new technique in nasal tip surgery by adding a graft for more definition and projection (13).

Since then, various cartilage grafts have been introduced for controlling nasal projection and rotation. However, their usage in rhinoplasty is still debatable. Because maintaining nasal projection is critical in modern rhinoplasty,

finding the best cartilage graft to create and keep the nasal projection in long-terms is essential.

Among the introduced cartilage grafts for controlling the nasal tip, columellar strut provides an adequate tip support. Furthermore, it balances and maintain the medial crura's shapes. If this graft is applied appropriately, it will make predictable results. However, it lacks the control of nasal projection and rotation. Thus, post-operative nasal tip drooping is a common finding after columellar strut utilization in rhinoplasty (14-16). Furthermore, columellar strut graft is commonly used for western noses (17).

In 1997, SEG was introduced in three main forms including paired spreader, direct extension, and paired batten grafts. The main disadvantage of this approach was septum thickening and nasal tip stiffness. Besides, more amount of cartilage is required in this technique (18, 19).

L-strut is the most important component of nasal septal cartilage. The L-strut function provides the foundation for the dorsum and the tip of the nose (20). L-strut grafts are usually used in managing the dorsal and caudal segments of cartilaginous septum which are severely deviated, underdeveloped, and over-resected (21).

Since the L-strut is fixed to the caudal septum and its vertical segment is placed between medial crura, the droopy tip is not frequent in this approach. Besides, its fixation is not very strong and the surgeon has the ability to put the tip where it is desired. All the mentioned advantages made us to consider L-strut as a suitable technique to make and maintain an adequate nasal projection (22).

In Korea, a group of 25 patients who had undergone rhinoplasty with an L strut graft were observed for more than nine months. The researchers compared pre- and post-operative photographs to evaluate the effects of the procedure. Using Adobe Illustrator, they measured the Columella labial angle and nasal

tip projection ratio. The results showed that the nasal tip projection ratio increased from 0.85 ± 0.07 to 1.12 ± 0.09 after the operation, indicating an average increase of 32% in tip projection due to the L-shape strut. Although the same results were obtained, the positioning of L-strut in this study differed from ours. Dhong et al. placed the apex of the right angle toward the nasal base and the vertical part of the strut was placed within the lower alar cartilage (22).

Dhong et al.'s and the current investigations indicate that the L-strut graft is an effective method for maintaining the nasal projection.

Apaydin et al. have reported using L-strut graft to manage very deviated noses. In their study 119 patients were assessed. Rhinion deviation angle and distance, tip deviation angle and distance were all improved after utilizing this graft (23). The result of the mentioned study was in accordance with Baykal et al's (24). The main goal of these study was to correct the nasal deviation while the current study focused on the nasal projection.

, there were also limitations. One major drawback was the short follow-up period and small sample size, with 90% of the patients being female. To improve accuracy, future studies should have larger sample sizes and extended follow-up periods.

Conclusion

The recent study found that using a new septal extension graft called the L-shape strut. Right after surgery improved Goode's ratio. However, this ratio decreased after six and twelve months. Despite this decrease, the ratio remained within the desirable range of 0.55 to 0.60 for every case in the study. These results indicate that the surgical approach is effective.

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Conflicts of Interest

The authors declare no conflicts of interest.

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Ethics

The study was in accordance to Declaration of Helsinki. The ethics committee approved the process of this survey (IR.SBMU.MSP.REC.1400.221).

Author's contribution

SK, MK conceptualized the study, NB, FD acquisition of data, and NB and SS drafting the manuscript, NB, LG, FD, RN revising for critical intellectual concept and approved of the version to be submit.

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