

A Comparison of the Tongue-in-Groove and Modified Alar Spanning Suture in Creating and Maintaining Tip Projection and Rotation

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Abstract

Background: The tongue-in-groove technique and alar spanning suture are two popular rhinoplasty techniques for adjusting tip rotation and projection. Herein, the long-term results of these two techniques on tip projection and rotation were compared.

Methods: A prospective review was undertaken. In total, 41 patients who had undergone rhinoplasty from 2016 to 2019 were included in this study. Among them, 26 patients had undergone tongue-in-groove technique as the main method to create ideal tip rotation and projection and an alar spanning suture, incorporating the dorsal septum, was used in the rest. Using pre and postoperative photographs, tip rotation and projection were evaluated and compared between two groups after one year.

Results: The patients mean age was 31.4 ± 7.6 years. Thirty-one (75.6%) patients were female. The mean follow up was 11 ± 2.9 months. The tongue-in-groove technique group had significantly better tip rotation results (p value= 0.028), but there was no significant difference in their projection.

Conclusion: According to our results, the tongue-in-groove technique is a more effective tool for creating of an ideal tip rotation when compared to reconstitution of tip support with an alar-spanning suture that incorporates the supratip septum.

Keywords: Females, Rhinoplasty, Rotation, Sutures, Tongue diseases

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Introduction

Tip management is among the most challenging and critical aspects of effective rhinoplasty. A successful treatment plan depends on an understanding of the anatomic variations of the soft tissues and cartilaginous framework of the tip, factors that influence tip support and their interrelation, and the effect of each surgical modification on the final surgical results (1).

Tip support mechanisms include the length and integrity of the Lower Lateral Cartilages (LLCs), the ligamentous attachment of the medial crura to the septal cartilage, the scrolled attachment between the upper lateral and the LLCs, the interdomal ligamentous sling, the septal cartilage, the membranous septum, the anterior nasal spine, the skin-soft tissue envelope, and the lateral crural attachment to the pyriform aperture (2,3). During rhinoplasty, violation of these mechanisms should be avoided. However, necessary surgical maneuvers such as transfixion incisions, cephalic trims, intercartilaginous incisions, and division of the LLC disrupt the support and change the position of LLC and, subsequently, tip projection and rotation. There are many techniques to restore tip rotation and projection and the choice is dependent on the surgeon's armamentarium. One of the most popular is the columellar strut, which can be placed to increase tip projection using an endonasal or external approach. However, some new research has showed that it may not be as effective as generally proposed (1,4-6). Some authors have presented the tongue-in-groove and/or supratip (alar-spanning) suture as a substitute to columellar strut (3,7,8).

The efficacy of the above mentioned techniques to obtain and control nasal tip projection and rotation is not well established in the literature; additionally, their long-term effects on maintaining tip rotation and projection as a routine technique during rhinoplasty is still questionable. Herein, the results of two techniques on tip projection and rotation in two groups were compared.

Materials and Methods

Study subjects

The study population was selected from a retrospective analysis of consecutive patients who underwent septorhinoplasty. The study recruited 41 patients who underwent rhinoplasty from 2006 to 2019 in the Division of Facial Plastic and Reconstructive Surgery

at Tehran University of Medical Sciences. Patients who referred for revision surgery and functional rhinoplasties were excluded from this study. Among them, 26 patients underwent a tongue-in-groove technique as the main method to create an ideal tip rotation and projection and alar spanning suture was used in the rest of them.

Protocol approval

The protocol of this study was approved by the Institutional Review Board of Tehran University. All aspects of the study were conducted according to the Declaration of Helsinki.

Technical details

The primary surgeon used the external rhinoplasty approach in all cases. All procedures were performed by senior author (BS) under general anesthesia. All participants had preoperative standard photography (6 views) with a Nikon DSLR Camera (D80, Nikon USA) with a 70 mm macro lens (105 mm effective focal length).

After taking each patients' picture, a simulated picture was created according to patients' desire in profile view with Photoshop CS5 liquify filter (Adobe Systems, Sunnyvale, CA). The senior author used the simulation picture as the primary goal of surgery especially with regard to rotation and projection. The patients were followed up for one year and the same standard pictures were obtained and used for comparison (detailed below).

Tongue-in-groove technique

After complete skeletonization of the tip area, the medial crura were divided from each other. Accordingly, caudal part of septum was dissected in both sides. Finally, the medial crura were sutured to the septum and together with a 5-0 prolene suture (Ethicon, New Jersey). If necessary, a septal extension graft was used (also, secured with 5-0 prolene sutures) (Figure 1).

Alar spanning suture

After complete skeletonization of the tip area, two lateral crura were sutured to dorsal part of septum by using of 5-0 prolene suture. Specifically, a specific point on the cephalic portion of the lateral crus was identified symmetrically and used to place a

symmetric suture through both lateral crura. Between each lateral crus, the suture was passed through the dorsal septum. The position of the suture to the dorsal septum allowed the surgeon to set tip rotation

and projection, as well as a supratip break (Figure 2).

Nasal tip projection

Goode's method was used to measure tip projection,

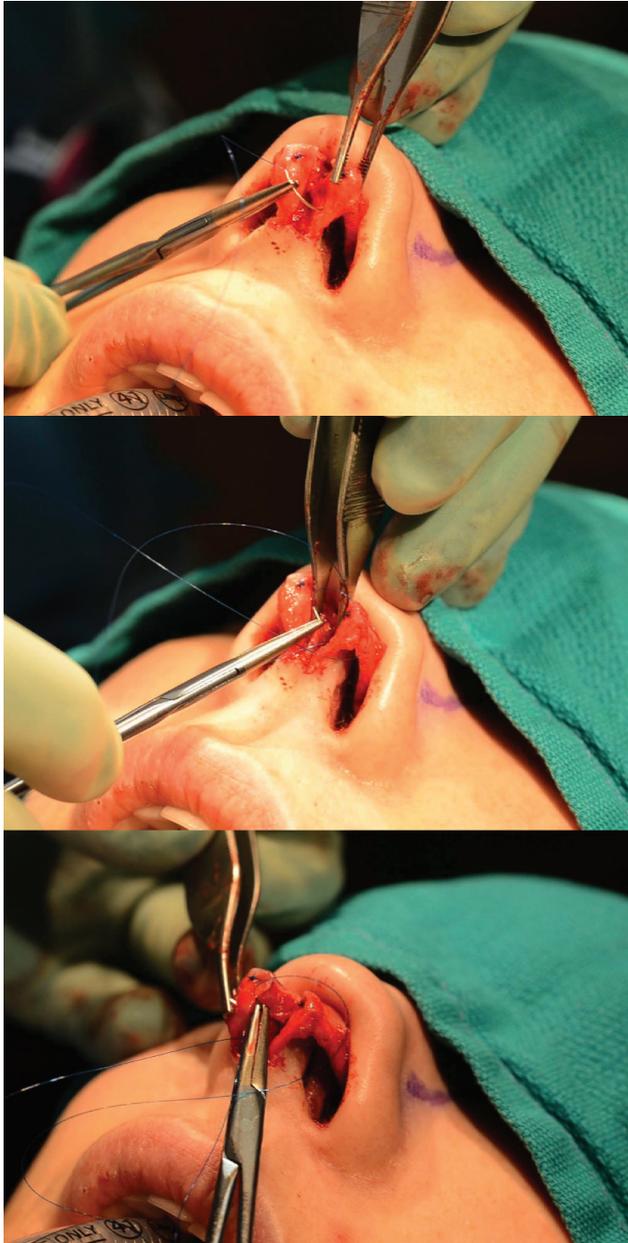


Figure 1. Tongue-in-groove suture. Top panel: The suture, in this case a 5-0 prolene, is passed through the medial crus of the lower cartilage, and the distance from the tip defining point and caudal edge are noted. Middle panel: The suture is then passed through the septum. The distance along the antero-posterior axis sets the tip projection, while the distance from the caudal edge will set the rotation. If the septum is too short, a septal extension graft may be used (Not pictured). Bottom panel: The suture is then passed through the opposite medial crus. It is imperative that the distance from both the nasal tip and caudal edge of the crus be equivalent to the entry point on the first crus, as this will ensure symmetry of the tip and caudal edges of the medial crura.

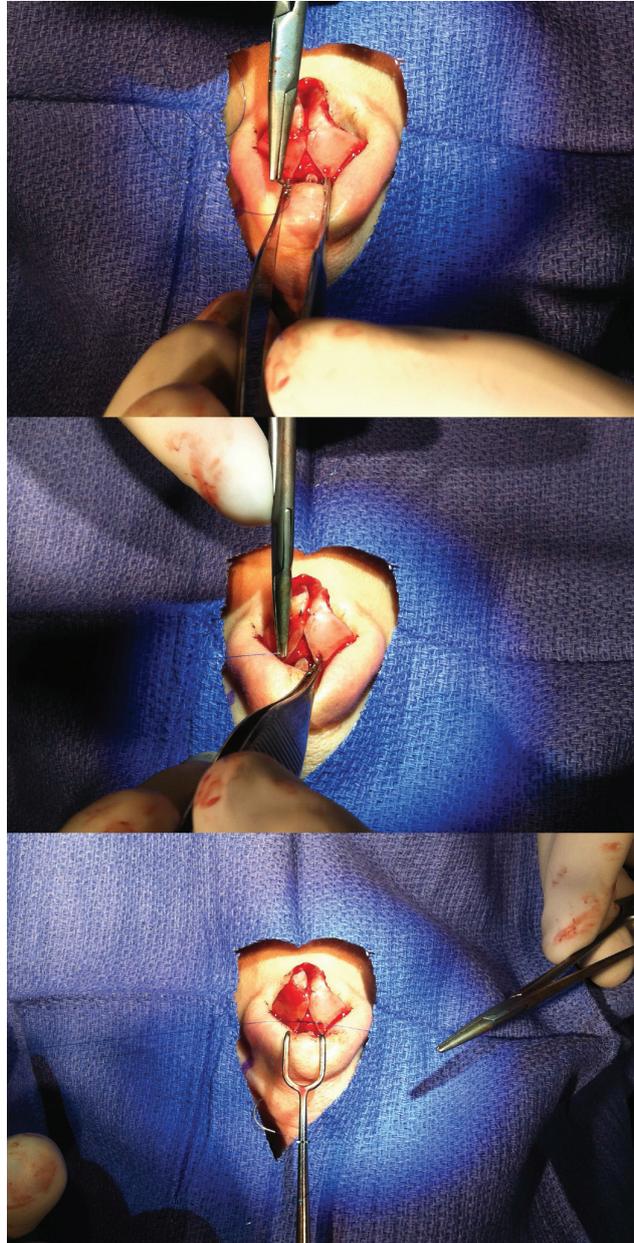


Figure 2. Alar-spanning supratip suture. Top panel: The suture, in this case a 5-0 prolene, is passed through the cephalic border of the LLC. Middle panel: The suture is then passed through the dorsal septal cartilage. The distance from the anterior septal angle will set the tip rotation. Bottom panel: The suture is then passed through the opposite (Right) LLC, at a point equivalent in distance from the cephalic edge and tip defining point as in the left LLC. In this example, a simple suture was used. This will cause some flare of the LLCs. If this was undesired, a mattress suture was similarly placed back to the opposite LLC. Typically, this return suture is not passed through the septum.

which measures the distance from the alar crease to the tip defining point as projection and relates this to dorsal length. Using this method, if length of the nose is normal (1/3 of facial length), ideal projection is 67% of the dorsal length.

Nasal tip rotation

Adobe Photoshop was used to measure the nasolabial angle between two lines drawn parallel to the upper lip and columella.

Rotation in the range of 90–95° for men and 95–110° for women was considered normal. The measurements of angles and ratios were performed by an independent researcher who was not aware of the preoperative and postoperative situation or procedures.

Despite the above mentioned ideal values, our final evaluation was according to simulation pictures.

Moreover, data regarding cephalic trim resection of lateral crura, septoplasty and usage of septal extension graft, in addition to demographic data, were gathered in both groups to prevent their effect as confounding factors.

Statistical method

Data were analyzed using SPSS 18 for Windows (SPSS, Inc., Chicago, IL). The chi-square test was used to evaluate preoperative and postoperative ratios in each group and also T test and paired T test for the rest of variables. Values were evaluated using descriptive statistical methods (Mean±SD) and results were significant at $p \leq 0.05$.

Results

Forty-one patients met inclusion criteria of this study. Among them, 15 (36.6%) underwent alar spanning suture and in the rest, tongue-in-groove technique was used as the primary technique to control tip rotation and projection.

The patients' mean age was 31.4 ± 7.6 years (Min=20 and Max=56) and 31 (75.6%) of the patients were female. Their mean follow up was 11 ± 2.9 months. The patients' characteristics in both groups were summarized in table 1.

Patients' preoperative rotation was $105.13 \pm 10.7^\circ$ and it became $106.04 \pm 9.96^\circ$ in postoperative follow up. Also, the preoperative projection was $63.22 \pm 5.4\%$. Moreover, the findings were evaluated according to

patients' differences in simulation. Their results were summarized in table 2.

As evident in table 2, the tongue-in-groove group had greater tip rotation postoperatively compared to the modified alar spanning suture group. Furthermore, the noses of the tongue-in-groove patients more closely matched the preoperative simulation. The alar spanning suture group had more projection, though this difference was not statistically significant.

There were no major complications in either group. No revisions related to either tip rotation or projection were required in any of the patients in the study.

Discussion

Over the years, different surgeons have used various techniques to restore and support the tip in rhinoplasty (1,5-8). In our opinion, none of them have emerged as the gold standard to maintain tip projection and rotation. Accordingly, some authors have presented the tongue-in-groove technique and alar spanning suture as primary methods to create stable tip rotation and projection (2,3,7,9-11). However, these two techniques are different, though both of them use the caudal part of the septum as a stable support mechanism and as a point of fixation for nasal tip rotation and projection. The tongue-in-groove stabilizes the medial crura to the caudal edge of the septum, a major tip support mechanism. The modified alar spanning suture, as described herein, secures the lower cartilages to the caudal portion of the dorsal septum. This is not generally considered a major tip support mechanism. Interestingly, it was subsequently found to be less effective in maintaining tip support and rotation than the tongue-in-groove technique.

In this study, it was demonstrated that the tongue-in-groove technique establishes tip rotation more reliably than the modified alar spanning suture. As noted above, a possible explanation for this difference is the reconstitution/augmentation of one of the major tip support mechanism (3,12). Also, this technique is more versatile for creating ideal tip rotation and projection. The use of the alar spanning suture is very dependent on the shape of lateral crura and the height of nasal septum. The other difference is about tip support mechanism. The tongue-in-groove technique strengthens one of major tip supports

which is attachment of medial crura to septum, but probably the important effect of alar spanning suture is reinforcement of some of minor tip supports like attachment of lateral crura to septum and integrity of the soft tissue over the tip area, which are not as effective as the tongue-in-groove technique. Interestingly, in a cadaveric study, Beaty *et al* showed that attachment of the two lateral crura together accounts for at least 25% of tip support (2). While in our method, the two lateral crura are not directly attached, they are secured together to the dorsal septum, and this technique alone does not seem to be adequate.

The generally accepted ideal nasolabial angle is 90 to 105 degrees in men and 100 to 120 degrees in women. In our practice, the planning for tip rotation uses these measures as a guide but ultimately planning is performed using personal preference during the photo simulation. Hence, preoperative simulation was used for each patient as the gold standard for each case.

Rohrich RJ *et al* recommended the tongue-in-groove technique in short noses (5). Guyuron and Varghai presented tongue-in-groove technique in 23 patients and concluded that this technique is a flexible method of tip-plasty, which does not have some of the major downsides of other techniques (7). These two papers presented the special usage of this technique, but did not compare its efficacy with other methods.

Akkus *et al* also presented a series and compared tongue-in-groove technique and columellar strut and concluded that the tongue-in-groove technique created

more stable results in tip rotation and projection (6). A strength of this study is its direct comparison and blinded design. However, our sample size was limited and follow-up was only one year. Longer-term follow-up may have demonstrated lack of effectiveness of the tongue-in-groove technique, though it seems to be unlikely. A randomized controlled trial would be an ideal way to evaluate this technique, but the feasibility of this type of study in aesthetic patients is low.

Conclusion

According to our results, tongue-in-groove technique may be more effective than the modified alar spanning suture for creating ideal tip rotation.

Ethical approval

The protocol of this study was approved by the Institutional Review Board of Tehran University of Medical Sciences.

Conflict of Interest

Authors have no conflict of interest.

Patient consent

Patients provided written consent before their inclusion in this study. Also, I have permission for the use of patients' photographs.

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