



CLINICAL STUDY

COMPARISON OF THE EFFECTIVENESS OF NASAL SUTURES FOR ENSURING THE CONTINUITY OF NASAL PROJECTION AND MAINTAINING NASAL PROJECTION

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SUMMARY

Objectives: In this retrospective study, four sutures frequently used for continuity of tip projection and arrangement of nasolabial angle were compared.

Methods: A total of 400 patients who underwent rhinoplasty surgery with Tebbetts tip rotation suture, interdomal suture with cartilage strut, triple cartilage suture and tongue-in-groove suture between 2017 and 2022, completed a one-year postoperative period were included in the study. In 4 centers, four sutures frequently used for continuity of tip projection and arrangement of nasolabial angle were compared. The nasolabial angle and projection from the face were measured by using the lateral photographs taken before and one month, and one year after surgery. Nasolabial angle change between preoperative and postop first month; and postoperative first month-1st year were evaluated, and VAS for patient and surgeon satisfaction from rhinoplasty were evaluated.

Results: Tebbett's Tip rotation suture, Interdomal suture with cartilage strut, and Triple cartilage suture's nasolabial angle change values were higher than Tongue-in-groove between preoperative period and postoperative first month; and at the first postoperative period (adjusted <0.0125). From the patients' view, Group 1's patient satisfaction from the rhinoplasty results in VAS score was significantly higher than Group 4's. From the surgeons' view, Group 1's surgeon satisfaction from the rhinoplasty results in VAS score was significantly higher than those of Group 2 and Group 4's surgeon satisfaction (adjusted <0.0125).

Conclusion: It shows that continuity of tip projection was maintained by Tebbetts Tip rotation suture, interdomain suture with cartilage strut, and triple cartilage suture at one 1-year after the operation.

Keywords: Type projection, Tebbett's suture, dome suture with cartilage strut, triple cartilage suture

NAZAL PROJEKSİYONUN DEVAMLILIĞININ SAĞLANMASI VE NAZAL PROJEKSİYONUN SÜRDÜRÜLMESİ İÇİN UYGULANAN BURUN DİKİŞLERİNİN ETKİNLİĞİNİN KARŞILAŞTIRILMASI

ÖZET

Amaç: Bu retrospektif çalışmada, burun projeksiyonunun devamlılığı ve nazolabial açının düzenlenmesi için sıklıkla kullanılan dört sütür karşılaştırıldı.

Yöntemler: 2017-2022 yılları arasında Tebbetts tip rotasyon sütürü, kıkırdak dikmeli interdomal sütür, üçlü kıkırdak sütür- ve çukurda dil sütürü ile rinoplasti ameliyatı uygulanan, ameliyat sonrası bir yıllık dönemi tamamlamış toplam 400 hasta çalışmaya dahil edildi. 4 merkezde tip projeksiyonunun devamlılığı ve nazolabial açının düzenlenmesi için sıklıkla kullanılan 4 sütür karşılaştırıldı. Ameliyat öncesi ve ameliyattan 1 ay ve 1 yıl sonra çekilen yan fotoğraflar kullanılarak nazolabial açı ve tipin yüzden uzaklığı ölçüldü. Ameliyat öncesi ve ameliyat sonrası birinci ay arasında nazolabial açı değişimi ve postoperatif 1. ay-1. yıl değerlendirildi. Hasta ve cerrahın. ve rinoplastiden memnuniyeti için VAS değerlendirildi.

Bulgular: Tebbetts tip rotasyon sütürü, kıkırdak destekli interdomal sütür ve triple kıkırdak sütürlerinin nazolabial açı değişim değerleri preoperatif dönemden postoperatif 1. aya kadar Tongue-in-groove'a göre daha yüksekti. Ameliyat sonrası ilk dönemde (düzeltilmiş <0.0125). Hastalar açısından Grup 1'in rinoplasti sonuçlarından hasta memnuniyeti VAS skoru Grup 4'e göre anlamlı olarak yüksekti. Cerrahların görüşüne göre, Grup 1'in VAS skorunda rinoplasti sonuçlarından cerrah memnuniyeti, Grup 2 ve Grup 4'ün cerrah memnuniyetinden anlamlı olarak daha yüksekti (düzeltilmiş ±0.0125).

Sonuç: Ameliyattan 1 yıl sonra Tebbetts Tip rotasyon sütürü, kıkırdak payandalı domlar arası sütür ve üçlü kıkırdak sütürü ile tip projeksiyonunun devamlılığının sağlandığını göstermektedir.

Anahtar Sözcükler: Tip projeksiyonu, Tebbetts sütürü, kıkırdak destekli domlar arası sütür, üçlü kıkırdak sütürü

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Received: 18 August 2023, accepted for publication: 25 August 2023

Cite this article: Azizli E., Oğuz O., Bayar Muluk N. Dündar R., Cingi C., Comparison Of The Effectiveness Of Nasal Sutures For Ensuring The Continuity Of Nasal Projection And Maintaining Nasal Projection. KBB-Forum 2023;22(3):192-197

INTRODUCTION

One of the most prevalent causes of a long, droopy nose is a combination of under-rotation of the nasal tip and a narrow nasolabial angle. Several methods, including lateral crural steal, lateral crural overlay, tongue-in-groove, columellar strut graft, tip rotation sutures, and



cephalic trimming, have been described as effective in these patients for correcting droopy tips and achieving an excellent nasal tip rotation. When the medial and lateral crura are extremely short, sufficient projection cannot be obtained in all patients with severe tip ptosis and under projection. Adjunctive tip grafts, such as a cap or shield over the dome, may be necessary in this scenario¹.

Knowledge of normal anatomy concerning improper projection and angles is crucial for diagnosing nasal ptosis and identifying genuine reasons for the droopy tips. Normal nasal tip position and rotation are often determined using the nasolabial angle (NLA) and nasal projection (NP)^{2,3}. The nasolabial angle⁴ is measured from the subnasal bone to the vermilion border of the upper lip and from the subnasal bone to the most anterior point on the columella. Although there is no agreement on the appropriate degree of tip rotation, the angle between the upper edge of the nose and the upper lip should be between 100 and 110 degrees for women and 90 and 100 degrees for men^{4,5}. The droopy tip results from a degree of rotation less than optimal. The Goode ratio in lateral view is the gold standard for evaluating NP. This is the relationship between the nasion and the nasal tip, measured in millimeters, and the alar line and the most anterior point of the nasal tip, measured in millimeters. Nasal projection is deemed normal if this ratio falls between 0.50 and 0.65⁵.

This retrospective analysis examined four different sutures to maintain tip projection and set the nasolabial angle. Some options include the Tebbett's Tip rotation suture, interdomain suture with cartilage strut, Triple cartilage suture, and tongue-in-groove suture.

MATERIAL and METHODS

This retrospective and multicentric study is conducted in the Otolaryngology Departments of Kırıkkale University, Bilecik Şeyh Edebali University, and Eskişehir Osmangazi University; and the Private Office of Dr. Azizli and Dr. Oğuzhan Oğuz Wellnose Clinic according to the rules outlined in the Declaration of Helsinki. Ethics committee approval was taken from TR Bilecik Şeyh Edebali University, Noninvasive Clinical Research Ethics Committee Committee (Date: 07.02.2023,

Number: 2). There is no need to take informed consent because the data were evaluated retrospectively.

Subjects

A total of 400 patients who underwent rhinoplasty surgery with Tebbetts Tip rotation suture (Group 1, n=100), interdomal suture with cartilage strut (Group 2, n=100), Triple cartilage suture (Group 3, n=100) and tongue-in-groove suture (Group 4, n=100) between 2017 and 2022 and completed a one-year postoperative period were included in the study⁶. The patients were selected from the patients who applied to the Otolaryngology Departments of Eskişehir Osmangazi University, Bilecik Şeyh Edebali University, and Private Office of Dr. Azizli and Dr. Oğuzhan Oğuz Wellnose Clinic. In 4 centers, four sutures frequently used for continuity of tip projection and arrangement of nasolabial angle were compared.

Inclusion criteria:

At least 1-year follow-up since the initial rhinoplasty operation.

Exclusion criteria:

The study did not include patients who did not come for postoperative follow-up.

Methods:

The nasolabial angle and projection from the face were measured by using the lateral photographs taken before and one month, and one year after surgery. The images were assessed randomly, and the assessor was blinded to the procedure and the surgeon.

Evaluations were performed as the following:

1. Nasolabial angle change between the preoperative and postop first month
2. Nasolabial angle change between the postop first month and first year
3. VAS for patient satisfaction from rhinoplasty (1-10) (1 showing minimum and 10 showing maximum)
4. VAS for surgeon satisfaction from rhinoplasty (1-10) (1 showing minimum and 10 showing maximum)

Statistical Analysis

The data collected in this study were analyzed using the SPSS for Windows 16.0 software (SPSS, INC, an IBM Company, Chicago, Illinois). Kruskal Wallis Variance Analysis and Mann Whitney U test with



Bonferroni correction were used for pairwise comparisons.

A value of $p < 0.05$ was considered statistically significant.

A value of p adjusted < 0.0125 was considered statistically significant.

RESULTS

In this retrospective study, there were a total of 400 patients.

Four different tip sutures in rhinoplasty are shown in Table 1.

Nasolabial angle change between preoperative and postop first month:

For Tebbetts Tip rotation suture (Group 1), it was $10.55^{\circ} \pm 1.94^{\circ}$

For Interdomal suture with cartilage strut (Group 2), it was $9.73^{\circ} \pm 2.35^{\circ}$

For Triple cartilage suture (Group 3), it was $10.82^{\circ} \pm 2.26^{\circ}$

For the Tongue-in-groove technique (Group 4), it was $4.14^{\circ} \pm 1.55^{\circ}$

The difference between the four groups was found as statistically significant ($p < 0.05$). Pairwise comparisons showed that for the Tongue-in-groove technique (Group 4), nasolabial angle change was significantly lower than the other groups (Groups 1,2 and 3) adjusted < 0.0125 .

Nasolabial angle change between the postop first month and 1st year

For Tebbetts Tip rotation suture (Group 1), it was $3.32^{\circ} \pm 1.28^{\circ}$

For Interdomal suture with cartilage strut (Group 2), it was $4.10^{\circ} \pm 1.61^{\circ}$

For Triple cartilage suture (Group 3), it was $3.41^{\circ} \pm 1.54^{\circ}$

For the Tongue-in-groove technique (Group 4), it was $1.83^{\circ} \pm 0.84^{\circ}$

The difference between the four groups was statistically significant ($p < 0.05$). Pairwise comparisons showed that for the Tongue-in-groove technique (Group 4), nasolabial angle change was significantly lower than the other groups (Groups 1,2 and 3) adjusted < 0.0125 .

VAS patient (1-10)

For Tebbetts Tip rotation suture (Group 1), it was 8.70 ± 1.02

For Interdomal suture with cartilage strut (Group 2), it was 8.36 ± 1.05

For Triple cartilage suture (Group 3), it was 8.52 ± 1.12

For the Tongue-in-groove technique (Group 4), it was 7.94 ± 1.12

From the patients' view, satisfaction with the rhinoplasty results was evaluated by VAS. Group 1's patient satisfaction VAS score was significantly higher than Group 4's patient satisfaction (adjusted < 0.0125).

VAS of the surgeons (1-10)

For Tebbetts Tip rotation suture (Group 1), it was 8.64 ± 1.01

For Interdomal suture with cartilage strut (Group 2), it was 8.23 ± 1.03

For Triple cartilage suture (Group 3), it was 8.39 ± 1.10

For the Tongue-in-groove technique (Group 4), it was 8.27 ± 0.98

From the surgeons' view, satisfaction with the rhinoplasty results was evaluated by VAS. Group 1's surgeon satisfaction VAS score was significantly higher than Group 2 and Group 4's surgeon satisfaction (adjusted < 0.0125).



Table 1: Four different tip sutures in rhinoplasty

	Tebbetts Tip rotation suture (Group 1) (n=100)			Interdomal suture with cartilage strut (Group 2) (n=100)			Triple cartilage suture (Group 3) (n=100)			Tongue-in-groove technique (Group 4) (n=100)			P*	Pairwise comparisons P _{adjusted} **
	Mean	Median	Std.Dev.	Mean	Median	Std.Dev.	Mean	Median	Std.Dev.	Mean	Median	Std.Dev.		
Nasolabial angle change between preoperative and postop 1 st month	10.55	10.00	1.94	9.73	9.00	2.35	10.82	11.00	2.26	4.14	4.00	1.55	0.000	Groups 1-2>0.0125 Groups 1-3 > 0.0125 Groups 1-4 < 0.0125 Groups 2-3 < 0.0125 Groups 2-4 < 0.0125 Groups 3-4 < 0.0125
Nasolabial angle change between postop 1st month and 1 st year	3.32	3.00	1.28	4.10	4.00	1.61	3.41	3.00	1.54	1.83	2.00	0.84	0.000	Groups 1-2 < 0.0125 Groups 1-3 > 0.0125 Groups 1-4 < 0.0125 Groups 2-3 < 0.0125 Groups 2-4 < 0.0125 Groups 3-4 < 0.0125
VAS patient (1-10)	8.70	9.00	1.02	8.36	8.00	1.05	8.52	8.00	1.12	7.94	8.00	1.12	0.000	Groups 1-2>0.0125 Groups 1-3 > 0.0125 Groups 1-4 < 0.0125 Groups 2-3 >0.0125 Groups 2-4 >0.0125 Groups 3-4 < 0.0125
VAS surgeon (1-10)	8.64	9.00	1.01	8.23	8.00	1.03	8.39	8.00	1.10	8.27	8.00	0.98	0.030	Groups 1-2 < 0.0125 Groups 1-3 > 0.0125 Groups 1-4 < 0.0125 Groups 2-3 >0.0125 Groups 2-4 >0.0125 Groups 3-4 >0.0125

*p value shows the results of Kruskal Wallis Variance Analysis

**p_{adjusted} value shows the results of Mann Whitney U test with Bonferroni correction. p_{adjusted} <0.0125 is considered as statistically significant



DISCUSSION

One of the cosmetic rhinoplasty's most crucial aspects is managing nasal tip protrusion. When determining how far out the tip should be, the surgeon must consider not only the nasal dorsum but also the upper lip length, the facial plane, and the location of the chin^{7,8}. When the surgery is complete, the nasal tip is then positioned using the facial plane and the cartilaginous dorsum. Due to the intricate dynamics of the nasal tip, changes in nasal tip projection may have unintended consequences for the tip's rotation and length. Several suture procedures have been proposed to alter the tip cartilage's size, form, and placement. Tebbetts⁹ favored the phrase "projection control suture".

When conducting rhinoplasty, it is significantly more challenging to manage the frontal perspective and the three-dimensional tip contouring than to align the profile in two dimensions. This is why many people with rhinoplasty look odd or misshapen from the front¹⁰. To properly appreciate the nasal deformity and its repair, one must have a thorough knowledge of the nasal anatomy in all three dimensions¹¹.

This retrospective analysis examined four different sutures to maintain tip projection and set the nasolabial angle. Group 1 includes the Tebbetts Tip rotation suture, Group 2 includes the internal suture with cartilage strut, Group 3 includes the Triple cartilage suture, and Group 4 includes the tongue-in-groove suture. Tongue-in-groove approach (Group 4) had the slightest change in nasolabial angle between the preoperative and postoperative first month compared to Group 1, Group 2, and Group 3. Between the preoperative and postoperative first month, the nasolabial angle change values for Tebbetts Tip rotation suture (10.550 1.94), interdomal suture with cartilage strut (9.73 2.35), and triple cartilage suture (10.82 2.26) were all greater than those for Tongue-in-groove. This demonstrates that the sutures still allowed for average tip projection after one month.

Tongue-in-groove approach (Group 4) had considerably less nasolabial angle shift than Groups 1, 2, and 3 between the first postoperative month and the first year. In other

words, the nasolabial angle change values for Tebbetts Tip rotation suture (3.32 1.28°), Interdomal suture with cartilage strut (4.10 1.61°), and Triple cartilage suture (3.41 1.54°) were all greater than those for Tongue-in-groove (1.83 0.84°) between postoperative months 1 and 12. This evidence demonstrates that these sutures maintained tip projection continuity during the first year.

Patients in Group 1 reported considerably better levels of satisfaction with their rhinoplasty outcomes than those in Group 4. The VAS score for surgeon satisfaction with the results of the rhinoplasty procedures performed on patients in Group 1 was substantially more significant than that of Group 2 and Group 4.

Major surgical procedures for tip refinement in rhinoplasty include resection, transection, moralization, scoring, suturing, and grafting. All four methods weaken the nasal tip's support framework, most noticeably the lower lateral cartilage resistance. The nasal tip's weakened structure is vulnerable to wound contracture and other problems following surgery. Using the abovementioned methods permanently compromises the nasal tip's structural integrity⁷.

The protrusion of the nasal tip must be restored throughout the suturing and grafting process. Several methods of nose tip contouring and placement using sutures are described. In most cases, suturing procedures maintain and strengthen the intrinsic tip support mechanisms. Transdermal and internal sutures accomplish the projection, constriction, and unification of the tip⁷.

The medial, middle, and lateral crura are shaped and united by transdermal and internal sutures and a columellar strut graft. The transdermal sutures that curve them inward make the lateral crura more convex and more prominent. The transdomal suture can be modified into a lateral crural steal suture to increase projection and rotation at the tip⁷.

The medial crural cartilage and the septal cartilage are brought together using the triple cartilage combining suture (TCCS) approach developed by Cingi and Songu¹². Their method allows for fine-tuned control over the rotation



and projection of the nasal tip while minimizing the columella's unnecessary exposure. Most patients (84 of 96) were delighted with the appearance and symmetry of their nose, according to the study of patients followed for more than one year. There were 84 patients, 48 being "very satisfied" and 36 reporting "complete satisfaction" with the outcome. Two patients who needed additional surgery were satisfied to a varying degree. They determined that the critical distinction between their procedure and the "tongue-in-groove" technique in septorhinoplasty is the figure eight-shaped suture, which prevents the nose from becoming overly stiff.

Suturing the nasal tip eliminates the need for grafts and improves both short- and long-term clinical results^{6,13}. Suture tightening, intrinsic stresses on the cartilages, cartilage thickness, and the degree of soft-tissue undermining all play a role in the clinical effects of sutures. The nasal tip complex is one of the most complicated parts of the nose, responding visibly but subtly to adjustments made to the lower lateral cartilages¹⁴.

One of the trickiest aspects of rhinoplasty is maintaining the desired form and position of the nasal tip. As an adequate substitute for tip plastics, suturing procedures have been developed. Noninvasive procedures involving nasal tip sutures have been in use for some time⁶.

In conclusion, the nasolabial angle change values for Tebbetts Tip rotation suture, interdomain suture with cartilage strut, and triple cartilage suture were all greater than those for Tongue-in-groove at both the pre-and postoperative periods. It demonstrates that these sutures kept the protrusion of the tips consistent.

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