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The Long-Term Results Of Suture And Graft Techniques Used To Increase Tip Projection and Rotation In Open Technique Septorhinoplasty

Sermin Can[1], Tuba Bayındır[2], Tamer Erdem[3], Serdar Ferit Toprak[4]

1 Dicle University Faculty of Medicine, Otorhinolaryngology and Head and Neck Surgery Clinic, Diyarbakır, Turkey

2 İnönü University Faculty of Medicine, Otorhinolaryngology and Head and Neck Surgery Clinic, Malatya, Turkey

3 Acıbadem University Faculty of Medicine, Otorhinolaryngology and Head and Neck Surgery Clinic, Istanbul, Turkey

4 Artuklu University Faculty of Medicine, Otorhinolaryngology and Head and Neck Surgery Clinic, Mardin, Turkey

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Abstract

Background: In this study, we aimed to evaluate the long-term results of suture and graft techniques used to increase tip projection and rotation in Open Technique Septorhinoplasty.

Methods: In this study, the data of 89 patients who underwent Open Technique Septorhinoplasty were analysed retrospectively. The patients were divided into groups 1,2,3,4 and 5 according to the suture and graft techniques used. Preoperative and postoperative photographs of all patients included in the study at the 1st, 3rd, 6th, 12th, 36th and 60th months were analyzed. To measure and compare these techniques, tip projection and rotation losses were measured on all photographs using a computer program called Imagej.

Results: A statistically significant increase was found between the preoperative mean Nasolabial Angle (NLA), Type Angle (TA), Byrd–Hobar Method (BHM) and Nasofacial Angle (NFsA) measurement values and the measurement values at 36th months postoperatively in Groups 1 and 4 ($p < 0.05$). In Group 2, a statistically significant increase was found between preoperative mean NLA, TA and BHM measurement values and postoperative 36th month measurement values ($p < 0.05$). In group 1 only, there was a statistically significant difference between the preoperative mean TA, BHM, Simons Method (SM), Goode Method (GM) and Powell-Modified Baum Method (PMBM) measurement values and the postoperative measurement values at 60th months ($p < 0.05$).

Conclusions: Our results showed that suture techniques were more effective on projection and rotation than graft techniques in the long term.

Keywords: Septorhinoplasty, greft technique, suture technique, nasal tip rotation, nasal tip projection

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***Correspondence / Yazışma Adresi*:** Sermin Can, Department of Otorhinolaryngology and Head and Neck Surgery, Dicle University Faculty of Medicine Diyarbakır 21010, Turkey e-mail: sermin.can@homail.com

Açık Teknik Septorinoplastide Tip Rotasyon ve Projeksiyonunu arttırmak için kullanılan Sütür ve Greft Tekniklerinin Uzun Dönem Sonuçları

Öz

Amaç: Bu çalışmada, Açık Teknik Septorinoplastide tip projeksiyonunu ve rotasyonunu artırmak için kullanılan sütür ve greft tekniklerinin uzun dönem sonuçlarını değerlendirmeyi amaçladık.

Yöntemler: Bu çalışmada Açık Teknik Septorinoplasti uygulanan 89 hastanın verileri retrospektif olarak incelendi. Hastalar kullanılan sütür ve greft tekniklerine göre 1,2,3,4 ve 5. gruplara ayrıldı. Çalışmaya alınan tüm hastaların ameliyat öncesi ve sonrası 1., 3., 6., 12., 36. ve 60. aylardaki fotoğrafları incelendi. Bu teknikleri ölçmek ve karşılaştırmak için, Imagej adlı bir bilgisayar programı kullanılarak tüm fotoğraflarda tip projeksiyon ve rotasyon kayıpları ölçüldü.

Bulgular: Grup 1 ve Grup 4 'de preoperative ortalama Nazolabial Açı (NLA), Tip Açı (TA), ByrdHobar Metodu (BHM) ve Nazofasiyal Açı (NFsA) ölçüm değerleri ile postoperative 36. aydaki ölçüm değerleri arasında istatistiksel olarak anlamlı artış saptandı ($p < 0.05$). Grup 2'de preoperative ortalama NLA, TA ve BHM ölçüm değerleri ile postoperative 36. ay ölçüm değerleri arasında istatistiksel olarak anlamlı artış bulundu ($p < 0.05$). Sadece grup 1'de preoperative ortalama TA, BHM, Simons Metodu (SM), Goode Metodu (GM) ve Powell-ModifiedBaum Metodu (PMBM) ölçüm değerleri ile postoperative 60. aydaki ölçüm değerleri arasında istatistiksel olarak anlamlı fark saptandı ($p < 0.05$).

Sonuç: Bu çalışmamız sonuç olarak uzun dönemde sütür tekniklerinin projeksiyon ve rotasyon üzerinde greft tekniklerine göre daha etkili olduğunu göstermiştir.

Anahtar kelimeler: Septorinoplasti, greft tekniği, sütür tekniği, nazal tip rojeksiyon, nazal tip rotasyon.

INTRODUCTION

The nose, which is our respiratory system organ. The nose is also an important organ in terms of facial expression and aesthetics. It is frequently subjected to surgical correction to achieve both functional and aesthetic goals. The ideal nose shape in Open Technique Septorhinoplasty (OTS) is one that is bilaterally symmetrical with proper rotation and projection[1] because nasal projection and rotation are the most interesting elements of the nose[2]. Especially given the structural nose features observed in Turkey, it is generally considered necessary to increase projection and rotation. However, in postoperative follow-up of patients, it has been observed that it is not possible to create a nose without loss of projection and rotation, and this result has forced surgeons to constantly develop new techniques in this area. In this study, we evaluated the long-term effects of suture and graft techniques used to increase nasal tip projection and rotation in OTS surgery.

METHODS

In this study, the data of 89 patients who underwent OTS surgery due to aesthetic and functional problems were reviewed retrospectively. Ethics committee approval was obtained from İnönü University on 2014/04. All of the patients underwent primary surgery, and revision cases were not included in the study. All of the patients were operated on and followed up by the same surgeon. PDS sutures were used in all patients. The patients were divided into five groups according to the techniques used in the surgery. Transdomal sutures were used for patients in group 1 (n = 42) (Figure 1. Transdomal suture), projection control sutures were used for patients in group 2 (n = 10) (Figure 2. Projection control suture), lateral crural steal sutures were used for patients in group 3 (n = 13), an onlay graft was used for patients in group 4 (n = 14) (Figure 3. Onlay graft) and a shield graft was used for patients in group 5 (n = 10) (Figure 4. Shield graft). In groups 2,4 and 5, in addition to these techniques dome binding suture were used. Photographs of all the patients included in the study taken by the same surgeon preoperatively and postoperatively at 1, 3, 6, 12, 36, and 60 months were examined. To measure and compare tip projection and rotation losses, nasolabial angle, tip angle, nasofrontal angle, nasofacial angle, Byrd-

Hobar ratio, Simons ratio, Goode ratio, Crumley-Lancer ratio, and Powell-modified Baum ratio were measured on all photographs using a computer program called Imagej (2013 by John Wiley & Sons). With this program, length measurements and angle measurements were made on the photographs taken from the right lateral of the patients.

Figure 1. Transdomal suture.

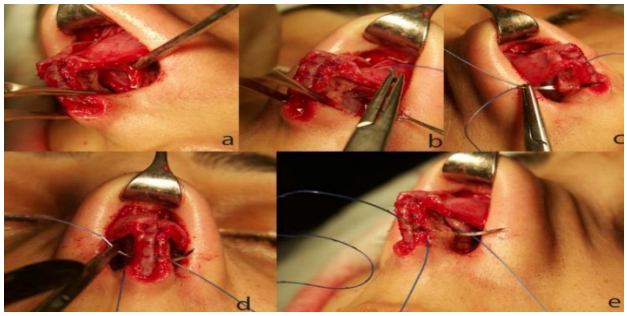

Figure 2. Projection control suture.

Figure 3. Onlay graft.

Figure 4. Shield graft.

Statistical Analysis

SPSS 2013 for Windows version 17.0 was used to statistically evaluate the research data. Data on the quantitative variables were defined as arithmetic mean (x) ± SD (standard deviation). The Shapiro–Wilk normality test was used to examine whether the data showed normal distribution. The paired t-test and the Wilcoxon signed rank test were used to analyse within-group variation, and the Kruskal–Wallis analysis of variance and Mann–Whitney U test were used for comparison between groups. A value of $p < 0.05$ was considered statistically significant.

RESULTS

Nasolabial Angle Measurement (NLA)

In all groups, a statistically significant increase was found between the preoperative mean NLA measurement values and the measurement values postoperatively at 1, 3, 6 and 12 months ($p < 0.05$). A statistically significant increase was found between the preoperative mean NLA measurement values and the measurement values postoperatively at 36 th month in Groups 1,2 and 4 ($p < 0.05$). The evaluation at the postoperative 60th month did not include group 4 because there was only one patient in this group, while no statistically significant difference was found between the preoperative NLA mean measurement value and the postoperative 60th month measurement values for the patients in groups 1, 2, 3 and 5 ($p > 0.05$).

Type Angle Measurement (TA)

A statistically significant increase was found between the preoperative mean TA measurement values and the measurement values postoperatively at 1, 3, 6 and 12 months in all groups ($p < 0.05$). A statistically significant increase was found between the preoperative mean TA measurement values and the measurement values postoperatively at 36 th month in Groups 1,2 and 4 ($p < 0.05$). In Groups 2, 3, 4 and 5, there was no statistically significant difference between the preoperative TA measurement values and the postoperative 60th

month measurement values ($p > 0.05$). In Group 1 only, a statistically significant difference was found between the preoperative mean measurement values and the postoperative 60th month measurement values ($p < 0.05$).

Nasofrontal Angle Measurement (NFrA)

In all groups, no statistically significant increase was observed between the preoperative mean NFrA measurement values and the measurement values taken postoperatively at 1, 3, 6, 12, 36 and 60 months ($p > 0.05$).

Nasofacial Angle Measurement (NFsA)

A statistically significant increase was found between the preoperative mean NFsA measurement values and the measurement values postoperatively at 1, 3, 6 and 12 months in Groups 1 and 2 ($p < 0.05$). A statistically significant increase was found between the preoperative mean NFsA measurement values and the measurement values postoperatively at 36 th month in Groups 1 and 4 ($p < 0.05$). There was no statistically significant difference between the preoperative mean measurement values and the measurement values at 60 th month postoperatively in groups 1, 2, 3 and 5 ($p > 0.05$).

Byrd–Hobar Method (BHM)

In Groups 1,2,3 and 4, a statistically significant increase was found between the mean BHM measurement value preoperatively and the measurement values postoperatively at 1, 3, 6 and 12 months ($p < 0.05$). A statistically significant increase was found between the preoperative mean measurement values and the measurement values at 36 th months postoperatively in Group 1,2 and 4 ($p < 0.05$).

A statistically significant increase was found between the preoperative mean measurement value and the measurement value at 60 th months postoperatively in Group 1 ($p < 0.05$).

Simons Method (SM)

A statistically significant decrease was found between the preoperative mean SM measurement values and the measurement values postoperatively at 1, 3, 6 and 12 months in Groups 1, 2 and 3 ($p < 0.05$). In Group 1 only, a statistically significant decrease was found between the preoperative mean measurement values and the postoperative 36th month measurement values ($p < 0.05$). In all groups, there was no statistically significant difference between the preoperative mean measurement values and the postoperative measurement values at 60th months ($p > 0.05$).

Goode Method (GM)

A statistically significant increase was found between the preoperative mean GM measurement values and the measurement values at 1, 3, 6 and 12 months postoperatively in Groups 1 and 2 ($p < 0.05$). In group 1 only, there was a statistically significant increase between the preoperative mean measurement values and the postoperative measurement values at 36 and 60 months ($p < 0.05$).

Crumley–Lancer Method (CLM)

In Group 2, a statistically significant increase was found between the preoperative mean CLM measurement values and the postoperative measurement values at 1, 3, 6 and 12 months ($p < 0.05$). In all groups, there was no statistically significant difference between the preoperative mean measurement values and the postoperative measurement values at 36 and 60months ($p > 0.05$).

Powell-Modified Baum Method (PMBM)

In groups 1, 3 and 4, there was a statistically significant decrease between the preoperative mean PMBM measurement values and the

postoperative measurement values at 1, 3, 6 and 12 months ($p < 0.05$). In group 1 only, there was a statistically significant decrease between the preoperative mean measurement values and the postoperative measurement values at 60th months ($p < 0.05$).

12^{th} month measurements of Nasolabial Angle, Tıp Angle, Nasofrontal Angle, Nasofacial Angle, Bryd- Hobar Ratio, Simons Ratio, Goode Ratio, Crumley-Lancer Ratio, Powell-Modified Baum Ratio (Table 1).

Table I: Preoperative and postoperative 12th month measurement comparison

	Group 1	Group 2	Group 3	Group 4	Group 5
NasolabialAngle	**105,59±5,17***	**109,07±12,27***	**107,67±10,39***	**105,52± 5,34***	**104,05± 8,19***
Tip Angle	**105,57±5,40***	**104,96±2,94***	**107,95±4,16***	**104,19± 2,68***	**104,91± 5,92***
NasofrontalAngle	136,76± 12,03	141,13±7,52	141,49±6,78	137,36± 9,03	142,47± 5,05
NasofacialAngle	**31,00 ± 4,11***	**29,50 ± 4,26***	31,40 ± 3,24	31,50 ± 2,92	30,52 ± 2,65
Byrd-HobarRatio	**0,68 ± 0,06***	**0,67 ± 0,03***	**0,66 ± 0,05***	**0,69 ± 0,03***	0,69 ± 0,05
Simonsratio	**0,69 ± 0,10***	**0,71 ± 0,15***	**0,65± 0,19***	0,63± 0,18	0,63± 0,09
Gooderatio	**0,63 ± 0,06***	**0,61 ± 0,05***	0,61± 0,04	0,66± 0,03	0,61± 0,02
Crumley-Lancerratio	0,2982 ± 0,03	**0,2967± 0,01***	0,2987± 0,01	0,3068±0,006	0,3087± 0,03
Powell-modifiedBaumratio	**2,73 ± 0,25***	2,82 ± 0,11	**2,78 ± 0,20***	**2,62 ±0,14***	2,66 ± 0,26

**, p<0,05*

36th month measurements of Nasolabial Angle, Tıp Angle, Nasofrontal Angle, Nasofacial Angle, Byrd-Hobar Ratio, Simons Ratio, Goode Ratio, Crumley-Lancer Ratio, Powell-Modified Baum Ratio (Table 2).

Table II: Preoperative and postoperative 36th month measurement comparison

	Group 1	Group 2	Group 3	Group 4	Group 5
NasolabialAngle					
Tip Angle	**106,13±3,60***	**105,53±5,13***	105,91±2,86	**102,86±5,95***	105,63±3,06
NasofrontalAngle	140,30 ± 9,20	142,39±11,23	137,18±5,05	133,45± 7,26	140,64± 0,70
NasofacialAngle	**30,74 ± 3,95***	31,05 ± 5,45	31,46 ± 4,91	**31,13 ± 3,02***	29,62 ± 1,61
Byrd-HobarRatio	**0,68 ± 0,06***	**0,68 ± 0,02***	0,71 ± 0,04	**0,70 ± 0,05***	0,69 ± 0,04
Simonsratio	**0,67 ± 0,09***	0,69 ± 0,09	0,62± 0,07	0,65± 0,15	0,60± 0,07
Gooderatio	**0,64 ±0,06***	0,62 ±0,02	0,64± 0,03	0,67± 0,03	0,61± 0,01
Crumley-Lancerratio	0,2860±0,02	0,3005±0,04	0,2949±0,02	0,3140±0,02	0,2919±0,01
Powell-modifiedBaumratio	2,80 ±0,27	2,71 ± 0,22	2,65 ± 0,21	2,65 ± 0,19	2,75 ± 0,07

**, p<0,05*

60th month measurements of Nasolabial Angle, Tıp Angle, Nasofrontal Angle, Nasofacial Angle, Byrd-Hobar Ratio, Simons Ratio, Goode Ratio, Crumley- Lancer Ratio, Powell-Modified Baum Ratio (Table 3).

Table III: Preoperative and postoperative 60th month measurement comparison

	Group 1	Group 2	Group 3	Group 4	Group 5
NasolabialAngle	107,93±7,66	110,69±15,27	106,88±5,97	-	97,07± 0,17
Tip Angle	**103,99±5,26***	105,26±5,51	106,04±3,39	-	105,65± 4,26
NasofrontalAngle	141,49 ± 6,61	150,11±0,68	137,38±8,40	-	133,62± 12,9
NasofacialAngle	30,02 ± 2,68	28,60 ± 4,33	29,63 ± 3,18	-	33,91 ±0 ,79
Byrd-HobarRatio	**0,70 ± 0,04***	0,64 ± 0,01	0,70 ± 0,01	-	0,70 ±0,04
Simonsratio	0,58 ± 0,11	0,70 ± 0,13	0,62± 0,05	-	0,60±0,08
Gooderatio	**0,64 ± 0,03***	0,54 ± 0,06	0,65± 0,01	-	0,70±0,09
Crumley-Lancerratio	0,3138± 0,02	0,2707±0,03	0,2938±0,02	-	0,3307±0,02
Powell-modifiedBaumratio	**2,63 ± 0,18***	3,16 ± 0,38	2,79 ± 0,09	-	2,49 ±0,16

**, p < 0,05*

DISCUSSION

Tip surgery in OTS is very difficult and controversial due to its complex three-dimensional structure. Various suture and graft techniques are used to increase tip projection and rotation. In this study, we evaluated the long-term results of suture and graft techniques in OTS surgery. While it was determined that nasal tip projection and rotation loss were less at 12 months postoperatively in patients who underwent transdomal suture, projection control suture and lateral crural steal suture techniques as well as patients who underwent onlay graft, it was determined that, at 12 months postoperatively, nasal tip projection and rotation loss were higher in patients who underwent shield graft. In addition, in the evaluation madepostoperatively at 36 months, it was observed that transdomal sutures and projection control sutures as well as onlay graft effectively increased tip projection and rotation. Moreover, in the evaluation conducted 60 months postoperatively, it was determined that, among all the techniques, only the transdomal sutures effectively increased nasal tip projection and rotation.

In a study that measured the effectiveness of transdomal matress suture, lateral crural steal suture and transdomal suture techniques on tip projection and tip rotation in nasal surgery, it was reported that suture techniques had a controlled effect in 70% of the cases. In addition, the authors found that transdomal sutures were easy to apply and effective in increasing nasal tip projection and rotation[3]. Another study evaluated the effectiveness of medial crural suture, bilateral transdomal suture and interdomal suture techniques and found that their effects on tip projection and type symmetry were greater than that of other surgery techniques[4]. In our study, it was observed that transdomal suture was an effective method to increase nasal tip projection and rotation even at the postoperative 60th month.

A study of patients who underwent projection control suture in OTS and were followed up for 26 months found that the projection control suture technique was a reliable in the early period as well as in the late period in cases with low projection[1]. Similarly, in our study, projection control suture was found to be an effective technique in both early and late periods in cases with low rotation. In addition, in a study in which four suture algorithms— transdomal, interdomal, lateral

cruralmatress suture and projection control suture—were applied, when the lateral, frontal and basal photographs of the patients were examined, a significant improvement was observed in tip bullousness and tip projection[5]. We think that transdomal suture, projection control suture and lateral crural steal suture techniques are equally effective in increasing tip projection and rotation in the early postoperative period, while transdomal and projection control suture techniques are more effective in the late period. Several studies have reported that the use of onlay cartilage grafts is effective in nasal tip projection in the long term[6,7]. Similarly, we found in our study that onlay grafts were effective on tip projection and rotation in the long-term postoperatively. Another study evaluated the effects of tip binding sutures and cartilage grafts on tip rotation and projection; in this study, tip binding sutures were used with the closed technique delivery method in one group, while transdomal suture, columellar support graft and shield graft were used in the other group using the open technique. The study detected an increase in tip projection and a decrease in nasal length in both groups, but it was determined that the elongation in the columella and tip projection were more pronounced in the group using the open technique shield graft compared to the group using the closed technique and sutures[8]. On the contrary, we found that the loss of projection and rotation in the long-term postoperatively was higher in the patient group using shield grafts compared to the groups using suture techniques.

Some studies have advocated the use of graft techniques when suture techniques are not sufficient to increase tip rotation and projection[9]. On the contrary, our results showed that suture techniques were more effective on projection and rotation than graft techniques in the long term. Altınel et al. reported that suture techniques were effective to increase tip rotation in the long term, but not as effective as columellar strut in increasing projection in the long term[10]. However, we think that suture techniques are effective on both rotation and projection in the long term.

According to these results, we think that our study's use of large parameters to measure tip projection and rotation makes a unique contribution to the literature. However, future studies are needed with longer patient follow-ups and larger case series.

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