

THE ROLE OF SEPTOCOLUMELLAR SUTURE IN TIP PLASTY IN PRIMARY OPEN RHINOPLASTY



Hiwa Asaad Abdulkareem ^a

Submitted: 25/9/2022; Accepted: 7/2/2023; Published: 21/12/2023

ABSTRACT

Background

Proper nasal tip control is a difficult step in rhinoplasty, and maintaining a proper nasal tip projection and rotation is mandatory in rhinoplasty, septocolumellar suture is a single maneuver that is useful for getting a stable nasal tip with the desired projection and rotation.

Objective

To evaluate the effect of septocolumellar suture on the degree of nasal tip projection and rotation by comparing the pre and postoperative results.

Patient and Methods

A prospective, descriptive study was conducted in the period from Jan 2019 –to Dec 2019 on 50 patients with ages ranging (18- 44), underwent primary open rhinoplasty in (ENT, Head and Neck Surgery Sulaimani Teaching Center) and (Zhyan Private Hospital), follow-up was done three and six months postoperatively, the nasal tip projection and rotation were assessed, and were compared with the preoperative data and analyzed statistically using SPSS version 22.

Results

Among included patients, all underwent an open rhinoplasty with septocolumellar suture, 72 % of them are female and 28% of them are male, with the age range of (18-44), the Goode's ratio increased to 52% and decreased in 48%, and The nasolabial angle increased from 89.33 to 98.94, so the nasal tip rotation increased.

Conclusions

The septocolumellar suture technique is a useful manoeuvre to decrease and increase the nasal tip projection to a limited range and increase nasal tip rotation, so it is a useful way to achieve these two changes with a single manoeuvre.

Keywords: *Septocolumellar suture, Objective evaluation, Tip projection, Tip rotation.*

^a College of Medicine, University of Sulaimani, Kurdistan Region, Iraq.

Correspondence: hiwa.abdulkareem@univsul.edu.iq

INTRODUCTION

The term Rhinoplasty means “nose moulding”, it refers to a procedure in Plastic Surgery in which the structure of the nose is changed, the change can be made by adding or removing bone or cartilage, grafting tissue from another part of the body, or implanting synthetic material to alter the shape of the nose ⁽¹⁾.

A beautiful and appealing nose receives the greatest contribution from the nasal tip subunit, and in rhinoplasty, it should be regarded as the primary center of attention during the procedure. For getting the desired position and shape of the nasal tip during open rhinoplasty, the septocolumellar suture functions as the major determinant together with the caudal part of the septal cartilage, which has a significant influence on the versatility of the septocolumellar suture ⁽²⁾.

Anatomy

Tip rhinoplasty is one of the most challenging aesthetic operations. So, the surgeon should know everything about the anatomy of the surgical area. Assessing the external nose requires an understanding of the anatomical components that contribute to its normal topographical features ⁽³⁾.

Anatomically, the nasal tip and nasolabial angle are formed from the lower lateral cartilages and caudal part of the nasal septum with muscles and fascial layers overlying by the skin.

Digital photograph analysis

Standardized photography should be obtained for all patients preoperatively. The photographic analysis is a key component of the secondary examination. Subtle asymmetries and deformities are more easily identified in quality photographs and with simultaneous evaluation of the deformity in multiple views.

Photographs also provide a significant contribution to the medical record by documenting the preoperative and postoperative status of the patient, for medicolegal purposes. Good-quality photographs depend on proper positioning, cameras, lenses, and flashes ⁽⁴⁾.

For rhinoplasty patients, it is important to use a lens that provides the least amount of distortion with the greatest depth of field to ensure that the whole face is in focus. Lenses recommended for rhinoplasty are known as portrait lenses. They are in the range of 90 to 105 mm in focal length and prevent barrel distortion that

often occurs with shorter focal lenses.

Both traditional films and digital photographs are acceptable, although digital formats allow for easy storage and retrieval and eliminate the expense of film and development ⁽⁵⁾.

The following standardized views are obtained and analyzed in all patients:

- Anterior (frontal); True lateral (right and left); Oblique (right and left); Basal (high and low); and Superior view.

Routinely the following views are taken:

- Anterior (frontal); True lateral (right and left); and Basal.

Facial disproportions should be pointed out to the patient to demonstrate that some asymmetries may not be corrected by the surgery or that additional procedures (for example, orthognathic surgery/genioplasty) may be necessary to accomplish the patient's goals ⁽⁶⁾.

Aesthetics and facial proportion

This facial analysis helps the surgeon anticipate the structural deformities and gives an idea to arrange a preoperative plan to reach the patient's desired results. Before analyzing the nasal deformity and planning the operative procedure, it is necessary to see the face as a whole. Changing the proportions and angles of the nose interferes directly with the other aesthetic parts. Therefore, knowledge of facial proportions is essential for every rhinoplastic surgeon.

Lateral (Profile) View

The lateral (profile) view is an important view for evaluating the relationship between the columella and nasal ala it's important for the evaluation of projection and rotation of the nasal tip. Powell and Humphreys have come up with a new concept: the aesthetic triangle to analyze facial proportions. In the lateral view, this aesthetic triangle relates the major aesthetic components of the face by soft tissue angles and lines as shown in Figure (1) the normal ranges for the various angles are:

- Nasofrontal (NFr) 115–130 degrees.
- Nasofacial (NFa) 30–40 degrees.
- Nasomental (NM) 120–132 degrees.

The Role of Septocolumellar Suture in Tip Plasty in Primary Open Rhinoplasty

- Mentocervical (MC) 80–95 degrees.
- Nasolabial (NL) 90-95 degrees in males and 95-110 degrees in females.

The nasolabial angle was measured by the angle between the junction of a line from the labral superior to the sub nasale and a line from the sub nasale to the most anterior point of the columella

The normal range measures 95 to 110 degrees in women and 90 to 95 degrees in men ⁽⁷⁾. As shown in the Figure (2).

Goode's ratio was measured by a vertical line drawn from the nasion to the alar groove, a perpendicular line from the alar groove to the nasal tip, and a line from the tip back to the nasion. The ratio comparing the length of the perpendicular line (alar groove to tip) with that of the nasal length (nasion to tip) should be 0.55 to 0.60. ⁽³⁾ As shown in the Figure (3).

Septocolumellar suture

The other name is the medial septocrural suture, also known as the projection control suture is one of the tip-supporting sutures used in rhinoplasty ⁽⁴⁾.

The septocolumellar suture is a technique that allows the surgeon to adjust tip rotation and projection. It can be placed both in open and closed approaches. Either single or two-level SCL can be used. Some surgeon uses triple suture. All of them are loop sutures suspending the medial crura to the caudal septum. The first suture is the key suture which creates the desired rotation and projection. This suture passes approximately from the mid-level of the height of both medial crura and

then from the desired height of the caudal septum. The second suture is used to secure the first suture and to prevent weakening. This suture was placed just like the first suture but all bites (from both the medial crura and the caudal septum) were placed 2 mm below the first suture ⁽³⁾.

Septocollumellar Suture Unites both medial crura of the lower lateral cartilage with the caudal septum and fixes them together, thus providing considerable tip support, according to the penetration level of these 3 cartilages, the following targets are achieved:

Increasing the tip projection; Decreasing the tip projection; Rotation of the tip and Stabilization of the tip.

Increasing the Tip Projection: The suture is passed through both medial crural cartilages at the mid-columellar level, and then it is passed through the caudal septum in a manner above the level of the medial crural penetration.

Decreasing the Tip Projection: The level of septal penetration of the suture must be below the medial crural penetration point to decrease the tip projection. The effect can be accentuated by penetrating the suture at the more superior portions of the medial crura to the more inferior portions of the caudal septum.

Rotation of the Tip: The loop must be passed through the uppermost portion of the medial crura (or middle crura) and the dorsal septum near the septal angle. Then the suture is tightened gradually until the desired tip rotation is obtained ⁽⁴⁾.

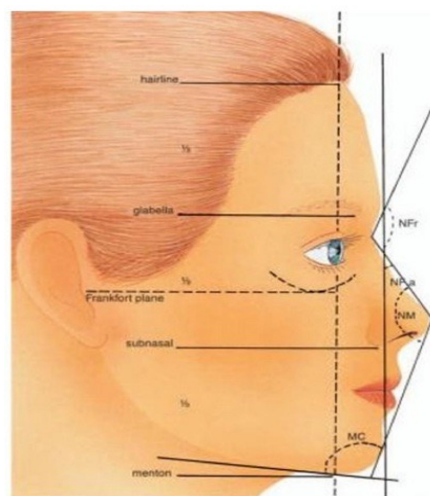


Figure 1. Shows a Lateral view of the face with the horizontal Frankfort plane, divided into three equal aesthetic proportions. Soft tissue angles and lines relate to the major aesthetic.

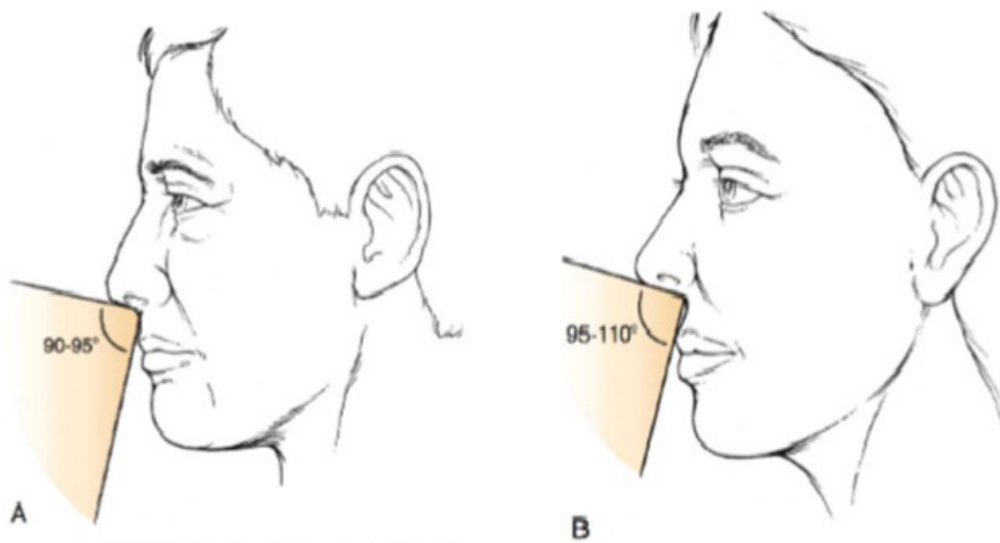


Figure 2. Nasolabial angle. A Male, 90 to 95 degrees. B, Female, 95 to 110 degrees.

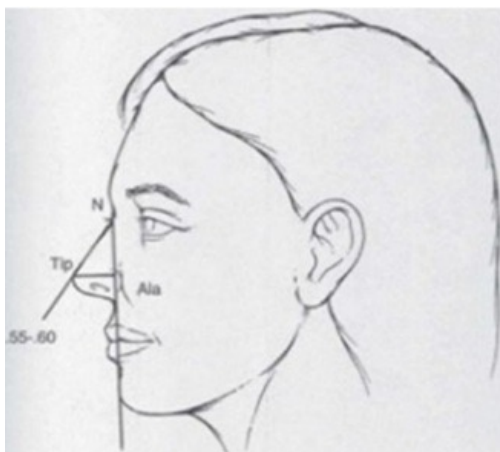


Figure 3 Goode's method of plotting tip projection. N, nasion.

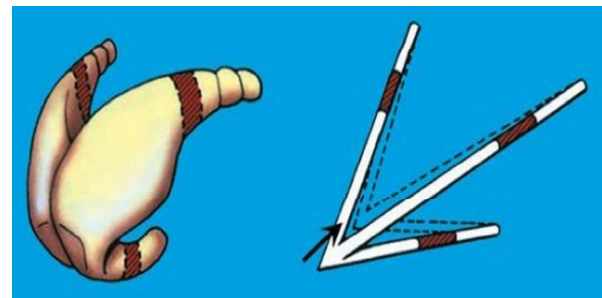


Figure 4. Shortening of all three tripod legs will result in decreased projection, with minimal influence on tip rotation⁽⁸⁾.

PATIENT AND METHOD

Study Design and Setting

A prospective, descriptive study was conducted on 50 patients who underwent primary open rhinoplasty in (ENT, Head and Neck Surgery-Sulaimani Teaching Center) and (Zhyan Private Hospital) from Jan 2019 – Dec 2019.

The study was conducted on 50 patients (34 females and 16 males) aged between 18-44 years. Preoperative consent for the operation was taken. Pre-operative

photographs were taken for each patient (5 different views) frontal, basal, lateral, right, left, and oblique (right and left). During the follow-up period same photographic views were taken for each patient after 3- and 6 months postoperatively).

The lateral view was used to calculate the parameters used in the measurement of the nasal tip projection and rotation, these images were analyzed using image dimensions calculating software (Image J v. 1.50i), and comparison was done with the postoperative values.

The Role of Septocolumellar Suture in Tip Plasty in Primary Open Rhinoplasty

The patients sit at a constant distance (about 1 meter) from the camera, the head in a natural position, A Lateral view (Profile view) was taken, to the determination of the important points used in the calculation like (Glabella, Nasion, the nasal tip, the alar point, Pogonion, the columellar point, the sub nasale, labralesuperius) was done then evaluation of the following four parameters for the calculation of the nasal tip rotation and projection as shown in the Figure 5.

Tip projection was calculated using Goode's method, which measured by drawing a vertical line from the nasion to the alar groove, and finding the ratio of (the length of a perpendicular line from the alar groove to the nasal tip) to (the length of a line between the tip and the nasion) .as shown in the Figure (6).

The nasolabial angle was measured by the angle between the junction of a line from the labralesuperius to the subnasal and a line from the subnasal to the most anterior point of the columella. As shown in the Figure (7).

Then descriptive statistics were calculated (Range, mean & standard deviation), and charts & and graphs were used to visualize the data. After that, the analytic statistics were applied using paired t-tests at a level of significance of <0.05 .

Inclusion Criteria:

All patients who underwent primary open rhinoplasty, with the use of septocolumellar suture technique for the alteration of the tip projection and rotation as a part of tip plasty, were included in the study.

Exclusion Criteria

Revision rhinoplasty, congenital anomalies (like micrognathia) , and severe degree of facial asymmetry.

Ethical Considerations

Inform consent that had been taken from the patients and was written in the ethical paper with privacy.

Surgical steps

Two Septocolumellar suture was used to support and fix the columella to the caudal part of the septum. In the case of a deprojected nose, we sutured the midpoint of the lower crura to a higher level of the caudal septum, and in the case of over projected nose, we sutured the midpoint of the lower crura to a lower level of the caudal septum. The 2nd suture (stabilization suture) will be at a lower level than the 1st suture.

Follow-up

After 3 and 6 months, follow-ups were done for all patients functionally and aesthetically and the patients were assessed clinically for tip symmetry and photographically for tip projection and rotation. Photographs of the patients were taken, by using the profile view (Lateral view), calculations (Goode's ratio) for tip projection, and (Nasolabial angle) for the tip rotation were done, the results were compared with preoperative data.

Statistical analysis

All patients' data entered by using computerized statistical software, Statistical Package for Social Science (SPSS), version 22 was used.

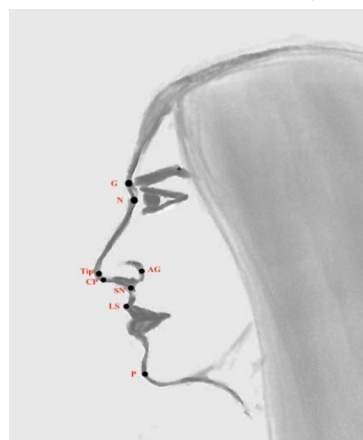


Figure 5. The important points used in the calculation of the nasal tip projection and rotation, (G: glabella, N: nasion, Tp: tip, AG: alar groove, CP: columellar point, SN: sub nasale, IS: labralesuperius, P: pogonion).



Figure 6. Goode's method of plotting tip projection. (N: nasion, A: alar groove, T: tip).



Figure 7. The nasolabial angle (It averages between 90-95 degrees in males and 95- 110 degrees in females).

RESULTS

In the current study, 50 patients (36 female and 14 male), their age ranges from 18 to 44 years were included. A pie Chart showing gender distribution

Goode's ratio

Paired t-test. Goode's ratio preoperative sample with a mean of (0.63) and standard deviation of (0.053), Goode's ratio postoperative sample with a mean of (0.61) & standard deviation of (0.030) Paired t-test applied to compare means and results show that there is a significant difference between pre & post means (P-value ≤ 0.001).

The bar chart below shows the distribution of Goode's ratio results pre- and postoperatively according to the normal ranges.

In the current study, we observe that the tip projection was increased in 25 cases and decreased in 23 cases.

Nasolabial angle

Paired t-test for female. Nasolabial angle in the female preoperative sample with a mean of (91.56) and a standard deviation of (5.514), Nasolabial angle in the female postoperative sample with a mean of (100.01) & standard deviation of (5.825) Paired t-test applied to compare means & results show that there are significant differences between pre-& post means

(P-value ≤ 0.001).

The bar chart below shows the distribution of the Nasolabial angle results in females pre and postoperatively according to the normal ranges.

Paired t-test for male. Nasolabial angle in the male preoperative sample with a mean of (87.11) and standard deviation of (7.16), Nasolabial angle in the male postoperative sample with a mean of (97.88) and standard deviation of (6.21) Paired t-test applied to compare means & results show that there are significant differences between pre-& post means (P-value ≤ 0.001).

The bar chart below shows the distribution of the Nasolabial angle results in females pre and postoperatively according to the normal ranges.

The bar chart below shows the distribution of the Nasolabial angle results in males pre and postoperatively according to the normal ranges.

The Role of Septocolumellar Suture in Tip Plasty in Primary Open Rhinoplasty

A pie Chart showing gender distribution

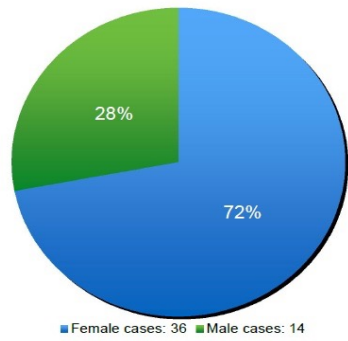


Figure 8. A pie Chart showing gender distribution.

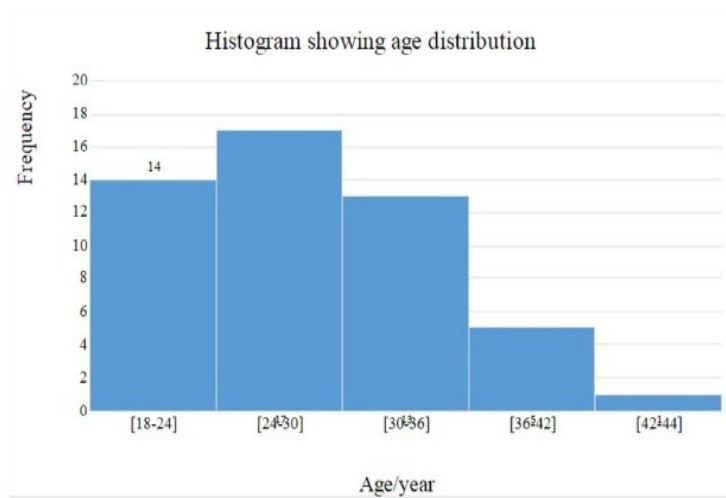


Figure 9. The age distribution of the sample.

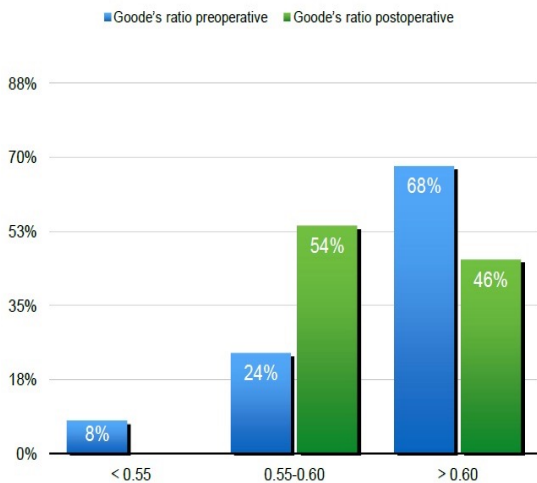


Figure 10. The Bar chart shows the difference between Goode's ratio results pre-and postoperatively.

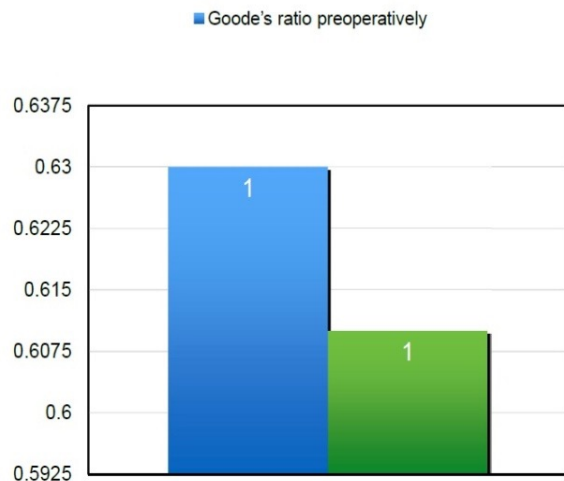


Figure 11. The bar chart shows the difference between the results of Goode's ratio pre- and postoperatively, showing that there is a decrease in the ratio of about 0.02.

Table 1. Shows the frequency of tip projection postoperatively.

Tip Projection	Positive		Negative	
	No.	%	No.	%
	25	50%	23	46%

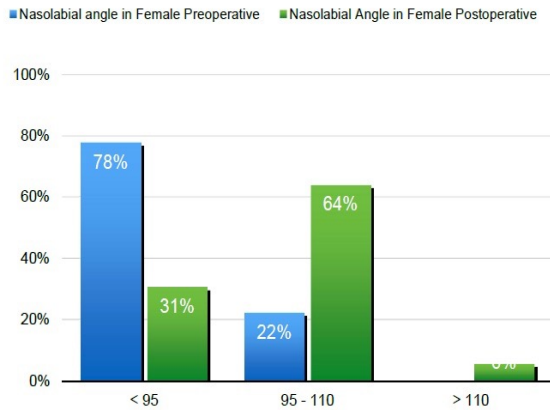


Figure 12. Show the difference between the Nasolabial angle results in female pre-and postoperatively.

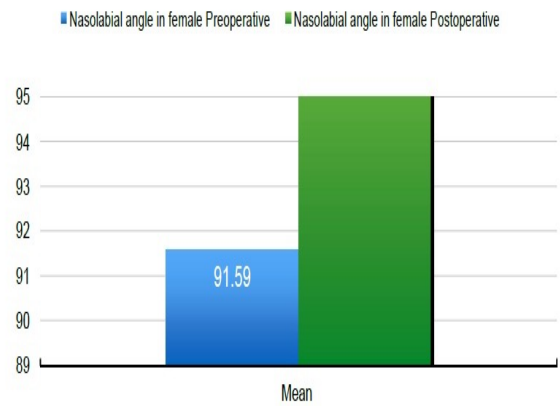


Figure 13. Bar chart shows the difference between the results of the Nasolabial angle in females pre- and postoperatively, showing that there is an increase in the angle of about 8.42.

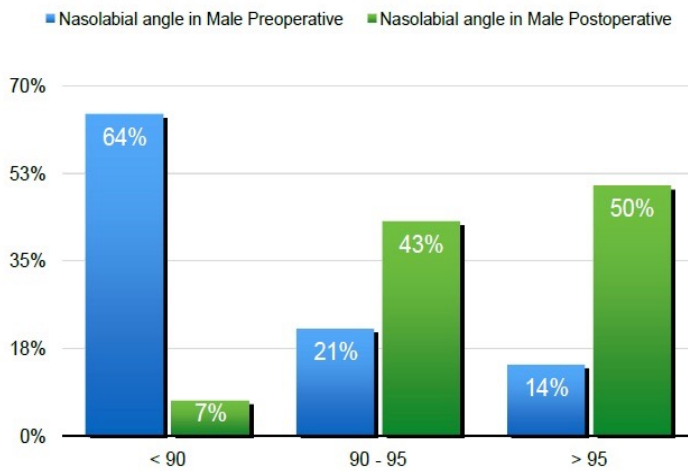


Figure 14. Show the difference between the Nasolabial angle results in males pre-and postoperatively.

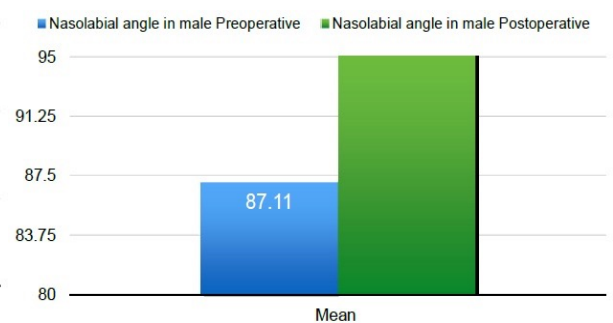


Figure 15. Bar chart shows the difference between the results of the Nasolabial angle in males pre- and postoperatively, showing that there is an increase in the angle of about 10.77.

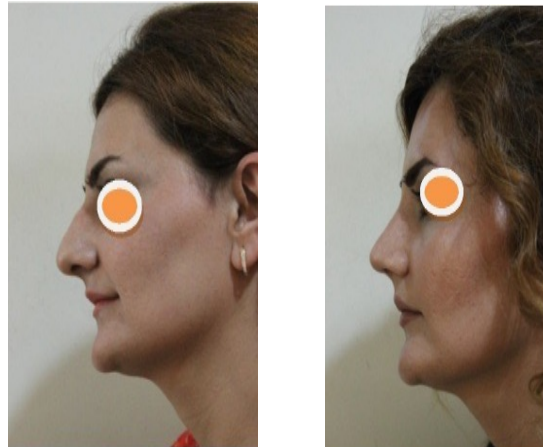


Figure 16. Preoperative (A), and 6 months postoperative (B) photograph (Profile view) of a -33- year female.



Figure 17. Preoperative (A), and 6 months postoperative (B) photograph (Profile view) of a -33- year female.

DISCUSSION

In the current study, the total number of cases operated on by open rhinoplasty was 50 cases. 36 patients (72%) of them were female, and 16 patients (28%) were male, this gives a female predominance. This result coincides with the study done by Hakan Sirinoglu^(9, 10, 11) where there is a female predominant. He reviewed in total of 44 patients (35 female and 9 male patients).

This indicates that in our society rhinoplasty is more common among females, this is because historically women are more likely to seek beauty and care more about aesthetics than men.

In these 50 cases, their age ranges between (18 - and 44) with a mean of 25.32, this indicates that rhinoplasty is more common among the younger age group and

coincides with Hakan Sirinoglu^(9,10,11) in his study the age range was 24.6, this may be because of youth are ambitious for change.

Regarding the nasal tip projection it was calculated using the Goode's ratio, in the current study the Goode's ratio preoperatively ranged between (0.52- 0.73) with a mean of (0.63) and a standard deviation of (0.053), among these results (8%) were below (0.55), (24%) between (0.55 - 0.60), and (68%) where (> 0.60)

While post-operatively Goode's ratio ranged between (0.56-0.68) with a mean of (0.56-0.68) and a standard deviation of (0.030), among these results (0%) were (< 0.55), (54 %) were between (0.55 - 0.60), and (46 %) where (> 0.60).

The mean difference in Goode's ratio pre- and post-operatively is (- 0.02), this result coincides with other studies where there is a change of (- 0.05) ^(9, 12, 13).

In the current study tip projection increased in 25 (50%) patients. And decreased in 23 (46%) patients. This is correlative with (Erdem Tezel, and Ayhan Numanog̃lu) ^(10, 14, 15) in which they state that septocolumellar suture can be used for increasing and decreasing tip projection.

In coincides with Hakan Sirinoglu which whose study using septocolumellar suture only causes increased tip projection, this may be due to the use of other techniques to enhance tip projection other than septocolumellar suture. This means that in the case of deprojected nasal tip septocolumellar suture increased nasal tip Projection, and in the case of a hyperprojected nose this technique can be used to de-project nasal tip.

Regarding the tip rotation which was calculated by Nasolabial angle:

The preoperative results of Nasolabial angle in males ranged between (72-98.2), with a mean of (87.11) and a standard deviation of (7.16), of these results (64.29 %) were (< 90 degrees), (21.43%%) were between (90-95 degrees), and (14.28%) were (> 95).

Postoperatively the results changed to ranging from (88.03-109), with a mean of (97.88), and a standard deviation of (6.21), of these results (7.14%) of them were (<90 degrees), (42.86%) of them were between (90-95 degrees), and (50%%) were (> 95 degrees)

The mean difference in the Nasolabial angle in males, pre- and post-operatively is (+10.77).

The preoperative results of Nasolabial angle in females ranged between (79.52 - 108), with a mean of (91.56) and a standard deviation of (5.514), of these results (77.77%) were (< 95 degrees) and (22.23 %) were between (95-110 degrees).

Postoperatively the results changed to ranging from (86.9- 111.4), with a mean of (100.01), and a standard deviation of (5.825), of these results (30.56%) were (< 95), (63.89%) were between (95-and 110 degrees), and (5.55%) were (> 110 degrees)

The mean difference in the Nasolabial angle in females, pre- and post-operatively is (+8.45)

The mean difference in the Nasolabial angle in all cases, pre and postoperatively is (+9.8), this result coincides with. Hakan Sirinoglu's ^(9, 16, 17) in which in

his study there is an increase in the Nasolabial angle (13.4 degrees) after (1 month) and (8.8 degrees) after (1 year) follow-up.

Also correlative with other studies where there is an increase of (8.4 degrees) in the Nasolabial angle ^(18,19 20).

In the current study, we used techniques other than septocolumellar suture which may enhance tip rotation such as resection of the cephalic end of lower lateral cartilages, and lower lateral crural overlap, which induces more tip rotation than using septocolumellar suture alone.

In conclusion, the current study demonstrates that septocolumellar suture is a valuable way for positioning and stabilizing the nasal tip. It is an effective technique to increase nasolabial angle (increase nasal tip rotation). And also, has a role in both increasing and decreasing nasal tip projection, but to a limited range.

A larger number of patients should be included in the study and for a longer duration of follow-up, to assess the effect of this technique and find the long-term changes that happen postoperatively.

Limitations

The selection of patients from more than one surgeon may affect the result of the operation, but this may happen because of the limited cases that need a selected technique to be done. Some of the patients were uncooperative regarding the follow-up because they should come from distant areas, sometimes it was needed to visit them to complete the follow-up.

The main limitations of the current study are the relatively short follow-up period and the limited number of patients. A larger number of patients with a longer follow-up period would give more precise results for the effects of the presented technique. However, most of the patients refused to be followed up and involved in the study and a larger sample size cannot be assessed.

REFERENCES

1. King Abdullah Bin Abdulaziz, Arabic health encyclopedia, updated Oct. 2016: <https://www.kaahe.org/health/en/class/9-ear-nose-and-throat-diseases.html>.
2. Tezel, Erdem; Ersoy, Burak. Tip-Oriented Closed Rhinoplasty Built on Septocolumellar Suture and a New Caudal Septal Graft Technique. Annals of Plastic Surgery 2016. Volume 77 - Issue 3 - p 264–271.

The Role of Septocolumellar Suture in Tip Plasty in Primary Open Rhinoplasty

3. Gleeson M, editor. Scott-Brown's Otorhinolaryngology: Head and Neck Surgery 7Ed: 3 volume set. CRC Press; 2008 Apr 25., page 2995 4- Rod J.Rohich.williamP.Adams, Jr Jack Gunter, advanced Rhinoplasty Anatomy Dall's Rhinoplasty,2007,1, page 12.
4. Rohrich RJ, Adams WP, Ahmad J, Gunter J, editors. Dallas rhinoplasty: nasal surgery by the masters. CRC Press; 2014 Mar 4. page 73
5. Rod L Rohrich.Jason K. Potter Alan Landecker,pre-operative concept for Rhinoplasty, Dall's Rhinoplasty, 2007, 5, page 62-75.
6. Alt, Jeremiah A.; Cohen, Noam NASAL PHYSIOLOGY. American Rhinologic Society 2015. Available online: URL (http://care.american_rhinologic.org/nasal_physiology). (Accessed on 17, February 2018).
7. Sam el M. Stal , Michael Kleb c, advances in omp ter Imaging 23-Niamtu III J. Cosmetic facial surgery. Elsevier Health Sciences; 2010 Sep 14. Page 179
8. Sclafani AP, editor. Rhinoplasty: The Experts' Reference. Thieme; 2014 Dec 1. Page 244.
9. Flint PW, Haughey BH, Robbins KT, Thomas JR, Niparko JK, Lund VJ, Lesperance MM. Cummings otolaryngology-head and neck surgery. Elsevier Health Sciences; 2014 Nov 28. Page 279
10. Flint PW, Haughey BH, Robbins KT, Thomas JR, Niparko JK, Lund VJ, Lesperance MM. Cummings otolaryngology-head and neck surgery. Elsevier Health Sciences; 2014 Nov 28. Page 280.
11. Şirinoğlu, Hakan. The Effect of the Short and Floating Columellar Strut Graft and Septocolumellar Suture on Nasal Tip Projection and Rotation in Primary Open Approach Rhinoplasty. Aesthetic Plastic Surgery 2017. 41:146-152. DOI 10.1007/s00266-016-0727-5.
12. Tezel, Erdem; Numanoğlu, Ayhan. Septocolumellar Suture in Closed Rhinoplasty. Annals of Plastic Surgery 2007.Volume 59 - Issue 3 - p 268-272. doi: 10.1097/SAP.0b013e31802e0930.
13. SABAN, Y. ANDRETTO, A.C. HAMMOU, J.C. POLSELLI, R. (2008) An anatomical study of the nasal superficial musculoaponeurotic system: surgical applications in rhinoplasty. Archives of Facial Plastic Surgery, 10 (2), pp.109– 115.
14. HWANG, K. Kim, D.J. HWANG, G. (2006) Relationship between the depressor septi nasi muscle and dermo cartilaginous ligament: anatomic study and clinical application. Journal of Craniofacial Surgery, 17 (2), pp. 286-290.
15. GUYURON, B. HODGSON, S. KUHN, B. MORTIMER, A. (eds.) (2012) Rhinoplasty. New York: Elsevier Saunders.
16. TORIUMI, D.M. (1995) Management of middle nasal vault in rhinoplasty. Operative Techniques in Plastic and Reconstructive Surgery, 2 (1), pp. 2-16.
17. Poublon, Anatomy, AESTHETICS, RHINOPLASTY. A Practical Guide to functional and Aesthetic Surgery of the nose third enlarged Edition, 2005, page1-11.
18. H STAMMBERGER AND VALERIE J LUND, Anatomy of the nose and paranasal sinuses, Scott - Brown's Otorhinolaryngology, Head and Neck Surgery,2007,104, Page 1316.R.M.L.
19. Rohrich RJ, Adams WP, Ahmad J, Gunter J, editors. Dallas rhinoplasty: nasal surgery by the masters. CRC Press; 2014 Mar 4., page 324
20. Ghavami A, Janis JE, Acikel C, Rohrich RJ. Tip shaping in primary rhinoplasty: an algorithmic approach. Plast Reconstr Surg 2008; 122: 1229– 1241