

EFFECT OF VARIOUS FACIAL ANGLES AND MEASUREMENTS ON THE RHINO-PLASTY**Louei Darjazini Nahas¹, Munir Shalish Hasan², Ali Daher¹, Solin Ibrahim¹, Mohammad Rmman³ and Rama Fawal***

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ABSTRACT

Background: With all Rhinoplasty surgeries, doctors try to reach the ideal shape that satisfies the patient. Therefore, after the osteotomy and routine steps of a Rhinoplasty, efforts are focused on reaching the ideal angles that give the most cosmetic result in appropriation to the facial measurements for each patient. **Objective:** The purpose of this study is to determine the changes on the Nose over 6 months period after a Rhinoplasty regarding the Nasofrontal angle, Nasolabial angle, Nasomental angle, and Nasofacial angle concerning their changes over intermittent time intervals, the level of changes, how much does this change affect the Rhinoplasty, and how important it is. **Methods:** A randomized Cross-section Prospective study was performed with a sample of 79 patient. We analyzed measurements of profile photographs and compared different factors that affect nasal tip location, including the Nasofrontal, Nasofacial, Nasolabial, and Nasomental angles. **Results:** Pre- and post-operative photographs of patients were reviewed, which showed that Nasofrontal, Nasolabial, and Nasomental angles exerted a statistically significant effect on ideal nasal tip position, where they gradually increase, which give more aesthetics due to the patient's likable elongated shape on the side view of the face. **Conclusion:** The Nasofrontal, Nasofacial, Nasolabial, and Nasomental angles have important effects on ideal nasal tip position and should be considered together during the preoperative evaluation of the location of the nasal tip. Concurrent genioplasty should optimize Rhinoplasty outcomes in appropriately selected patients.

KEYWORDS: Anthropometry, Rhinoplasty, Nasofrontal, Nasolabial, Nasomental, Nasofacial.**INTRODUCTION**

Rhinoplasty is one of the most complex surgical procedures that has increased globally in the past decade.^[1,2] The nose is important because of its central location in the face; therefore, the shape of the nose is often one of the factors influencing the development of our personality and the formation of body image. Thus, Rhinoplasty is one of the most common surgical procedures in the field of facial plastic surgery.^[3] Patients usually have complaints that include both the aesthetic and functional aspects of the nose. Each Rhinoplasty procedure faces difficulties due to individual differences and patient expectations. Conventional assessments of the success of surgery focus on morbidity, complications, sequelae, and objective changes in the shape of the nose. However, the patient's perspective and satisfaction are the most important determinants of the success or failure of Rhinoplasty.^[4,5]

Epidemiology

Even with all its complications to get the best functional and aesthetic results, Rhinoplasty has remained one of the most common cosmetic procedures.^[6] In the United States, Rhinoplasty ranked third among cosmetic surgeries, with more than 215,000 operations performed in 2017.^[7] In Iran, Rhinoplasty is performed in about 180 cases per 100,000 population, which means about 150,000 surgeries. Annually.^[8] Worldwide, this procedure is also consistently ranked among the top five most common cosmetic procedures. According to the Aesthetic Plastic Surgery International Society, more than 780,000 plastic surgeries were performed globally in 2016, ranking fourth in the number of surgeries performed by plastic surgeons. This represents an 8% increase compared to 2015.^[9]

Additionally, with regard to the high prevalence of rhinoplasty, satisfaction is one of the important issues in this procedure which is related to the final results of the

surgery.^[10] The satisfaction rate after Rhinoplasty has been reported between 54.3% and 88.7% in different studies.^[11] Some factors are associated with patient satisfaction such as age, masculine gender, mental disorders, personality disorders, the patient's perception of preoperative appearance, and patient expectations.^[12]

The noses of people in the Middle East display a widely different phenotype. It shows much greater diversity in anatomical features than previously thought. Thus, there is no typical medial shape as the eastern nose is called although large nose size, prominent curvature, and a 90° Nasolabial angle are common.^[13]

Facial and Nasal angles^[13]

Nasofrontal angle

This angle is formed between the imaginary line drawn from the nasion to the glabella, and between the imaginary line drawn between the nasion and nasal dorsum or the nasal tip. Its normal value range between (130 - 135°). This angle is used to study the nasal dorsum and determine its osteochondral tuberosity.

Nasofacial angle

This angle is formed between the imaginary line drawn from the nasion to the most prominent edge of the nasal dorsum, or the nasal tip if its level is above the dorsum, and between the imaginary line drawn between the nasion and the frontal point of the pogonion, with an optimum value of 36°.

Nasolabial angle

This angle is formed between the imaginary line drawn from the superior labral towards the subnasal point, and between the imaginary line drawn from the subnasal point towards the columella breakpoint, its optimum value is (90-95 degrees) in females and (100-105°) in males. It is used to study nasal tip rotation.

Nasomental angle

This angle is formed between the imaginary line drawn between the superior anterior edge of the chin Pogonion towards the nasal tip, and the imaginary line drawn from the nasal tip towards the nasion, with a normal value of (120-132°). This angle is used to study the protrusion of the nasal tip.

PATIENTS AND METHOD

A randomized Cross-section Prospective study was performed between 01, December. 2021 and 28, February 2022. The study was conducted at a private medical center in Damascus, Syria. We analyzed measurements of profile photographs and compared different factors that affect Rhinoplasty over 6 months period, including the Nasofrontal, Nasolabial, and Nasomental, and Nasofacial angles. The patients were explained the steps of the study and their consent was signed. The pictures of each patient were taken with a professional Canon 2018 camera. The pictures were taken sideways on both sides after the

first week, a month, three months, and six months after the Rhinoplasty.

Afterward, we went back to the lateral pictures of the sample patients before the surgical operation, as they were processed into the AutoCAD program where the angles were measured to study their changes, in order to compare the Nasofrontal, Nasofacial, Nasolabial, and Nasomental angles, before and after the operation, and to study their changes.

Entry criteria

Patients attending the center between the ages of 18-60 years, whose first goal was the cosmetic aspect, even if it was not a reconstructive operation for the first time.

Exclusion criteria

Patients outside the age group, with a history of congenital anomalies such as cleft palate, and facial syndromes, who did not cooperate with follow-up, or who refused to participate in the study.

Sample collection

130 patients seeking Rhinoplasty were recruited, and 79 were eligible for inclusion in the study.

Statistical analysis

The statistical analyses were performed using the Statistical Package for Social Sciences (SPSS-25). Association metastasis with clinicopathologic variables was assessed using a simple chi-square test. The goodness of Fit Test was applied to study whether statistically significant differences were found between the relative distributions (percentages) of the classifications of a descriptive variable, by applying the chi-squared statistic. A level of $P < 0.05$ was taken as significant.

RESULTS

The study included 130 patients, and after the exclusion, we had 79 patients whose variables were studied. At first, we divided the study sample according to the measurement of the Nasofrontal angle before surgery and during the follow-up period that lasted six months. Where the Mean value of the angle before surgery was 149.52 with a deviation of 6.702. After A week of the surgical procedure, it was 154.04 with a deviation of 6.862. While the mean after a month was 152.66 with a deviation of 6.308. After three months the angle mean was 151.60 with a deviation of 5.779, where we were able to follow up on the cases for three months. But after six months we were able to follow up only 27 cases where the mean was 152.37 with a deviation of 5.779. By analyzing the relationship between the angle's mean before surgery and during the follow-up, it was found that there is a statistical relationship between the Nasofrontal angle's mean in all follow-ups, where the P-value = 0.401, which is shown in Table (1).

Table 1: Distribution of the study sample according to the measurement of the Nasofrontal angle.

	Before Rhinoplasty	After one week	After one month	After three months	After six months
Mean value	149.52	154.04	152.66	151.60	152.37
Standard Deviation	6.702	6.862	6.369	6.308	5.779
Minimum Value	137	137	138	135	142
Maximum Value	176	172	167	168	165
P-Value		0.000	0.000	0.000	0.008

The mean of the Nasofacial angle before the surgical procedure was 32.64, with a deviation of 3.742. While the mean after a week of surgery was 33.73, with a deviation of 3.398. Which is similar to the mean after a month of follow-up, where it was 33.48 with a deviation of 3.626. After three months, the mean angle was 33.13, with a deviation of 3.499. While the mean was 32.07,

with a deviation of 4.463, after six months of follow-up. During the study of the relationship between the Nasofacial angle's mean before surgery and during the follow-up period, there was a statistical relationship between all the means, where the P-value < 0.05, and this is what is shown in Table (2).

Table 2: Distribution of the study sample according to the measurement of the Nasofacial angle.

	Before Rhinoplasty	After one week	After one month	After three months	After six months
Mean Value	32.64	33.73	33.48	33.13	32.07
Standard Deviation	3.724	3.398	3.626	3.499	4.463
Minimum Value	23	24	24	24	16
Maximum Value	42	41	41	41	38
P-Value		0.000	0.000	0.000	0.001

After measuring the Nasolabial angle and comparing the mean before surgery with the rest of the means during follow-up, it was found that the mean value of the angle before surgery was 104.43 with a deviation of 10.878. While the mean after a week was 121.68 with a deviation of 9.189. After a month the mean was 117.69 with a deviation of 9.509. And after three months, the mean was 115.56, with a deviation of 9.785. While the Nasolabial

angle's mean of the cases that lasted for six months of follow-up was 114.67, with a deviation of 10.065.

It was also found that there is a statistical relationship between the Nasolabial angle mean before surgery with the rest of the angle's means during the follow-ups, where the value of P-value < 0.05, which is shown in Table (3).

Table 3: Distribution of the study sample according to the measurement of the Nasolabial angle.

	Before Rhinoplasty	After one week	After one month	After three months	After six months
Mean Value	104.43	121.68	117.69	115.56	114.67
Standard Deviation	10.878	9.189	9.509	9.785	10.065
Minimum Value	75	103	93	93	100
Maximum Value	128	139	138	137	133
P-Value		0.000	0.000	0.000	0.002

The mean of the Nasomental angle was measured for all cases before surgery and followed up during a year of surgery, where the angle mean before surgery was 127.73 with a deviation of 5.915, while the angle mean after a week of follow-up was 126.79 with a deviation of 4.854, and 127.95 with a deviation of 5.363 after a month of follow-up, and 128.69 with a deviation of 5.207 after a follow-up of three months, and for the cases that continued with follow-up for six months, the mean was 128.81 with a deviation of 4.879.

measurement and the angle mean during the follow-up period, where the P-value < 0.05, as shown in Table (4).

Here, too, it was found that there was a statistical relationship between the mean of the preoperative angle

Table 4: The distribution of the study sample according to the measurement of the Nasomental angle.

	Before Rhinoplasty	After one week	After one month	After three months	After six months
Mean Value	127.73	126.79	127.95	128.69	128.81
Standard Deviation	5.915	4.854	5.363	5.207	4.876
Minimum Value	108	112	116	120	122
Maximum Value	143	138	142	145	142
P-Value		0.000	0.000	0.000	0.000

DISCUSSION

The line between the eye lateral canthus and the oral commissure has been our consistent guide for studying the variables of the rest of the angles, as this constant does not change postoperatively. There are a few articles found in the literature that demonstrate the facial angles measures in patients after the facial aesthetic surgery.

The Nasofrontal Angle

Since the surgical procedure was done by the same surgeon and the same technique for the sample patients, we have limited fixed variables. One of the steps of the technique was to restore the back of the bone and remove the bony tuberosity, explaining the change observed after the surgery, which rises with the increase in the angle over time due to the healing of edema on the nasal dorsum. According to a study in the states published in 2022, which was conducted on 37 patients, the Nasofrontal angle increased, and the depth between the forehead and nose increased, resulting in a more beautiful extended profile.^[14]

The Nasofacial Angle

Since one of the steps of the technique is to manufacture the nasal tip and raise it using cartilage manufacturing with the implantation of a graft in the subnasal, this explains the change in the angle, as it increased over time and gave more aesthetic, thus the patient was satisfied with the new shape. According to a study published in 2021 in Mexico that was conducted on 114 patients, changes in the Nasofrontal, Nasofacial, Nasolabial, and Nasomental angles were noticed. This study emphasized the importance of a good anthropometric study of the lateral and anterior shape of the nose to acknowledge the changes and the necessity of explaining them to the patient.^[5]

The Nasolabial Angle

Since the manufacture of the nasal tip requires raising and shortening it, this angle changes, where it increased and gave aesthetics to the collateral portfolio of the face. Chun, M.J. has noticed that this angle increased, and the patient's satisfaction was great with the change.^[1] But on the other hand, no changes were observed on the Nasofacial and Nasolabial angles in Jin, L study.^[3]

The Nasomental angle

The results indicated an increase in this angle, which was also one of the important signs of change, as it gave the patients more aesthetics and satisfaction with the collat-

eral portfolio. In Arab women, there was also a noticeable change in the Nasolabial angle along with the other angles.^[4]

CONCLUSION

The Nasofrontal, Nasolabial, and Nasomental angles have important effects on ideal nasal tip position and should be considered together during the preoperative evaluation of the location of the nasal tip. Concurrent genioplasty should optimize Rhinoplasty outcomes in appropriately selected patients. The Nasofrontal angle should not be significantly increased during the surgical procedure, as it changes over time. As we must inform the patient of the normal course of nasal healing that lasts for more than six months in order to get to the final result. It is also necessary to take side and collateral photographs before and six months after the rhinoplasty, to show the patient the size of the change, as the change is not instantaneous, but rather gradual over time.

More studies should be conducted on the subject to obtain more data and information regarding the changes in face angles after Rhinoplasty and how they affect the final aesthetic result.

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