Analysis and Evaluation of Nasal Angles in Non-Surgical Rhinoplasty with Hyaluronic Acid

Análisis y evaluación de los ángulos nasales en rinoplastia no quirúrgica con ácido hialurónico

Arroyo Armijo, P.[a] Contreras Rojas. I.[b] Rojo Pereira, J.[c] Hernández Quezada, R.[d]

a. DDS. Docente, Virtus Academy, Santiago Chile.

b. DDS., Virtus Academy, Santiago Chile.

c. DDS. Docente, Virtus Academy, Santiago Chile.

d. MSc. Docente, Universidad de Chile, Santiago Chile.

Recibido 2025-01-19
Revisado 2025-03-28
Aceptado 2025-04-07

Abstract

Background:

Studies show the efficacy and safety of nasal reshaping with hyaluronic acid. However, there is little evidence on the clinical parameters modified to achieve an aesthetic improvement in the nasal profile. In aesthetic analysis, the nasolabial angle has often been used to evaluate the rotation of the nasal tip in non-surgical rhinoplasty, a parameter dependent on the position of the upper lip. The researchers declare no conflicts of interest.

Objetive:

The purpose of this study is to demonstrate the changes induced by non-surgical rhinomodelling in the nasal profile by measuring the nasolabial angle traced on soft tissues and the new nasal angle proposed by the authors. Additionally, the study highlights the efficacy and safety of nasal reshaping with hyaluronic acid.

Methods:

This is a prospective open-label study where the outcome of non-surgical rhinoplasty treatment with cannula (23G x 38 mm) was evaluated in 25 adult patients (treated in the areas of the nasal spine, columella, and supratip) using a maximum of 0,6 ml of hyaluronic acid.

Results:

Twenty-five patients participated in this study (22 women and 3 men) with an average age of 34 years. An average of 0.33 ± 0.11 ml of hyaluronic acid was infiltrated during the procedure. Twenty-two patients underwent this procedure for the first time during this study, while the other three had undergone between 1 to 3 previous procedures. Only two patients required a second intervention, using an average of 0.18 ml. Nasolabial angles before and after treatment were measured; on average, this increased from 89.3 ± 11.3° to 98.4 ± 8.2° (average change of 9.1 ± 7.3°). No complications were recorde.

Conclusion:

Statistically significant changes were observed when comparing the nasolabial angle measurements before and after the procedure, with an average increase of 9°, as determined through nasal profile analysis and subsequently tested in STATA 11 (P=0.0000). Additionally, given that the nasolabial angle may vary due to aging and modifications in perioral structures, it is necessary to measure another angle to assess nasal tip projection.

Keywords:

Hyaluronic acid, nasal remodeling, non-surgical rhinoplasty, facial profile analysis, nasolabial angle.

Arroyo Armijo, P., Contreras Rojas. I., Rojo Pereira, J., Hernández Quezada, R. (2025) Analysis and Evaluation of Nasal Angles in Non-Surgical Rhinoplasty with Hyaluronic Acid. Odontología Vital, 2(43) 31-41. https://doi.org/10.59334/ROV.v2i43.666

Introduction

Minimally invasive procedures such as neuromodulator injections, hyaluronic and non-hyaluronic acid fillers, among others, have gained popularity in recent years. Currently, Generation X (born between 1965 and 1981) represents 46% of all these procedures, while Baby Boomers (born between 1946 and 1964) represent 31%. Together, these two age groups account for 77% of the total market for minimally invasive procedures (Kumar et al., 2021).

The nose harmonizes and balances the face; it is its centerpiece, indicative of our heritage, and it is closest to the lens when taking a photo, and probably the most distorted when looking in the mirror. A well-structured nose enhances the beauty of the entire face. For this reason, rhinoplasty has emerged as a treatment alternative, and in recent years, with the increased popularity of hyaluronic acid injectable fillers, non-surgical rhinoplasty has become a less invasive option (American Society of Plastic Surgeon, 2021, 2022).

Surgical rhinoplasty is a procedure under general anesthesia that involves a recovery process of about one year. Often, patients do not wish to undergo this procedure due to potential functional deficits, dissatisfaction with the final results, and failed results due to surgical complications leading to revision rhinoplasties. In contrast, non-surgical rhinoplasty is less invasive, requires minimal downtime, and the results are temporary and reversible, making it a treatment of choice for some patients (American Society of Plastic Surgeon, 2021, 2022).

Generally, non-surgical rhinoplasty with hyaluronic acid is a safe and satisfactory procedure for patients. Despite its increased popularity, complications remain low and mostly minor. Nonetheless, it is essential to be aware of severe complications for prevention and proper management (DeVictor et al., 2021).

To reduce the risk of vascular complications, it is recommended to aspirate when using a needle to ensure not being in a vascular territory, inject slowly, and in small volumes. Additionally, the use of a cannula instead of a needle is suggested. Regarding the technique, the filler should be placed along the midline and under the subcutaneous and musculoaponeurotic system layer where the main nasal vasculature is located (Bertossi et al., 2019; DeVictor et al., 2021).

Furthermore, it is crucial for the injector to have a comprehensive understanding of ideal facial proportions, anatomy and age-appropriate aging characteristics to achieve predictable and successful results. Facial symmetry and harmony are often defined as the most important characteristics of facial beauty and ideal proportions (Akinbiyi et al., 2020).

The objective of this study is to measure and demonstrate the changes induced by non-surgical rhinoplasty in the nasal profile by assessing the nasolabial angle traced on soft tissues and the new nasal angle proposed by the authors. Additionally, the study highlights the efficacy and safety of nasal reshaping with hyaluronic acid.

Materials and Methods

Study Design and Patient Selection:

This was a prospective, open-label study where the outcome of non-surgical rhinoplasty treatment with a cannula (23G x 38 mm) was

No. 43, Vol 2, 31-41 2025 (23) | ISSN2215-5740

evaluated. Procedures were carried out between September 2023 and January 2024, and all patients signed informed consent.

Twenty-five patients aged 21 to 58 who wanted to improve the appearance of their nose without undergoing surgery were selected. Selection criteria included patients with realistic expectations, without significant deformities, and without functional impairments. Additionally, for patients who had undergone previous treatment, at least six months have been waiting since the last intervention.

Other exclusion criteria included pregnant or breastfeeding women, patients with previous surgical rhinoplasties, patients with autoimmune diseases, and individuals under 18 years old.

These patients were followed telematically for 30 days to evaluate possible complications and satisfaction with the procedure.

Procedure:

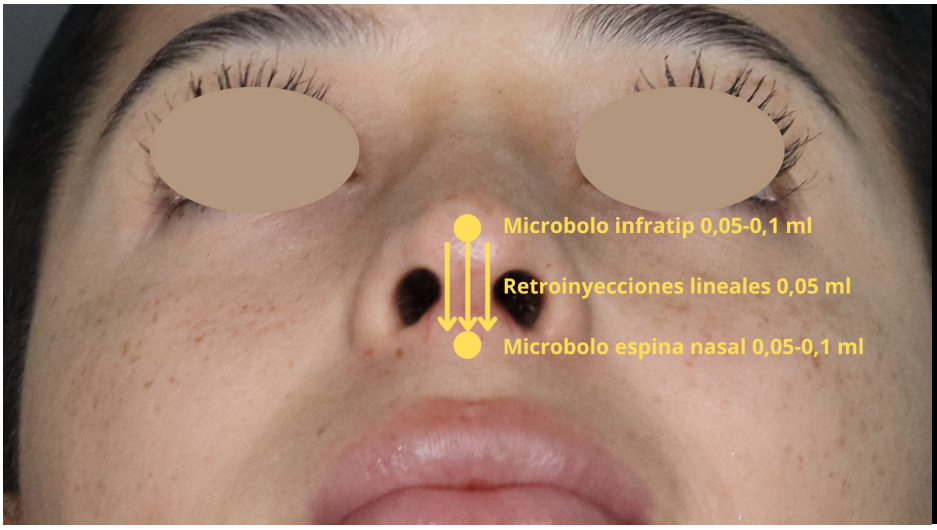
All procedures were performed with high cross-linking hyaluronic acid (23 mg/ml HA) using a cannula injection technique, infiltrating an average total volume of 0.33 ml in the nasal spine, columella, and infratip nasal areas. The treatment's objective was to harmonize the nose by opening the nasolabial angle and projecting the tip, incorporating slight rotation in certain cases.

Prior to the injection, intraoral anesthesia is administered using 3% lidocaine (without a vasoconstrictor). The access point at the base of the nose is then disinfected with 70% alcohol, after which the cannula is inserted into this area.

Regarding the technique, the cannula is introduced at the base of the nose, centered along the midline, directed towards the nasal spine, where a microbolus of 0.05 to 0.1 ml is infiltrated. The cannula is then pre-curved at 45°, with the opening facing the posterior of the columella, to perform three linear retro-injections of 0.05 ml each, descending from the infratip to the base of the nose. Finally, a last microbolus (before the final retro-injection) is deposited in the infratip to project the nasal tip with 0.05 to 0.1 ml (Figure 1).

Figure 1. Schematic representation of the injection technique used.

Figure 1. Schematic representation of the injection technique used.



First, a microbolus of 0.05 to 0.1 ml is injected. Then, three linear retroinjections of 0.05 ml are performed, descending from the infratip to the nasal base at an average injection speed of 7 seconds. Finally, a last microbolus (before the final retroinjection) is deposited in the infratip to project the nasal tip, ranging from 0.05 to 0.1 ml.

No. 43, Vol 2, 31-41 2025 (23) | ISSN2215-5740

Upon completion of the procedure, all patients were provided with post-operative instructions both verbally and in writing. Touch-ups were scheduled for one month after the initial intervention, if necessary.

Standardized pre- and immediate post-treatment photographs were taken of all patients participating in this study using the PhotoDoc application. The photographs were taken from a distance of 1 meter and using an 18" 15V ring light.

Five standard clinical photographs (i.e., frontal view, both 45° oblique views, and both lateral views) were taken for each patient in identical positions. However, for the anthropometric evaluation, only the right lateral views were used.

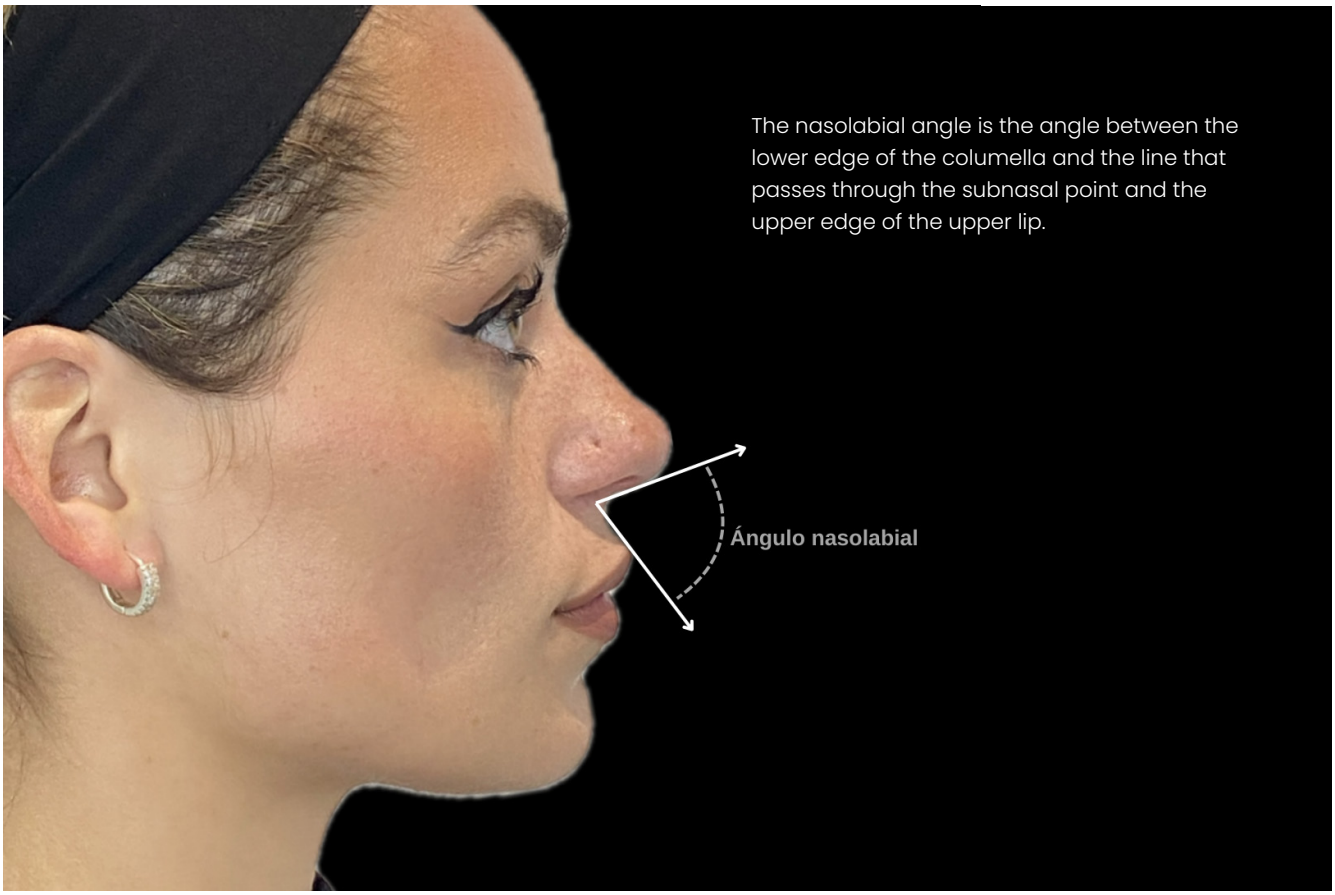
Statistical Analysis:

The impact of the treatment was evaluated by measuring the nasolabial angles in patient photographs before and after the procedure using Digimizer software.

The data obtained were analyzed with STATA 11 statistical software, assessing their distribution with the Shapiro-Wilk test and comparing the groups using the appropriate statistical test for paired samples.

The nasolabial angle was measured considering the angle formed between the inferior edge of the columella and the line drawn between the subnasal point and the superior border of the upper lip (Figure 2).

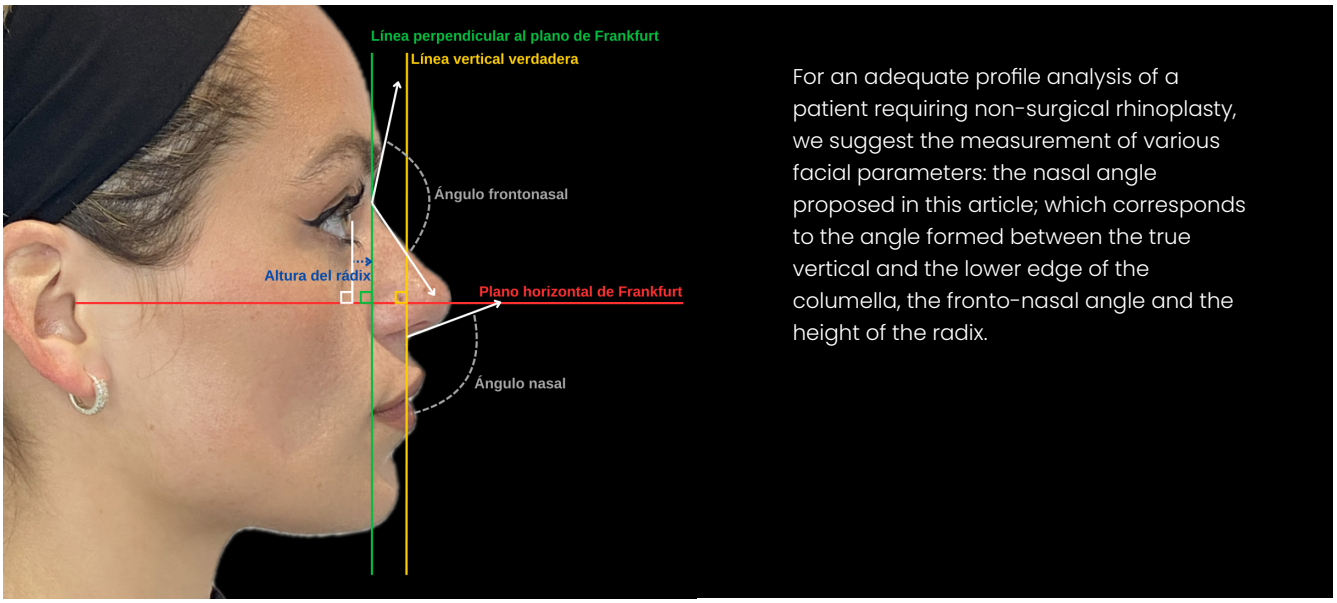
Figure 2. Measurement of the nasolabial angle in a standardized profile photograph.



No. 43, Vol 2, 31-41 2025 (23) | ISSN2215-5740

Additionally, a proposed nasal angle was measured, corresponding to the angle between the true vertical line (perpendicular to the Frankfurt Plane passing through the subnasal point) and the inferior edge of the columella (Figure 3).

Figure 3. Facial profile analysis for non-surgical rhinoplasty.



With all these measurements, descriptive statistics are provided, including mean, standard deviation, and range for continuous variables, while frequency were provided for categorical variables.

Results

Patient Characteristics and Treatments:

Twenty-five patients participated in this study, 22 women and 3 men, with an average age of 34 years ± 9 years. Three of the total patients had previously undergone non-surgical rhinoplasty.

An average volume of 0.33 ml ± 0.11 ml (range 0.2-0.6 ml) was injected into the patients during the first intervention. Only two patients required a subsequent second intervention, receiving 0.1 ml and 0.25 ml, respectively. On average, 0.05 ml was injected into the infratip area, 0.18 ml into the columella, and 0.9 ml into the base of the nose (Table 1).

Table 1. Injected Volumes of Hyaluronic Acid.

Total volume (ml)	Infratip volume (ml)	Columella volume (ml)	Nasal spine volume (ml)
0,4	0	0,2	0,2
0,45	0,05	0,2	0,2
0,4	0	0,2	0,2
0,5	0,1	0,2	0,2
0,3	0,1	0,1	0,1
0,35	0,05	0,3	0
0,6	0,1	0,3	0,2
0,5	0,05	0,25	0,2

No. 43, Vol 2, 31-41 2025 (23) | ISSN2215-5740

0,25	0,05	0,15	0,05
0,25	0,05	0,15	0,05
0,25	0,05	0,15	0,05
0,3	0,05	0,15	0,05
0,25	0,05	0,15	0,05
0,25	0,05	0,15	0,05
0,25	0,05	0,15	0,05
0,25	0,05	0,15	0,05
0,4	0,1	0,2	0,1
0,35	0,1	0,2	0,05
0,25	0,05	0,15	0,05
0,25	0,05	0,15	0,05
0,25	0,05	0,15	0,05
0,2	0,05	0,15	0
0,3	0	0,2	0,1
0,3	0	0,15	0,15
0,25	0	0,15	0,1
0,33	0,05	0,18	0,09

The total volumes of hyaluronic acid and the volume infiltrated in each area of the nose are provided. The average values are shown in the last row.

Efficacy of the Treatment:

The mean nasolabial angle increased from 89.3 ± 11.3° before treatment to 98.4 ± 8.2° after treatment, with a mean change of 9.1 ± 7.3° (range 3°–34°) (Table 2).

Table 2. Nasolabial Angle Measured Before and After Treatment.

Pre-treatment nasolabial angle	Post-treatment nasolabial angle	Nasalolabial angle increase
84	91	7
58	92	34
85	96	11
92	100	8
108	111	3
104	108	4
91	105	14
104	105	1
90	97	7
94	103	9
82	89	7
105	109	4
78	82	4
78	82	4
89	90	1

No. 43, Vol 2, 31-41 2025 (23) | ISSN2215-5740

81	96	15
92	106	14
94,8	98	3,2
98,6	105	6,4
88,6	91,8	3,2
105,7	109,9	4,2
95	102,4	7,4
80,2	92,6	12,4
79,6	105,1	25,5
86,2	93,2	7
89,7	**98,4**	**8,7**

Additionally, the difference between both measurements is provided to determine the increase in the nasolabial angle. The average values are shown in the last row.

When measuring the proposed nasal angle in this article, it increased from 106.3 ± 6.7° to 114.9 ± 5.5°, with a mean change of 8.7 ± 4.4° (range 2.5°-19.3°) (Table 3).

Table 3. Nasal Angle Measured Before and After Treatment.

Pre-treatment nasal angle	Post-treatment nasal angle	Nasal angle increase
111,9	116,6	4,7
96,1	115,4	19,3
102,3	110,9	8,6
109,9	120,4	10,5
106,3	122,2	15,9
106,5	112	5,5
106,4	116,2	9,8
104,7	118	13,3
111,7	120	8,3
106,4	112,5	6,1
104,7	110,4	5,7
111,6	117,7	6,1
102,9	107,9	5
111,5	116,6	5,1
109,2	121	11,8
100	104,9	4,9
101,7	107,9	6,2
105	111,3	6,3
105	118,2	13,2
112	118,3	6,3
115,2	121,6	6,4
116,7	123,7	7
100,1	110,3	10,2

No. 43, Vol 2, 31-41 2025 (23) | ISSN2215-5740

85,5	103,7	18,2
113	115,5	2,5
106,3	114,9	8,7

Additionally, the difference between both measurements is provided to determine the increase in the nasal angle. The average values are shown in the last row.

These improvements demonstrate a significant increase in the nasolabial angle and an increase in nasal rotation, resulting in a cosmetic enhancement of the profile.

The results of the statistical analysis suggest a significant improvement in the angle following the treatment compared to the initial value. The Shapiro-Wilk test indicates that the data follow a normal distribution both before and after the treatment ($p > 0.05$ in both cases), validating the use of a parametric test.

The paired t-test shows a significant mean difference of -9.088 degrees between the pre- and post-intervention angles, with a 95% confidence interval ranging from -12.15 to -6.02 ($p < 0.0001$). The t-value (-6.1186) supports that the observed difference is not due to chance, suggesting that the treatment was highly effective in improving the evaluated angle (Figure 4).

Figure 4. Statistical Analysis.

```
    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
      GENERO |         25         .12    .3316625         0          1
        EDAD |         25       34.08    10.95795        21         58
   ANGULOPRE |         25      89.272    11.59427        58        108
  ANGULOPOST |         25       98.36     8.40828        82        111

. swilk  ANGULOPRE

                  Shapiro-Wilk W test for normal data

    Variable |        Obs        W           V        z       Prob>z
-------------+--------------------------------------------------------
   ANGULOPRE |         25    0.95306       1.304    0.543    0.29348

. swilk ANGULOPOST

                  Shapiro-Wilk W test for normal data

    Variable |        Obs        W           V        z       Prob>z
-------------+--------------------------------------------------------
  ANGULOPOST |         25    0.95132       1.353    0.617    0.26846

. ttest ANGULOPRE== ANGULOPOST

Paired t test

------------------------------------------------------------------------------
Variable |        Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
ANGULO~E |         25      89.272    2.318854    11.59427    84.48612    94.05788
ANGULO~T |         25       98.36    1.681656     8.40828    94.88923    101.8308
---------+--------------------------------------------------------------------
    diff |         25      -9.088    1.485298    7.426491   -12.15351   -6.022496
------------------------------------------------------------------------------
    mean(diff) = mean(ANGULOPRE - ANGULOPOST)                     t =  -6.1186
Ho: mean(diff) = 0                     degrees of freedom =       24

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

Statistical analysis showing the Shapiro-Wilk test and the paired t-test.

No. 43, Vol 2, 31-41 2025 (23) | ISSN2215-5740

Complications:

No complications were recorded in the patients.

Discussion

Among the facial measurements for treatment planning in the nose, the nasolabial angle allows us to evaluate the effectiveness of nasal tip rotation, as it is one of the parameters that define the shape of the nose (Alshawaf et al., 2024; Youn & Seo, 2016).

In this regard, it is beneficial to have analysis methods like Digimizer to evaluate the changes over time. However, there are few studies on the use of software for soft tissue analysis and treatment planning.

Better methods for measuring the nasolabial angle need to be established as there is no consensus among professionals. While this article considered the angle between the tangent line to the columella and the line drawn from the subnasal point to the upper lip's edge, other studies have considered the angle between the tangent line to the columella and the line drawn from the subnasal point tangent to the philtrum (Alshawaf et al., 2024).

Additionally, it is crucial to question the utility of the nasolabial angle in evaluating treatment outcomes, as it is influenced by age-related changes. These changes include an increase in nasal dimensions, nasal tip ptosis, and the progressive resorption of the maxillary bone, which further reduces nasal tip projection and consequently sharpens the nasolabial angle (Helal et al., 2019; Shastri et al., 2021).

Similarly, facial harmonization procedures in the lip area and orthodontic treatments can also modify the nasolabial angle by altering the position of the upper lip (Pop et al., 2025).

In this article, we propose the measurement of a nasal angle that is independent of the lip position. This angle corresponds to the tracing between the tangent line to the columella and the line perpendicular to the Frankfurt plane that passes through the subnasal point. This way, the measurements would be more reliable by reducing the standard variation.

For a more detailed evaluation, it is recommended to analyze other facial parameters, such as the frontonasal angle and the percentage increase in radix height, as described in Figure 2 (Youn & Seo, 2016). A comprehensive evaluation is necessary, tracing vertical and horizontal lines to assess the nose in relation to the rest of the facial structures (Alshawaf et al., 2024).

Non-surgical rhinoplasty is a procedure whose effects last up to 8 to 12 months. To maintain these results over time, it is necessary to repeat the procedure at least once a year, which can cause more fibrosis in the long term (Bertossi et al., 2022; Frédéric et al., 2023). In this regard, it is essential to consider the repercussions of repeating the procedure over the years and to consider the alternative treatment of surgical rhinoplasty.

Conclusions

In this study, non-surgical rhinoplasty treatment with up to 0.6 ml of hyaluronic acid was well tolerated, safe, and effective. The recovery time was minimal (14 days). Objective evaluations using Digimizer demonstrated significant changes in nasolabial angles before and after treatment.

No. 43, Vol 2, 31-41 2025 (23) | ISSN2215-5740

Given that the nasolabial angle can vary due to aging and modifications in perioral structures, it is necessary to measure another angle to evaluate nasal tip projection. This article proposes a nasal angle dependent on the columella, the Frankfurt plane, and a vertical line perpendicular to it.

A thorough understanding of nasal anatomy and the technical specifications for injecting this area remains essential to avoid complications.

Declarations

This study adhered to bioethical principles of autonomy, beneficence, non-maleficence, and justice, ensuring the safety and rights of participants.

A detailed informed consent was obtained prior to inclusion, outlining the study objectives, procedures, risks, benefits, and data confidentiality.

Only adult patients without contraindications for hyaluronic acid were included, while those with allergies, autoimmune diseases, pregnancy, or who were minors were excluded. Personal data were protected in accordance with current regulations, and no adverse effects or complications occurred during the study.

AUTHOR CONTRIBUTION:
The authors have contributed to the conception, planning, execution and approval of the final version of this article.

Conflict of interest:
The authors declare that they have no conflicts of interest.

Funding:
Declaración de contribución de autores:
Conceptualización y diseño: PA
Revisión de literatura: JR PA IC
Metodología y validación: JR RH PA
Análisis formal: PA IC
Investigación y recopilación de datos: PA IC
Recursos: PA
Análisis e interpretación de datos: PA IC RH
Redacción-preparación del borrador original: IC PA
Redacción-revisión y edición: IC
Supervisión: PA
Administración de proyecto: PA IC

Referencias Bibliográficas

Akinbiyi, T., Othman, S., Familusi, O., Calvert, C., Card, E. B., & Percec, I. (2020). Better Results in Facial Rejuvenation with Fillers. In Plastic and Reconstructive Surgery - Global Open (Vol. 8, Issue 10, p. E2763). Lippincott Williams and Wilkins. https://doi.org/10.1097/GOX.0000000000002763

Alshawaf, S. M., McGuire, C., ElAbd, R., Fakih-Gomez, N., Williams, J., AlYouha, S., & Samargandi, O. A. (2024). Preferred Nasolabial Angle in Rhinoplasty: A Cross-Sectional Analysis. Aesthetic Surgery Journal, 44(3), 275–285. https://doi.org/10.1093/asj/sjad309

American Society of Plastic Surgeon. (2021). The centerpiece of the face: Why nonsurgical rhinoplasties are gaining popularity | ASPS. https://www.plasticsurgery.org/news/articles/the-centerpiece-of-the-face-why-nonsurgical-rhinoplasties-are-gaining-popularity

American Society of Plastic Surgeon. (2022). 2022 ASPS Procedural Statistics Release. In Plastic and reconstructive surgery (Vol. 1, Issue 1). https://doi.org/10.1097/PRS.0000000000011235

Bertossi, D., Giampaoli, G., Verner, I., Pirayesh, A., Nocini, R., & Nocini, P. (2019). Complications and management after a nonsurgical rhinoplasty: A literature review. Dermatologic Therapy, 32(4), 1–8. https://doi.org/10.1111/dth.12978

Bertossi, D., Magagnotto, N., Chirumbolo, S., D'Souza, A., & Nocini, R. (2022). Nonsurgical Rhinoplasty: Long-Term Follow-Up of High G' HA Nasal Injections. Facial Plastic Surgery, 38(2), 96–101. https://doi.org/10.1055/s-0042-1742431

DeVictor, S., Ong, A. A., & Sherris, D. A. (2021). Complications Secondary to Nonsurgical Rhinoplasty: A Systematic Review and Meta-analysis. In Otolaryngology - Head and Neck Surgery (United States) (Vol. 165, Issue 5, pp. 611–616). John Wiley & Sons, Ltd. https://doi.org/10.1177/0194599820987827

Frédéric, B., Philippe, K., Jérôme, P., & Florian, N. (2023). Concepts and principles of medical rhinoplasty. Journal of Dermatology & Cosmetology, 7(4), 158–163. https://doi.org/10.15406/jdc.2023.07.00254

Helal, H. A., Ghanem, M. A. M., Al-Badawy, A. M., Abdel Haleem, M. M., & Mousa, M. H. (2019). Histological and Anthropometric Changes in the Aging Nose. Aesthetic Surgery Journal, 39(9), 943–952. https://doi.org/10.1093/ASJ/SJY245

Kumar, V., Jain, A., Atre, S., Shome, D., Kapoor, R., Doshi, K., & Vadera, S. (2021). Non-surgical rhinoplasty using hyaluronic acid dermal fillers: A systematic review. Journal of Cosmetic Dermatology, 20(8), 2414–2424. https://doi.org/10.1111/jocd.14173

Pop, S. I., Bud, E., Mártha, K., Mureșan, I. É., Jánosi, K. M., Dósa, B., & Kerekes-Máthé, B. (2025). Cephalometric and Photographic Evaluation of the Nasolabial Angle in Orthodontically Treated Patients: An Observational Cohort Study. Diagnostics, 15(2), 132. https://doi.org/10.3390/DIAGNOSTICS15020132

Shastri, D., Tandon, P., & Singh, A. (2021). Nasal changes in different age groups. National Journal of Maxillofacial Surgery, 12(3), 367–371. https://doi.org/10.4103/njms.NJMS_246_20

Youn, S. H., & Seo, K. K. (2016). Filler Rhinoplasty Evaluated by Anthropometric Analysis. Dermatologic Surgery, 42(9), 1071–1081. https://doi.org/10.1097/DSS.0000000000000832

No. 43, Vol 2, 31-41 2025 (23) | ISSN2215-5740