

Photogrammetrics and clinical features of nasal siliconoma in Asians

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ABSTRACT

BACKGROUND Nasal silicone injections have been a common procedure among Asians. However, this procedure can lead to severe complications. Unfortunately, there are limited data available on the distortive characteristics of nasal siliconoma in the Asian population. This study aimed to provide objective data on the distortive characteristics of nasal siliconoma to be a reference for a treatment outcome.

METHODS This cross-sectional study was conducted at Cipto Mangunkusumo Hospital from June 2017 to March 2018 involving 30 Asian females with nasal siliconoma. Nasal photogrammetric measurements were taken using a portable mirror stand device and analyzed to formulate the distortive characteristics.

RESULTS The mean (standard deviation) of intercanthal width was 3.33 (0.25) cm, nasal root width was 2.70 (0.30) cm, alar width was 4.48 (0.31) cm, two tip-defining points (TDP) distance was 2.09 (0.22) cm, nasofrontal angle was 141.10 (8.40)°, length of the nose was 3.10 (0.48) cm, nasofacial angle was 32.94 (4.51)°, nasion projection was 0.64 (0.36) cm, pronasion projection was 2.00 (0.25–2.46) cm, tip angle was 122.7 (4.52)°, nasolabial angle was 78.81 (15.93)°, columella length (n = 20) was 0.64 (0.20) cm, tip lobular portion length was 1.12 (0.20) cm, the extend of extended columella was 0.47 (0.31) cm, and base of the nasal width was 3.98 (0.25) cm.

CONCLUSIONS Nasal siliconoma in Asians had certain characteristics such as a wider nasal root, wider two TDP distance, wider nasion projection, acute nasolabial angle, hanging columella, and a long lobular portion of the tip.

KEYWORDS Asia, face, nose, photogrammetry, silicones

Asian noses are typically boxy with wide alae and a lack of tip projection and dorsal height. Many Asians seek out nose beautification for strong aesthetic reasons.¹ However, some individuals still opt for injectable silicone to augment soft tissue, despite its ban by the Food and Drug Administration in 1940.^{2,3} The lure of cheaper costs and ‘instant’ results can be tempting without realizing the potential for disfiguring complications such as siliconoma.⁴

Surgery remains the primary treatment for correcting aesthetic distortions caused by nasal siliconomas. Unfortunately, achieving the desired aesthetic outcome can be challenging, particularly when attempting to achieve a relatively slimmer nasal dorsum and a defined tip. Surgical correction often results in a broadened nasal dorsum and poor tip definition. Despite the best efforts of surgeons, patients may still be dissatisfied with their appearance after surgery.⁵

Objective data on the distortion characteristics and clinical features of nasal siliconomas have not yet been reported. Hence, to improve the outcomes of nasal reconstruction, this study aimed to provide data as benchmarks for reconstruction that will help surgeons and patients agree on achievable targets for reconstruction and better appreciate the post-surgical results.

METHODS

This cross-sectional study was conducted on 30 females with nasal siliconoma at Cipto Mangunkusumo Hospital, Jakarta, Indonesia, from June 2017 to March 2018. The sample size was calculated based on the standard deviation (SD) of a previous study on the morphometry of the Deutero-Malay female nose.⁶ Deutero-Malay was selected because it was the only specific subrace with available published data on nasal morphometry related to Mongoloid Asians among the various other Asian subraces in Indonesia.

The participants were of Mongoloid Asian origin and had a history of previous injections of materials such as silicone, paraffin solution, and mineral oil in the nasal region. The collected data included age, injection time, service provider, and type of injectable material used. All participants voluntarily participated in the study and provided informed consent and a photo release consent. The Ethics Committee of the Faculty of Medicine, Universitas Indonesia, approved this study (No: 892/UN2.F1/ETIK/2017).

The participants completed a questionnaire regarding their aesthetic perception of their nose and expectations for their future appearance after surgical correction. After receiving a brief information on the available surgical options, they expressed their opinions on nasal reconstructive techniques, including the open technique and the use of autografts and/or implants. They were also asked about their nasal shape before the injection and the reasons for the injection.

Four anatomical landmarks including the maxillofrontal (mf), tip-defining points (TDP), highest point of the columella (c), and subnasal were marked on the subjects' faces using makeup pencils. Photographs were taken with a mirror stand (MirS) device by adopting the technique as described earlier,⁷ using a Canon IXUS 500 HS digital camera (Canon Inc., Japan) (Figure 1). The MirS device provided consistent and unbiased photographs as a constant formula

developed by inventors to convert photographic values into anthropometric values that are consistent with actual facial measurements.⁷

Measurements were taken using the method described by Prasetyono et al⁶ and categorized according to the universal one-third division of the face. The measurements included the intercanthal width, nasal root width (the distance between two mf points), alar width, distance between two TDP, nasofrontal angle, length of the nose (radix to pronasion), nasofacial angle, nasion projection, pronasion projection, tip angle, nasolabial angle, columella length, extension of the columella, and base of the nasal width (Figure 2). From the lateral view, the columella was assessed by measuring the distance between the long axis of the nostril and the columellar edge, as well as the distance from the long axis to the superior nostril rim. Furthermore, the lobular portion of the nose (tip lobule length) and the ratio of the columella to the lobular portion of the nose were measured based on the basal view (Figure 2f). The presence of long-standing inflammation of the nose, which manifested as persistent redness after injection, was also assessed.

Photographs were analyzed using the ImageJ software (LOCI, USA) to obtain morphometric measurements. In addition, the lengths of the upper face (trichion to glabella), middle face (glabella to subnasal), and lower face (subnasal to menton) were measured to obtain the horizontal one-third of the facial parts. Differences between the non-chin-injected and chin-injected groups were analyzed using one-way analysis of variance and Kruskal-Wallis tests. SPSS software version 22.0 (IBM Corp., USA) was used for the statistical analysis.

RESULTS

Thirty females were enrolled in the study, with a mean age of 46.6 (9.01) years. Table 1 shows the demographics of the participants, and Table 2 shows the morphometric data of the nasal siliconomas.

Of the 30 patients, 15 had a low nasal dorsum before the injection, 12 had a low nasal root width, 2 had a round or broad nasal tip, and 1 had broad alae. Eleven participants desired a higher nasal dorsum, and eight wanted to improve their appearance. When asked about the liquid material injected into their noses, 19 participants mentioned "collagen,"



Figure 1. Photograph of the patient with nose siliconoma taken with mirror stand

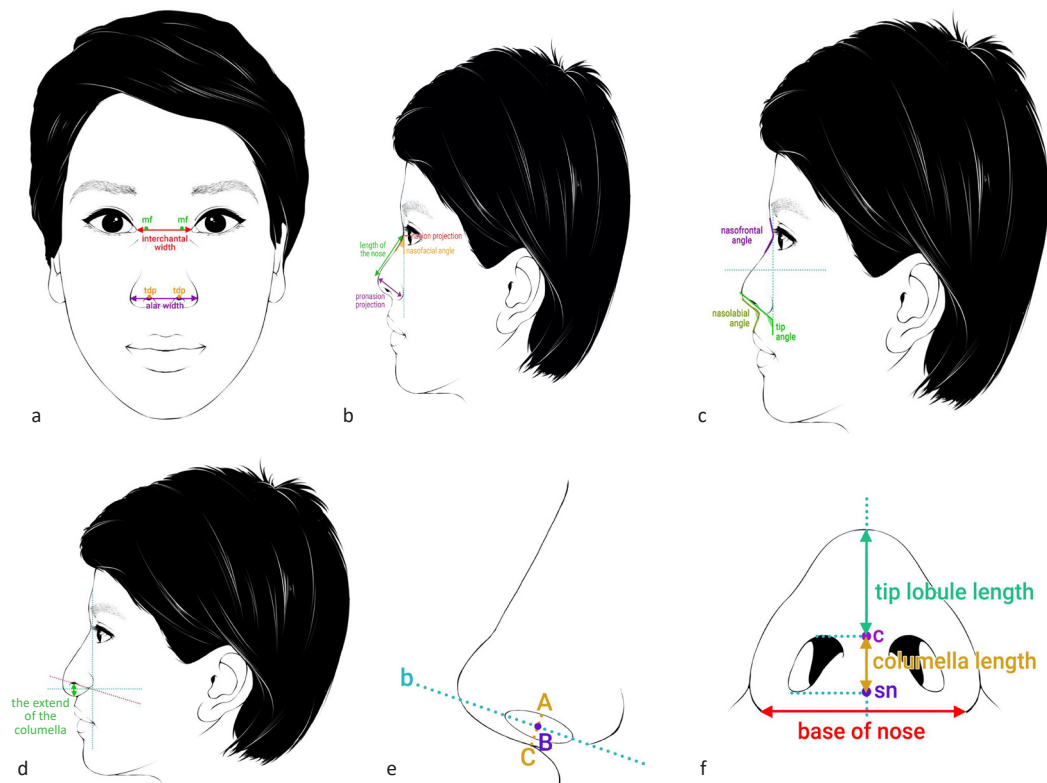


Figure 2. Measurements based on one-third division of the face. (a) frontal; mf-mf was nasal root width, and TDP-TDP was tip-defining points width, (b-e) left lateral; point B to point C was the distance between the long axis of the nostril and the columellar edge. Point A to point B was the distance from the long axis to the superior nostril rim. Point B was the intersection of line b and line AC. Line b was drawn through the most anterior and posterior portions of the oval-shaped nostril, and (f) basal views. mf=maxillofrontal; TDP=tip-defining points; c=highest point of the columella; sn=subnasal

10 mentioned “liquid silicone”, and one mentioned “vitamin”. However, the terms used by the participants may not reflect the actual materials used, as the nonprofessional injectors explained the terms to them based on their own understanding. Likely, the liquid used was silicone.

There were significant differences between the horizontal facial thirds of the participants. The upper part of the face was significantly different from the middle and lower parts. Additionally, significant differences were observed between the middle and lower parts in the non-chin-injected group. However,

Table 1. Demography of the participants

Variables	n (%) (N = 30)
Education	
Elementary school	18 (60)
Junior high school	4 (13)
Senior high school	8 (27)
Marriage status	
Single	2 (7)
Married	28 (93)
Social reason for taking injection	
Lured by provider	7 (23)
Lured by friend	17 (57)
Lured by family	3 (10)
Lifestyle	3 (10)
Provider of injection	
Beautician in beauty salon	2 (7)
Allied health worker	2 (7)
Individual door-to-door salesperson	26 (87)

Table 2. Morphometrics of nasal siliconoma in Asians

Parameters	Nasal siliconoma, mean (SD)	Normal nose, mean (SD)
Intercanthal width (cm)	3.33 (0.25)	3.56 (0.27) ⁶
Nasal root width (cm)	2.70 (0.30)	1.9 (0.2) ⁸
Alar width (cm)	4.48 (0.31)	4.14 (0.28) ⁶
Two TDP width (cm)	2.09 (0.22)	2.09 (0.22) ⁶
Nasofrontal angle (°)	141.10 (8.40)	134.6 (7.3) ⁶
Length of the nose (cm)	3.10 (0.48)	4 (0.21) ⁶
Nasofacial angle (°)	32.94 (4.51)	36.3 (4.3) ⁶
Nasion projection (cm)	0.64 (0.36)	0.43 (0.22) ⁶
Pronasion projection (cm)	2.00 (0.25–2.46)	2.29 (0.26) ⁶
Tip angle (°)	122.7 (4.52)	111.5 (4.4) ⁶
Nasolabial angle (°)	78.81 (15.93)	90.4 (8.3) ⁶
The extend of extended columella (cm)	0.47 (0.31)	-
Base of the nose width (cm)	3.98 (0.25)	3.69 (0.29) ⁶
Columella length (cm)*	0.64 (0.20)	0.78 (0.15) ⁸
Tip lobular portion length	1.12 (0.20)	-

SD=standard deviation; TDP=tip-defining points

*There are 20 data available; ⁶Prasetyono TOH, Karina. Morphometry of Deutero Malay female nose. Med J Indones. 2009;18(2):120–3;

⁸Leong SC, White PS. A comparison of aesthetic proportions between the Oriental and Caucasian nose. Clin Otolaryngol Allied Sci. 2004;29(6):672–6

there was no significant difference between the middle and lower parts in the chin-injected group. The measurements of the horizontal thirds of the faces of the participants are presented in Table 3.

The mean (SD) distance between the long axis of the nostril and the columellar edge was 0.36 (0.22) cm; and 0.14 (0.13) cm from the long axis to the superior nostril rim on the lateral view. On the basal view, the ratio of the columella to the lobular portion of the nose was 1:1.75, with a mean (SD) lobular portion length of 1.12 (0.20) cm and columella length of 0.64 (0.20) cm. Figure 3 illustrates the characteristics of Asian females with nasal siliconoma based on the data above.

Long-standing inflammation was defined as persistent skin redness. Only two of the 30 participants had long-standing inflammation, with no signs of infection.

In terms of anatomical regions, most participants (60%) received injections only in the nasal region, whereas the remaining received injections in other areas such as the chin, lower lip, eyelid, temple, and forehead. After the injection, 19 participants had a higher nasal root, while 11 had a higher nasal dorsum. None of the participants underwent any procedure to remove the injected material.

When asked about their aesthetic perception of their noses, 25 participants rated it as average, four rated as poor, and one as good. Most participants (20) were unaware of the available reconstructive techniques, whereas 10 were aware of several open techniques involving autografts and/or implants. In terms of expectations for future nose reconstruction, 22 (73%) participants expected a higher nasal root, followed by 4 (13%) participants who wished a higher nasal dorsum and a slimmer nasal tip at the same number of responses.

DISCUSSION

The normal ranges of morphometry for the Asian nose are represented by the Oriental^{8,9} and Deutero-Malay⁶ populations. This study showed that nasal siliconoma is characterized by a wider nasal root width, alar width, nasion projection, nasofrontal angle, and tip angle, as well as more acute nasofacial and nasolabial angles, compared with a normal Asian nose. Meanwhile, the intercanthal width and nasofacial angles were similar to what is obtained in a normal nose.

Table 3. Lengths of horizontal facial one-third of the participants

Horizontal one-third of the face	Non-chin-injected group			Chin-injected group		
	Mean (cm) (n = 21)*	Post-hoc multiple comparison Bonferroni	p	Mean (cm) (n = 9)	Post-hoc multiple comparison	p
Upper face	5.77 (0.59)	Upper vs. middle	<0.001	5.44 (0.49) [†]	Upper vs. middle	<0.001
Middle face	6.50 (0.52)	Upper vs. lower	<0.001	6.87 (6.34–8.28) [†]	Upper vs. lower	<0.001
Lower face	6.96 (0.56)	Middle vs. lower	0.030	6.89 (0.49)	Middle vs. lower	>0.99

*Analysis of variance (ANOVA) before post-hoc multiple comparison Bonferroni showing $p < 0.001$; [†]Kruskal-Wallis test before post-hoc multiple comparison showing $p < 0.001$; *mean (range)

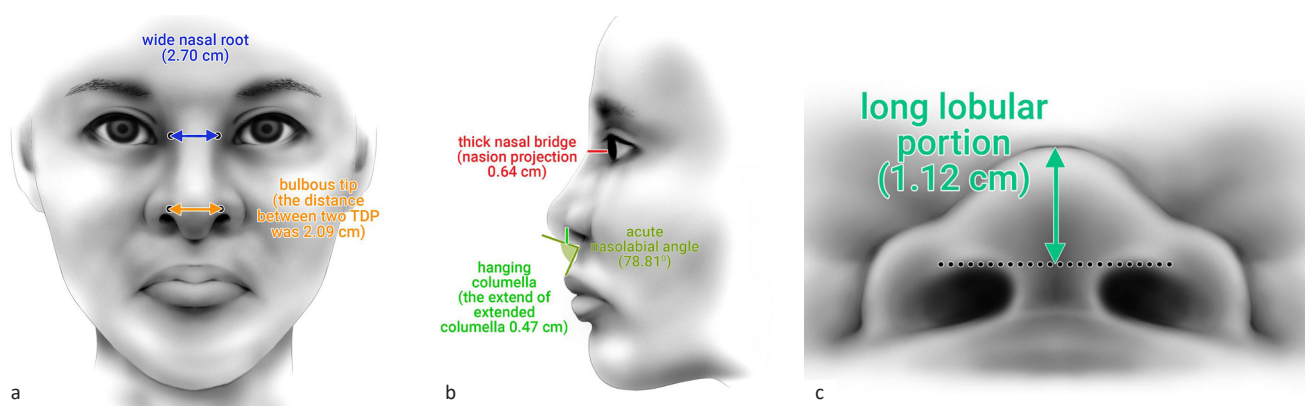


Figure 3. Schematic drawing in the (a) frontal,^{*} (b) lateral,[†] and (c) basal views[†] of the average siliconoma nose in Asian females. *Siliconoma nose had a wide nasal root (2.70 [0.30] cm) and two TDP distance of 2.09 (0.22) cm; [†]the nasion projection was 0.64 (0.36) cm; nasolabial angle was 78.81 (15.93)[°]; the extend of extended columella was 0.47 (0.31) cm; [†]the lobular portion of the tip was 1.12 (0.20) cm. TDP= tip-defining points

This study showed that a face with nasal siliconoma did not fit the neoclassical facial proportion.¹⁰ Distortion of the nose was demonstrated by significant elongation of the middle face compared to the upper face. This was because the subnasal point interfered with the hanging columella. Interestingly, the lower face was significantly longer than the upper face, even in participants who did not receive chin injections, creating an unnatural appearance.

Compared with to the normal Oriental nose, the nasal root of the nasal siliconoma was 1.42 times wider, and the two TDP were 0.6 cm wider, creating a more bulbous appearance.¹¹ The nasion projection or nasal bridge of nasal siliconoma was also 0.21 cm thicker than that of the Asian Deutero-Malay nose⁶ and 0.14 thicker than the Oriental nose.

The distance between the long axis of the nostril and the columellar edge in nasal siliconoma was 0.36 cm, and the distance from the long axis to the superior

nostril rim was 0.14 cm. Based on the classification by Gunter et al,¹² this study showed a true hanging columella in the alar-columellar relationship of nasal siliconomas. As a result of this hanging columella, it is not surprising that the nasolabial angle in nasal siliconomas is more acute than the Asian norm.

From the basal view, the ratio of the columella to the lobular portion of the nose was 1:1.75, with the lobular portion being larger than the columella portion. Unfortunately, there was no reference for this ratio. Among the normal Western population, the ratio is approximately 2:1.¹³

Most participants had an “average” aesthetic perception of their nose, although they knew that their nose differed from the norm. This response may be related to their subjective coping mechanisms for the distortions. Interestingly, most participants with nasal siliconoma demanded a higher nasal root than what was believed to be the higher nasal dorsum.

This study had limitations, including a small sample size and the subject population being from the middle and lower social classes. The invitation for the study did not draw the interest of people from a higher social class who might have different aesthetic perceptions and expectations for their future nose appearance after surgical correction. Moreover, this study had no controls, and it would be better to conduct a case-control study in the future. Nevertheless, there was no comparison between the original features and the features after injection to provide objective data on nasal siliconoma. This study is expected to aid in appreciating reconstructive surgery by referring to the characteristics of the disfigurements identified in this study. Additionally, the questionnaire used in this study was developed without validation.

In conclusion, nasal siliconomas in Asian females were characterized by a wider nasal root and greater width of the two TDP, creating a more bulbous appearance, a thickened nasal bridge, and a hanging columella with a longer lobular portion of the tip.

Conflict of Interest

Theodeus Octavianus Hari Prasetyono is the editorial board member but was not involved in the review or decision making process of the article.

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