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The ideal shape of the female jaw angle: An online survey

Maurice Y. Mommaerts [a,b,*], Robbert Cleymaet [c]

[a] European Face Centre, Universitair Ziekenhuis Brussel, 1090 Brussels, Belgium
[b] Face Ahead Surgicenter, 2018 Antwerp, Belgium
[c] Division of Oro-Maxillo-Facial Surgery, Department Plastic Surgery, University Hospital Gent, 9000 Ghent, Belgium

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ABSTRACT

The aim of this study was to determine the characteristics of an attractive white female jaw angle in the three dimensions.

An online survey of photographs of celebrities and laypeople was used to rate their attractiveness using 6 questions and a 3-item Likert scale. If ≥ 80% of participants rated a model as having attractive aesthetic features, it was considered attractive.

The following features were considered important: a gonial angle in profile of 125.5° and in anterior view of 142°, an intergonial-interzygomatic width ratio of 0.83 and the vertical position of the jaw angles at the level of the stomion or upper lip.

Surgeons can use these consensus criteria to help design a jaw angle implant, define orthognathic surgical strategies, or shape the angle using injectables.

1. Introduction

Many artists, scientists and craftsmen (orthodontists and facial surgeons) have tried to define what is behind the attractiveness of the face (Pallett et al., 2010). The classical and neoclassical proportions of the Renaissance and the golden ratio have been propagated (Iyer et al., 2021; Zwahlen et al., 2022), but have also received criticism (Hwang and Park, 2021; Khoshab et al., 2022; Yalcinkaya et al., 2022). Over the past decade, the emergence of new beauty standards on social media has affected a generation that is also open to cosmetic procedures. More recently, the COVID-19 pandemic has shifted face-to-face meetings to video calls to increase focus and self-reflection on one's own facial anomalies. This 'Zoom Boom' or 'Zoom effect' again increased interest in aesthetic facial treatments (Pikoos et al., 2021).

For facial surgeons, modeling a pleasing aesthetic result is achieved using their knowledge of contemporary beauty standards, ethnic characteristics, patient desires, planning software and experience (Porter and Olson, 2001; Saponaro et al., 2018). Reduction mandibuloplasty is popular in East Asia, and aesthetic angle parameters are available for this population (Guo et al., 2022; Mao et al., 2018). This study was designed to determine what makes the Western/Caucasian female jaw attractive and to help guide mandibuloplasty procedures that have recently become very popular in the West.

2. Materials and methods

The two authors and a non-surgical physician selected 53 white (European, American, Canadian, Australian and/or New Zealand) female personalities who were perceived as attractive by popular magazines and social media (Instagram/Facebook). Facial photographs were selected from Angelina Jolie, Kate Moss, Mila Kunis, Irina Shayk, Scarlett Johansson, Kendall Jenner, Margot Robbie, Iris Mittenaere, Emma Watson, Hailey Baldwin, Rosie Huntington-Whiteley, Cara Delevingne, Gigi Hadid, Miranda Kerr, Ashley Graham, Taylor Hill, Doutzen Kroes, Romee Strijd, Olivia Wilde, Taylor Swift, Ester Expósito, Monica Bellucci, Diane Kruger, Emily Ratajkowski, Ariana Grande, Jessica Stam, Brigitte Bardot, Cindy Crawford, Keira Knightley, Megan Fox, Kara del Torro, Stella Maxwell, Natalie Portman, Charlotte McKinney, Olivia Culpo, Serinda Swan, Marloes Horst, Madison Beer, Candice Swanepoel, Nadine Leopold, Emilia Clarke, Martha Hunt, Karlie Kloss, Lily James, Gisele Bundchen, Jessica Biel, Barbara Palvin, Victoria Beckham, Ursula Corbero, Emma Stone, Amber Heard.). Photographs from around their young adult years were collected and distributed with randomly selected individuals with no abnormalities. The non-copyrighted face pictures from the internet (Instagram, Facebook, Google) were reformatted to black and white jpeg format. Photographs in frontal, sagittal and oblique view were found but not available for everyone. Accordingly,

* Corresponding author. Face Ahead Surgicenter, Van Putlei 35a, B-2018 Belgium
E-mail addresses: info@mauricemommaerts.eu (M.Y. Mommaerts), cleymaetrobbert@gmail.com (R. Cleymaet).

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individuals were grouped to measure specific characteristics. The eyes were covered.

2.1. Assessors

Each eligible assessor was reached through the authors' personal contact list. Informed consent, email address, age, sex, and professional occupation (facial surgeon versus non-facial surgeon) were requested and recorded. The data were anonymized.

2.2. Online survey

An online survey was set up with Google Docs and made available from July 1 to September 30, 2021. The questionnaire consisted of 6 questions. The participants rated their aesthetic appreciation with the Likert scale (Likert, 1932).

The following parameters were analyzed: the jaw angles (contour) in anterior view (question 1), the intergonial width in anterior view (question 2), the angle of the lower edge in relation to the horizontal plane (question 3), the vertical position of gonion in relation to of the mouth (question 4), the slope of the lower edge relative to the horizontal plane in profile view (question 5) and the relationship between the vertical component of the lower jaw and the forehead slope (question 6). If $\geq$ 80% of participants rated a model with pleasant aesthetic features, it was considered attractive. The aim of the study was to define the attractive white female jaw angle and to construct the results as guidelines for surgical planning.

2.3. Statistical analysis

Data were analyzed using SPSS software, version 27 (IBM Corp, Armonk, NY, USA). A two-sample unequal variance *t*-test was performed to compare measures between attractive (score $\geq$80%) and non-attractive women. Inter-rater reliability (95% confidence interval) was assessed with the intraclass correlation coefficient (ICC) between facial surgeons and participants with no expertise in facial surgery. Results were considered statistically significant if the *p*-value was less than 0.05.

3. Results

3.1. Assessors

A total of 46 assessors were enrolled in the study: 38 male (82.6%) and 8 female (17.4%). About 32 (69.5%) performed contouring surgery of the face, and 14 (30.4%) had no expertise in this field. The mean age of all the assessors was 46.2 $\pm$ 12 years.

3.2. Online survey

Each assessor assessed 88 models: 16 models for question 1, 12 for each question from 2 to 4, 20 for question 5 and 16 for question 6. The estimated time to complete the survey was 15 min.

Question 1 analyzed the jaw angle contour in frontal view: model #10 (Fig. 1) had the highest score (76.1%), but no model was considered attractive according to the >80% rule. Model #16 (Fig. 2) had the worst score, with 97.8% considering her as unattractive. More results are displayed in Table 1. The average interrater reliability was high: 0.9 (95% CI 0.95–0.99) for facial surgeons, and 0.93 (95% CI 0.87–0.97) for assessors having no expertise.

Question 2 analyzed the intergonial-interzygomatic width ratio (Fig. 3): three models had an attractive intergonial distance. Average measure interrater reliability for facial surgeons was 0.92 (95% CI 0.83–0.97), and 0.844 for participants having no expertise (95% CI 0.68–0.97).

Question 3 assessed the angle of the lower border in frontal view in relation to the Frankfort horizontal plane: all participants (100%)

Fig. 1. Gonial angle in frontal view (yellow lines–question 1). Model #10 was considered to be the most attractive by 76,1% of the assessors. Her gonial angle was 139°.

Fig. 2. Most unattractive gonial angles.

Table 1
3-item Likert scale questionnaire regarding the attractiveness of different features of the female jaw angle.

Question 1: How would you rate the jaw angles (contour) of these models in frontal view?
1 = unattractive; 2 = sufficient; 3 = attractive
Question 2: What is your opinion about the jaw width in frontal view?
1 = too narrow; 2 = good; 3 = too wide
Question 3: What is your opinion about the angle of the jawline in frontal view?
1 = too steep; 2 = good; 3 = too flat
Question 4: What about the vertical position of the gonial angles in frontal view?
1 = too low; 2 = good; 3 = too high
Question 5: What do you think about the inclination of the lower border in profile view?
1 = too steep; 2 = good; 3 = too flat
Question 6: What is your opinion about the lower jaw when taking the forehead slope into account?
1 = unattractive; 2 = sufficient; 3 = attractive

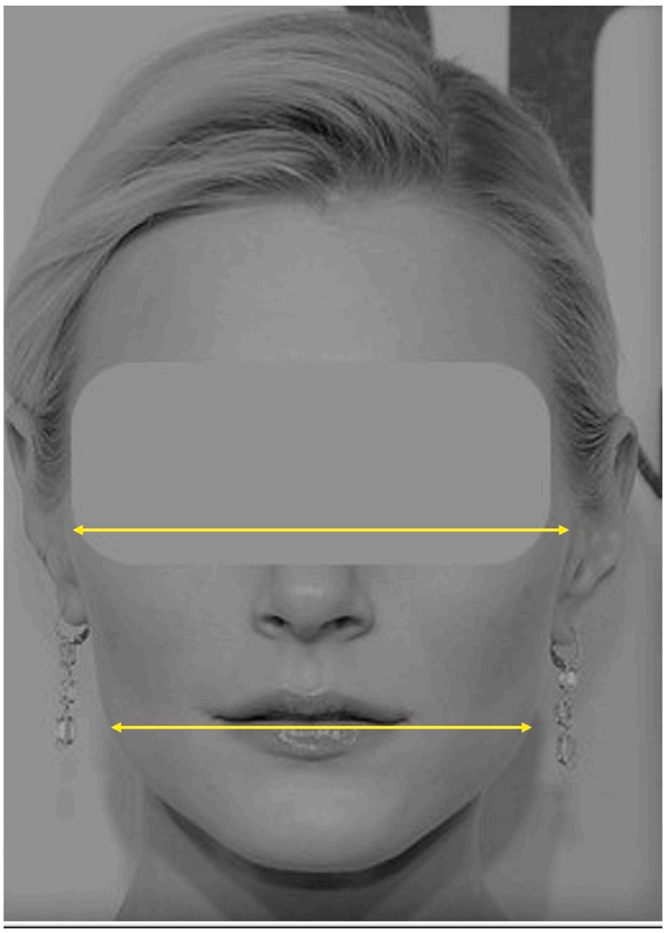

Fig. 3. Intergonial distance/interzygomatic distance in frontal view (yellow lines–question 2). Her ratio was 0.842.

agreed about model #29 (Fig. 4) having an attractive jaw angle. Model #32, #35, #34 and #40 were also perceived as attractive (≥80%). High reliability (ICC) was shown: 0.97 for facial surgeons (95% CI 0.95–0.99), and 0.95 for non-surgeons (95% CI 0.90–0.98).

Regarding the vertical position of the jaw angle in question 4, only model #46 (82.6%, Fig. 5) had an attractive vertical position, which was not too high or too low compared to stomion. However, reliability was low: 0.38 for facial surgeons (95% CI –0.26 to 0.79), and 0.30 for non-surgeons (95% CI –0.47 to 0.76).

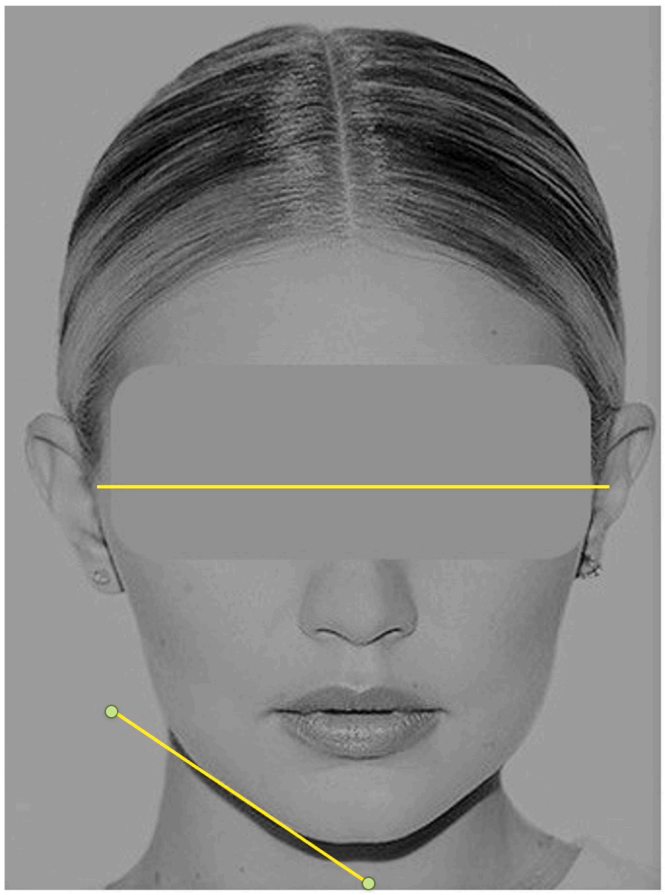

Fig. 4. The jaw angle (question 3) of model #29 was rated good by 100% of the assessors as being niether too steep nor too flat. The angle measured 141.9°.

In question 5, the inclination of the lower border was compared to the horizontal plane. At least 80% of the participants scored 6 models (#53, #59, #63, #64, #66 and #69, Fig. 6) having this feature as attractive. Excellent indications of reliability were obtained: 0.94 for facial surgeons (95% CI 0.89–0.97). For participants having no surgical experience, it was 0.77 (95% CI 0.59–0.89).

Question 6 analyzed the relation between the vertical component of the jaw and the forehead slope. None of the models obtained an attractive relationship higher than 80%. However, 93.5% scored model #79 (Fig. 7) as non-attractive. Interrater reliability showed excellent agreement between facial surgeons, which was 0.96 (95% CI 0.93–0.98). For non-surgical participants, it was 0.89 (95% CI 0.78–0.95), indicative of good agreement.

3.3. Attractive vs non-attractive/sufficient faces

Statistical difference between attractive and non-attractive/sufficient faces was determined for each feature (Tables 2–14 in supplementary material).

In the attractive group, the gonial angle in frontal view was 141.9° ± 0.96 (SD). For the non-attractive/sufficient ones, which combines the gonial angles from question 1 and 3, it was 140° ± 3.96 ($p = 0.05$). The average attractive woman had an intergonial-interzygomatic width ratio of 0.83 ± 0.01, and the non-attractive/sufficient 0.86 ± 0.028 ($p = 0.08$). Regarding the vertical position of gonion, higher scores were given when it was positioned at the level of the stomion or upper lip rather than below. The mean gonial angle in profile for attractive women was 125.5°, while the angle was higher for non-attractive ones (129.1°). Those results were not statistically different ($p = 0.28$). No relation was found between the vertical component of the jaw and the

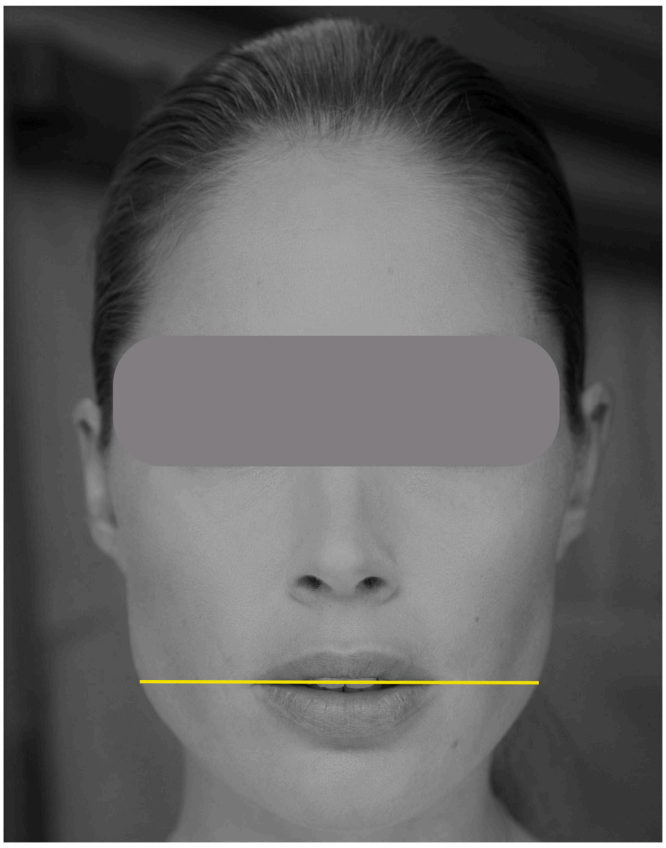

Fig. 5. Model #46 had a pleasing vertical position (question 4) as 82.6% of the raters thought it was attractive. Gonion was positioned at the level of stomion in this example.

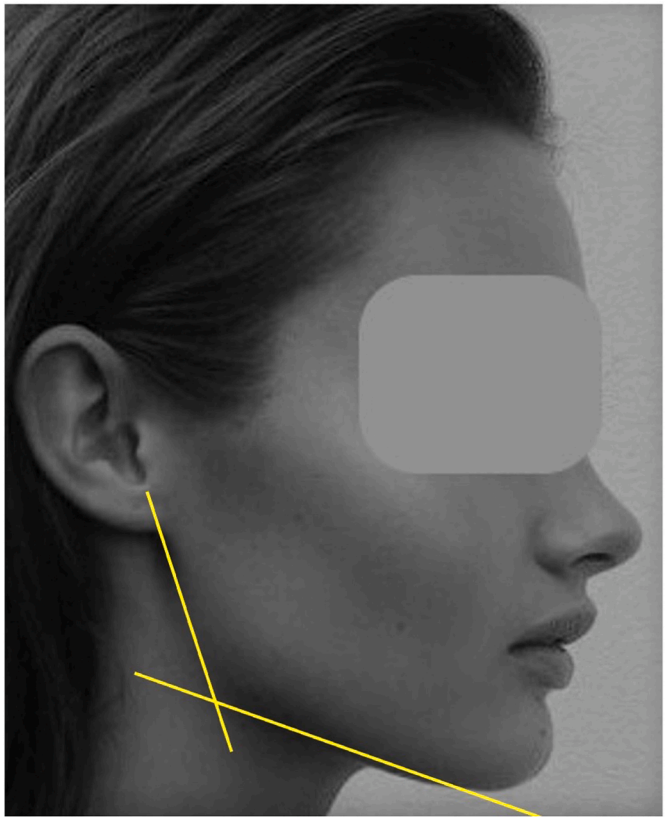

Fig. 6. Model #63 was considered the most appealing in terms of the inclination of the lower border in profile compared to the horizontal plane (question 5), with 93% of those surveyed agreed on this finding. Her gonial angle in profile was 122.3°.

forehead slope.

4. Discussion

The importance of pleasing facial aesthetics in numerous elements of one's well-being and quality of life is traditionally understated in medicine. An attractive face is associated with more opportunities, more success and self-confidence (Little et al., 2011). As a result, surgeons are sometimes consulted to alter the physical appearance of the facial bones. The chin, malar region and jaw angle are areas of great interest in feminisation of *cis*- and transgender women (Ching et al., 2021). In east Asia, lower face recontouring by reduction mandibuloplasty is common (Guo et al., 2022).

Mommaerts and Moerenhout (2011) and Mommaerts (2016) found that while white men demand a strong and square jawline with a heavy chin, white women appreciate softer facial features, such as a pointed gnathion with reduced chin width/height and a reduced intergonial distance. Differences exist between ethnicities.

Most studies concerning attractive faces were analysing proportions and angles in one plane (Kiekens et al., 2008; Mommaerts and Moerenhout, 2011; Büttner and Mommaerts, 2015), or explored other racial groups (Mao et al., 2018). To our knowledge, this is the first article analysing the ideal white female lower jaw in two planes (coronal and sagittal).

The aim was to analyse as many models as possible, without altering the attention span of the participants. This was achieved by providing a 3-item Likert scale, to complete the survey within a reasonable time (about 15 min).

In our three-dimensional study, it was found that the ideal female lower jaw has an angle of 142° in frontal view, 125.5° in profile view, and is vertically positioned at the level of the stomion or upper lip, with an intergonial-interzygomatic width ratio of 0.83:1. In agreement with an analysis of Chinese women, a gonial angle in profile view of 124° ± 3° (SD) and a vertically positioned angle at the occlusal level or higher was seen as appealing. However, in the Chinese study, the jaw was judged to be more attractive if it had an intergonial-interzygomatic ratio of 0.73:1 (1–2.5 cm below the ear lobe) (Mao et al., 2018). The latter characteristic shows that the ideal female jaw's shape differs between Chinese and white women. As the Chinese say: "瓜子脸 (guāzǐ liǎn) pretty face having oval shape." Also, in a Persian study, orthodontists and surgeons gave the highest attractiveness scores to intergonial: interzygomatic ratio of 72.5%, while the best ratio was 74.4% for the laypeople (Moradinejad et al., 2022). Surgeons and orthodontists gave the highest score to a gonial position of 4.5 mm above the mouth, while the laypeople gave the highest score to the gonial height of 4.5 mm below the mouth.

Bajracharya et al. (2021) found that the mean gonial angle was 133° in hyperdivergent skeletal patterns (SD 3.3°), 124°in normodivergent skeletal patterns (SD 3.9°) and 119° in hypodivergent skeletal patterns (SD 6.4°). Our attractive gonial angle in profile of 125.5° places it in the category of normodivergent skeletal patterns. Hence, abnormality (the sub- or supranormal) is not considered attractive in case of a white and Chinese female jaw angle.

Attractiveness is not, per definition, related to morphology. Profession and one's gender both play a part in how beauty is perceived. This was revealed in several studies after noting that transgender women and surgeons both consider an obtuse gonial angle to be more attractive and feminine than do cisgender women (Balaji, 2016; Ching et al., 2021).

There are several options to accentuate or de-emphasize the gonial angle (Monson, 2013; Büttner and Mommaerts, 2015; Mommaerts et al., 2019). Currently, CAD/CAM implants have become an extra option. The various planes of the jaw angle will be affected differently depending on

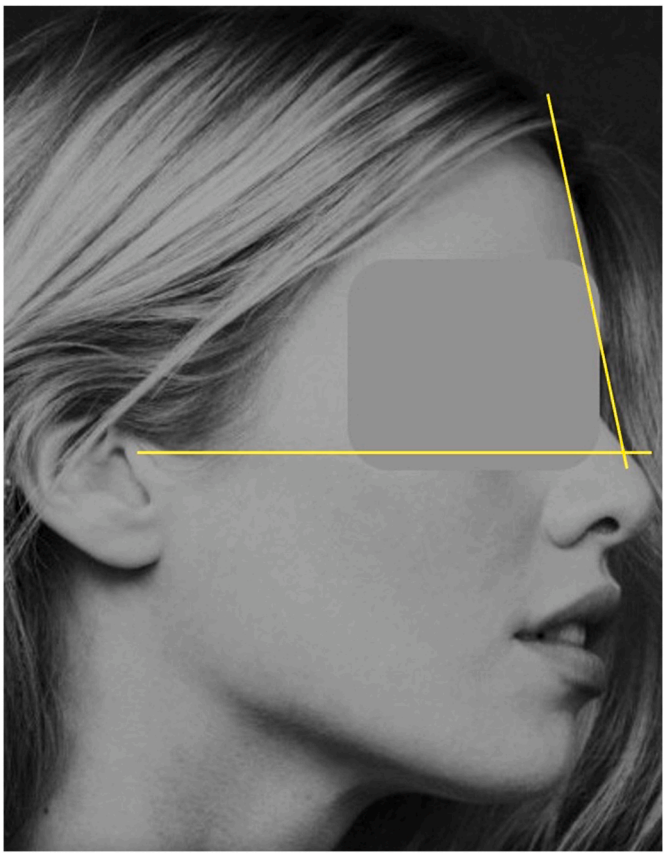

Fig. 7. For the relationship between the vertical component of the jaw and the slope of the forehead (question 6), none of the models achieved an 80% agreement. Model #82 (here depicted), received the highest score, with 76.1% of the voters rating her attractive.

the shape of the implant.

There are several limitations to this study. Complete anonymization of the pictures remained a difficult task. The use of models from the model/fashion/movie industry made the likelihood of recognizing the personalities very high and may account for a source of bias. Another caveat is the fact that other facial features may have influenced the participant's decision, such as jewellery, hair style, or shape of lips, chin, and nose. Finally, the evaluation of the images may also be altered by the assessor's age (not studied).

5. Conclusion

Based on an online survey, the attractive characteristics of the white female jaw angle have been determined. It has an angle of 142° in frontal view, 125.5° in profile view, and is vertically positioned at the level of the stomion or upper lip, and the face has an intergonial-interzygomatic width ratio of 0.83:1. These results will aid the surgeon during the patient evaluation and surgical planning of a *cis*- or transgender jaw angle.

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Informed consent and ethical committee approval

Both were not required as the study entailed no patients, and the photographs of human females were available online.

Declaration of competing interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jcms.2023.08.009.

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