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Bone Aspects to Be Considered in Surgical Intervention for Feminization of a Face With Male Characteristics

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ABSTRACT

Introduction: this work compiled the differences between the shape of the male and female skull and reproduced, in an artificial cranium, the changes resulting from the feminization of the facial skeleton.

Objective: was to assess whether surgical interventions on the facial bones can result in a face with more feminine contours.

Methods: initially, exploratory research was carried out to qualitatively identify male and female cranial characteristics in natural skulls. The specimens analyzed belong to the collection of two Human Anatomy Laboratories from Universidade Federal dos Vales do Jequitinhonha e Mucuri (UFVJM) in Minas Gerais, Brazil. Surgical interventions on facial bones were performed on an artificial male-looking skull to qualitatively assess the shift from a male cranial aspect to a female pattern. Results: This study indicated that an increase in nasofrontal angle, attenuation of the supraorbital hump, shortening of zygomatic distance, and reduction of bigonial and chin width determine a more feminine-looking face.

Conclusion: bone surgical interventions indicated for facial feminization can modify the characteristics that confer masculinity to the face.

Keywords: Facial feminization; Facial skeleton; Surgical interventions; Skull.

Introduction

At birth, the individual is classified into two different groups based on the appearance of their external genitalia. Then people are raised and educated within cultural parameters designated for what would be the corresponding gender and, culturally, gender identification with the corresponding biological sex is expected. However, some people develop a different gender from the stereotype defined by their genitalia.

According to Shams and Motamedi[1], a person's sex refers to what is seen, while gender corresponds to what one feels. Some people have a whole life of not identifying with their bodies. Others, at a given moment, seek to adapt their bodies to the gender they identify with. In this aspect, the face is a crucial point, since the social identification of the person and their characterization as female or male occurs, at first, through visual contact and the formation of the facial image.

Becking and colleagues[2] argue that among transgender individuals there is a desire to live and be accepted as a member of the opposite sex. This desire leads to the search for a somatic treatment that makes the body compatible with gender identity. Altman[3] mentions that facial feminization surgery aims to convert a face with male characteristics into a female one.

Sexual dimorphism is conditioned, especially, by the hormonal level. Thus, the development of sex differences in the skeleton reflects hormonal differences underlying each sex[4]. Lundgren and Farnebo[5] state that individuals who have chosen to transition from "male to female" but have not started the process before puberty have a face with more masculine characteristics as a result of testosterone.

Many surgical procedures in soft tissues, bones, and thyroid cartilage are used to obtain a female appearance in an originally male face[6-10]. Such interventions are based on maxillofacial techniques.

Captain et al[9] state that facial feminization allows better adaptation to the work, social, and family environment, as it allows for modifying and eliminating the masculine characteristics of the face of these patients. In this sense, other researchers[5] argue that relationships between parts of the craniofacial skeleton are much more important for facial feminization than absolute measurements of angles and projections.

Although facial feminization surgery is predominantly performed on transgender women, cisgender women also benefit from these procedures. More feminine contours can be achieved in women with faces that resemble the masculine aspect. In this sense, the work by Talisman[11] with a series of 105 patients also included 27 cisgender women who sought

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a more feminine appearance.

Shams and Motamedi[1] made a comparison of the main features and facial parameters in men and women. In summary, they highlighted that women have a greater nasofrontal angle, a more pointed chin, a less supraorbital hump, and a less zygomatic and bigonial width. In addition, the nasal dorsum is slightly concaved in females and relatively straight in males.

In this work, a description of the existing differences between the shape of the male and female skulls was performed. Then, a compilation of surgical modifications in specific cranial points of the facial skeleton was also presented in an anatomical model of the skull to indicate surgical references for facial feminization procedures.

Material and Methods

Exploratory research was carried out in natural skulls to observe the characteristics of female and male skulls. The skulls belonged to the laboratories of Human Anatomy of the Faculdade de Medicina do Mucuri (FAMMUC) and the Faculdade de Ciências Biológicas e da Saúde (FCBS) in the cities of Teófilo Otoni and Diamantina, respectively. Both faculties are part of the Universidade Federal dos Vales do Jequitinhonha e Mucuri (UFVJM) in the northeast of the state of Minas Gerais, Brazil.

A series of interventions on a male artificial skull was performed to observe and qualitatively catalog the change from a male to a female pattern in the facial skeleton. The authors state that every effort was made to follow all local and international ethical guidelines and laws that pertain to the use of human cadaveric donors in anatomical research.

2.1 Research Steps

Initially, a photographic record was made of the collection of skulls and jaws from the laboratories of FAMMUC and FCBS.

A total of 17 skulls were examined and randomly numbered from 10 to 26. Skulls numbered 19 and 26 were discarded since their state of conservation did not allow their classification. The remaining 15 skulls were considered suitable for the research. Each skull was photographed in an anterior view and also in the left and right half-profile.

Skulls were then classified as male or female according to the following bony facial features: nasofrontal angle, supraorbital hump, and zygomatic width. It was established that an agreement of 2 of these criteria would be sufficient to define sex, even if the third criterion was discordant.

A total of 15 mandibles were examined and randomly numbered from 1 to 15. In a similar way to the skulls, mandibles numbered 6, 7, 8, 9 were discarded due to the state of conservation. The characteristics used to classify the mandibles into male and female were chin shape and bigonial width[1]. However, only the bigonial width in the disarticulated mandible did not give a definition as true as in the set with the rest of the skull. Thus, we chose to analyze the shape of the gonial angle based on Krogman[12] and White and colleagues[13] as follows:

"The mandible in males is larger and thicker, with a greater height of the body, especially at the symphysis, and with a wider ascending ramus; the gonial angle formed by the body and ascending ramus is less obtuse; and the condyles are larger (...). It is also noted the robustness of the chin, that is, the mentum in males is more prominent, being more discreet in females."

Right gonial angles or angles closer to 90° usually define a more masculine pattern, while obtuse angles or greater than 90° distinguish a more feminine pattern. The rounded shape of the chin suggests a female face, while a squared-type chin with well-defined angles is typical of the male.

The male and female skulls and mandibles were qualitatively compared to obtain references regarding bone surgical procedures for facial feminization. In a male artificial skull, interventions were performed at the points defined for feminization and the photos before and after each procedure were compared. Although some of these points could be measured with appropriate instruments (caliper and goniometer), the relationship between the parts is more important than the absolute measurements of angles and projections[5]. The relationships of greatest interest were:

- Nasofrontal Angle – on average 3 degrees higher in women.
- Zygomatic Distance – on average 7 mm smaller in women.
- Bigonial Width – on average 6 mm smaller in women.

The interventions performed on a male artificial skull for facial feminization were the reduction of the supraorbital hump (which also reduces the nasofrontal angle), the reduction of the zygomatic distance, the reduction of bigonial width (including modification in the contour of the angle of the mandible) and the reduction of the width of the chin.

Each point undergoing intervention on the skull was marked with black ink and photographed (Canon EOS 600D machine). The entire marked area had its dimensions modified and was subsequently photographed again in frontal view, half right profile, and half left profile until the entire intervention was complete.

Interventions on the artificial skull were performed using an electric surgical motor and surgical drills, which are part of the Oral Maxillofacial Surgery arsenal.

Results

Based on the criteria proposed by Shams and Motamedi[1], 10 skulls were classified as male (58.8%), while the remaining 5 skulls were classified as female (29.4%). The skulls that presented the 3 defining characteristics of the male sex (smaller nasofrontal angle, more pronounced supraorbital hump, and greater zygomatic width) corresponded to 80% of the male sample. Two skulls were defined as male because they presented at least 2 typical male criteria, representing 20% of the male sample.

Two skulls presented 3 female characteristics (greater nasofrontal angle, less supraorbital bossing, and smaller zygomatic width), representing 40% of the female sample. Three skulls were defined as female because they presented at least 2 favorable criteria, representing 60% of the female sample.

Figure 1 shows representative examples of male (nº 23) and female (nº 18) skulls, in which the supraorbital bossing, the nasofrontal angle and the zygomatic distance can be compared.

Of the total sample of valid jaws (11 pieces), three were defined as male (27.27%) and eight were classified as female (72.72%). In all 11 pieces analyzed, the shape of the chin and the gonial angle were coincident for the male or female pattern. In other words mandibles with rounded chins had obtuse gonial angles (greater than 90°), representative of the female pattern. When the chin was more square, the gonial angles were straighter (closer to 90°), thus defining the male pattern.

Figure 2 shows male (1) and female (2) mandibles most representative of the sample. The shape of the gonial angle and the width and shape of the chin are evident.

The results of the experiment with the artificial skull can be seen in Figure 3, which shows the change from a male pattern to a female pattern. The same skull is portrayed before and after facial feminization interventions. In Figure 3, the photos on the left show the skull before the intervention, showing a prominent supraorbital hump (with acute nasofrontal angle), large zygomatic width, large bigonial width (with right angles), and wide chin with defined angles in the transition to the body of the jaw. The photos on the right show the same skull after interventions for feminization. Note the increased nasofrontal angle, attenuated supraorbital hump, shortened zygomatic distance, and reduced bigonial width with obtuse (rounded) gonial angles, and reduced chin width with a smooth transition to the body of the mandible.

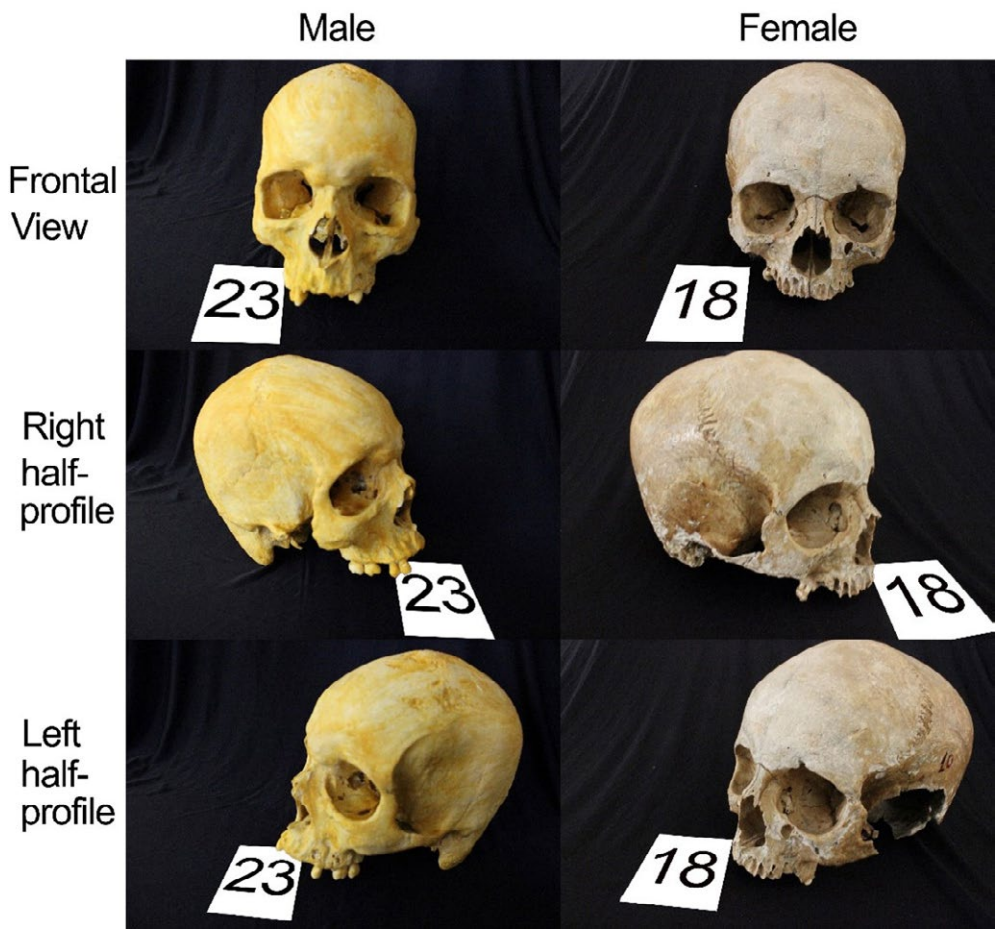

Figure 1. Frontal view (anterior), right half-profile and left half-profile of male and female skull.

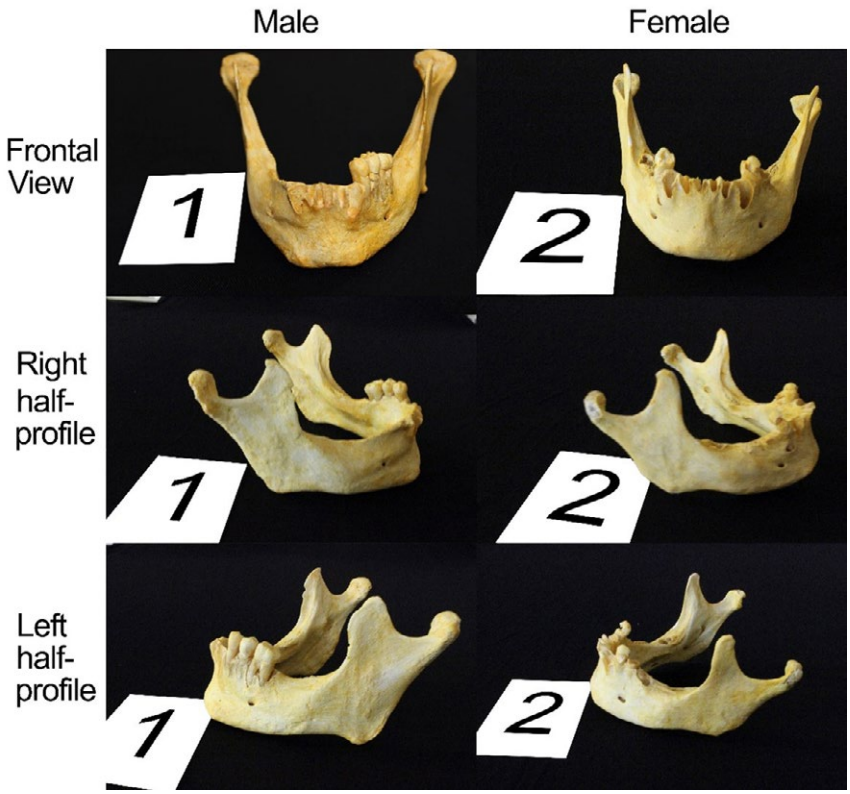

Figure 2. Male and female jaws.

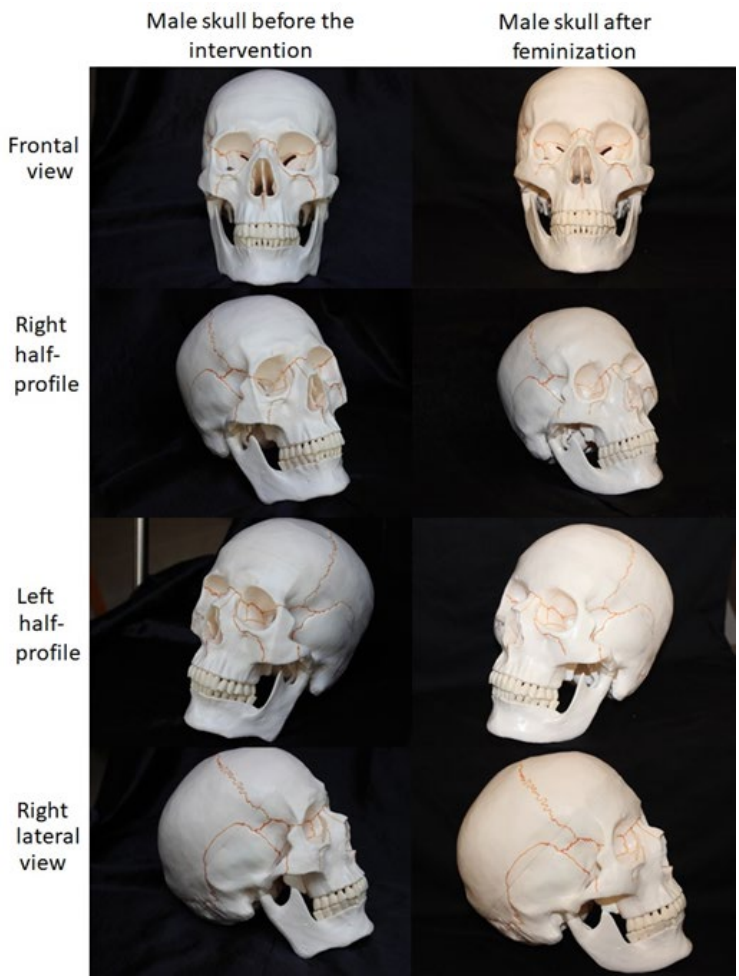

Figure 3. Male artificial skull before and after feminization. Interventions were performed in the nasofrontal angle, zygomatic bones, gonial angles and chin.

Discussion

It is known that skulls do not have uniquely male or female characteristics. The predominance of some characteristics over others is what defines the facial pattern for sex. The female pattern is more difficult to define by qualitative analysis in dry skulls, see the lower percentage of agreement of the 3 criteria used to define the sex of the skeletons. The criterion that most frequently generated doubts was the zygomatic width, with the supraorbital bossing and nasofrontal angle as the best definers between male and female patterns in the dry skull.

As qualitative and subjective criteria, we can assume that the shape of the chin and the gonial angle are good definers of male and female patterns in mandibles.

The proposed surgical interventions on the facial skeleton can change the characteristics of a male to a female skull, as shown in Figure 3. Bone surgical interventions indicated for Facial Feminization can be systematized considering the modification of the characteristics that confer masculinity to the face[14]. Thus, the interventions to be carried out would be a reduction of the supraorbital hump and supraciliary arches, reduction of the nasofrontal angle, reduction of zygomatic distance, reduction of bigonial distance with rounding of the mandibular angle, making it more obtuse, and reduction of the width of the chin with rounding of its angles creating a smoother transition to the body of the mandible.

Conclusions

The demand for facial feminization of transgender women and also of cisgender women who seek to modify some facial features has grown. The importance of this work lies in indicating consistent surgical references for facial feminization procedures. To give female contours to the male skull, the surgeon must reduce the supraorbital hump, supraciliary arches, nasofrontal angle, and zygomatic distance. Reduction of the bigonial distance, leaving the angle of the mandible more rounded and obtuse, and reduction of the width of the chin, leaving its contour more rounded and with a smooth transition to the body of the mandible, complete the interventions for facial feminization.

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