Facial Feminization Surgery: Part 1 of the Plastic Surgeon’s Perspective of Gender-Affirming Surgery

Alexander R. Gibstein, BA  
Sinan K. Jabori, MD  
Sara Danker, MD

The perceived feminine face is distinctly unique from the perceived masculine face. Facial feminization surgery (FFS) includes a range of surgical procedures designed to change characteristically masculine facial features into feminine ones. FFS encompasses a set of bone and soft-tissue reconstructive procedures including, but not limited to, forehead contouring with or without frontal sinus setback, hairline adjustment, brow lift, rhinoplasty, lip lift, mandibular shaping, genioplasty, and “tracheal” shave, and fat grafting. Some patients choose to undergo one, all, or groupings of the procedures. The surgical decision is tailored to the individual and based on clinical opinion, patient desire, and insurance status or means to pay. FFS improves patient quality of life, has good general aesthetic outcomes, and improves feminine gender appearance (Morrison et al., 2020).

The perceived feminine face is distinctly unique from the perceived masculine face (Table 1). There are certain features of male and female human faces that make it unmistakable, even when just looking at a silhouette or profile (Ousterhout, 1987). Facial feminization surgery (FFS) includes a range of surgical procedures designed to change characteristically masculine facial features into feminine ones. FFS encompasses a set of bone and soft-tissue reconstructive procedures including, but not limited to, forehead contouring with or without frontal sinus setback, hairline adjustment, brow lift, rhinoplasty, lip lift, mandibular shaping, genioplasty, “tracheal” shave and fat grafting. Some patients choose to undergo one, all, or groupings of the procedures. The surgical decision is tailored to the individual and based on clinical opinion, patient desire, and insurance status or means to pay. Patients often note that their jaw, brows, and chin are the most masculine aspects of their face and thus these tend to be common areas of concern and anxiety (Morrison et al., 2020).

The goal of facial feminization is to modify the appearance of the face so that the presenting individual physically matches their gender identity and is socially perceived as female. Transgender women desire to be recognized and treated as female. Because it is the feature of every person most outwardly presented to the public, facial feminization is considered one of the most influential mechanisms in supporting the transition of transgender women (Morrison et al., 2020). FFS improves patient quality of life, has good general aesthetic outcomes, and improves feminine gender appearance (Morrison et al., 2020).

Studies have shown that FFS successfully changes the social perception of a patient’s gender. After undergoing FFS, patients are more likely to be identified as female and to have greater confidence than before surgery despite using preoperative female hormone therapy and nonsurgical methods to feminize their appearance (Chen et al., 2020; Fisher et al., 2020). As the acceptance of transgender individuals grows, and with Medicare covering many gender-confirming surgeries, having health care professionals versed in the techniques and outcomes of facial feminization surgery is critical for the continued growth of the field (Rabin, 2014). It is important that facial feminization be incorporated into the overall care of a transgender patient, as research has illuminated improvements in quality of life and high patient satisfaction associated with it (Ainsworth & Spiegel, 2010; Raffaini et al., 2016). In a prospective, international, multicenter cohort study on quality-of-life outcomes after FFS, the researchers found that FFS achieved improved quality of life, feminized cephalometries (i.e., dental and skeletal features of
the human skull), increased feminine gender appearance, provided good overall aesthetics, and led to high levels of patient satisfaction, all of which were present and stable at more than 6 months after surgery (Morrison et al., 2020).

Unlike breast and genital gender-affirming surgery, there is no World Professional Association for Transgender Health (WPATH) criteria specifically for facial surgery at the time of this writing. Patients desiring to undergo FFS do not require a letter from a psychologist or psychiatrist. However, research has shown that once beginning hormonal therapy, it may change the appearance of the face for up to a year and thus performing FFS after just 1 year of hormonal therapy may be too early (Tebbens et al., 2019). This article describes the major FFS options available to clinicians to support their transfeminine patients’ goal of achieving an outwardly feminine appearance. Currently, the topic of transgender health care is being discussed more than ever before. According to data from 2016, approximately 1.4 million people in America identify as transgender. This number has grown and continues to do so (Flores et al., 2016).

FFS HISTORY

Although gender-affirming surgery can be traced back to 16th-century Europe, it was in the 1980s when studies related to FFS were first initiated, primarily related to attempts to modify and alter the forehead (Zurada et al., 2018). This research was conducted by Douglas Ousterhout, MD, a pioneering surgeon who assessed the sexual differences of the human skull (Plemons, 2014). His research helped determine that thick frontal sinuses; supraorbital bossing (i.e., a prominent, protruding forehead); straight, flat eyebrows; an M-shaped hairline with temporal recession; and a flat forehead are associated with the male skull and phenotype (Plemons, 2014). Remarkably, a patient request led to the development of FFS in 1982 when plastic surgeon Darrell Pratt, MD, approached Ousterhout regarding one of his patients on whom he had performed male-to-female genital reconstruction. Although the patient’s private life had profoundly changed, her public life had not. Ousterhout developed an algorithm for forehead contouring and reduction of supraorbital bossing. Based on the thickness of the anterior table of the frontal sinus, augmentation could be undertaken with minimal bony reduction (Morrison et al., 2016). Ousterhout also performed the initial studies on feminization of the chin and jaw, mainly focusing on reducing the mandibular angles and narrowing the chin.

Like any other surgery, FFS underwent many modifications to refine the techniques. Further approaches to modifying and contouring the face to achieve a more feminine appearance have been undertaken by various surgeons. They range from supraorbital shaving with excision of excess skin after scalp undermining allowing for brow lift and hairline lowering to osteotomy of the anterior table of the frontal sinus, followed by contouring and replacement with microplates, to use of virtual surgical planning for design of osteotomies and contouring (Morrison et al., 2016).

FFS FUNDAMENTALS

FFS is a critical part of the treatment of gender dysphoria, defined as discomfort/distress caused by a discrepancy between a person’s gender identity and assigned sex. A male skull has a rectangular shape, a wider, more pronounced chin, and a vertically longer jaw than a female skull, which is oval with a shorter and more pointed chin and jaw (Table 1). Although addressing each component of the face is critical to creating a female appearance, the periorbital region or upper third of the face provides

<table>
<thead>
<tr>
<th>Facial Feature</th>
<th>Male Characteristics</th>
<th>Female Characteristics</th>
<th>Surgical Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forehead</td>
<td>Enlarged frontal sinus with frontal bossing and deep-set eyes, M-shaped hairline</td>
<td>Smaller frontal sinus with a convex forehead, O-shaped hairline</td>
<td>Forehead contouring, Frontal sinus setback, Scalp advancement</td>
</tr>
<tr>
<td>Nose</td>
<td>Wide nasal bone with flared nostrils, Acute nasalabial angle</td>
<td>Narrow dorsum, Obtuse nasolabial angle with slightly raised tip, Small nostrils</td>
<td>Feminizing (reduction) rhinoplasty</td>
</tr>
<tr>
<td>Jaw and chin</td>
<td>Wider and longer jaw due to pronounced lateral flare and protuberance, Flared and sharp mandibular angles, Square-shaped chin</td>
<td>Soft mandibular angles, Narrow and pointed chin</td>
<td>Mandibular burning, cutting, and rasping, Mandibular osteotomy, Genioplasty</td>
</tr>
<tr>
<td>Neck</td>
<td>Angled and protruded thyroid cartilage</td>
<td>Obtuse and smooth thyroid cartilage</td>
<td>Chondrolaryngoplasty</td>
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</table>
the strongest clue in determining sex (Morrison et al., 2016; Roberts & Bruce, 1988). Compared with a female face, a male face has an M-shaped hairline, increased intercanthal distance, straight and inferiorly positioned eyebrows, and decreased orbit size (Spiegel, 2011). Likewise, the non-hairbearing forehead is longer in males whereas the temporal region is more angular and less rounded.

There are several other differences that can be noted between the male and female face. The height of each orbit is lower in females, and the eyes are positioned more closely together (Habal, 1990; Hage et al., 1997). Similarly, the bony orbital margins are sharper in females, but the orbits are higher, more rounded, and appear larger. Collectively, this leads to a softer facial appearance in females (Krogman & Iscan, 1986). Finally, a male nose is typically larger and longer and has a more acute glabellar angle, broader nasal bones, and a straighter dorsum with little supratip break, whereas a female nose has a smaller bony framework, a narrower dorsum, and an age-dependent concavity (Habal, 1990; Hage et al., 1997). In a female nose, the nasolabial and nasofrontal angles are commonly more obtuse whereas the nostrils and nasal base tend to be smaller. Other key characteristics of the female face include more prominent cheekbones and an absent laryngeal prominence, or “Adam’s apple.”

**FFS OPTIONS**

**Forehead Contouring (Feminizing Forehead Cranioplasty)**

Forehead surgery was the first component of FFS to be thoroughly studied, beginning in the 1980s with Douglas Ousterhout in San Francisco. This is likely because the brow ridge and eyebrows are one of the most important areas of the face relative to determining gender perception (Spiegel, 2011). Although techniques have changed, the forehead is now treated in 95% of patients who currently undergo FFS (Safa et al., 2019).

The goal of forehead contouring is to flatten and feminize the forehead. Because of an enlarged frontal sinus or thick bone, the masculine glabellar ridge is more pronounced than a more convex superolateral aspect of the orbit in a female. This makes the male forehead appear more protruded, creating an appearance of deeper set eyes. In contrast, the female forehead is convex in its entirety.

To address these issues, in the majority of cases, part of the forehead bone is removed, cut and reshaped, and put back into place to create the feminine appearance defined by a higher, smoother, and more vertical forehead. It is important for the surgeon to address each component of this facial area during FFS of the forehead and orbital fields.

Categorically, there are four forehead classifications (Table 2). Type I forehead has mild excess or bossing of the brow and requires only burring of the anterior table of the frontal sinus. Type II forehead has mild excess but masculine flatness above the superior orbital rim. As such, the surgeon must create openings (i.e., burring) and fill in the hollow areas. Type III forehead, which describes the vast majority of patients, is defined by moderate to severe excess of the anterior table (i.e., part of the forehead, brow, and glabella) and thus requires osteotomy and frontal sinus bone (i.e., two large sinuses in the frontal bone that form the lower part of the forehead and reach over the eye sockets and eyebrows) setback. Because the anterior table is so thin, shaving is insufficient to achieve the desired outcome of a flat or convex female forehead. Type IV forehead has a severe slope. In these cases, it is impossible to bring the brow bone back far enough to create the desired outcome. Instead, the forehead is built up to create a flatter surface. Forehead skin can also be removed simultaneously to drop the hairline, which helps raise the eyebrows and create shallow orbits, all of which enhance femininity.

Currently, the most widely utilized approaches to forehead contouring involve reducing the supraorbital ridge with burring, removing and remodeling the anterior table, and creating bony islands over the frontal sinus (Van Boerum et al., 2019). Options for incisions include modified anterior hairline and coronal incisions. Obtaining preoperative imaging of the skull is critical to evaluate the size of the frontal sinus and thickness of the frontal bone to select the most appropriate technique. A feminizing forehead procedure also typically addresses the orbits in both the anterior and inferior aspects (Morrison et al., 2016). In males, the angle formed by the transition between the forehead and nose is more acute than in the female. Correction of the supraorbital rim and frontal bossing can soften this angle and create a more feminine appearance with good aesthetic outcomes (Bellinga et al., 2017). Risks and complications associated with forehead

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**TABLE 2 Forehead Types and Treatments**

<table>
<thead>
<tr>
<th>Type I forehead</th>
<th>Type II forehead</th>
<th>Type III forehead</th>
<th>Type IV forehead</th>
</tr>
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</table>
| **Description:** Mild excess or bossing of the brow  
**Treatment:** Burring of the anterior table of frontal sinus | **Description:** Mild excess but flatness above the superior orbital rim  
**Treatment:** Burring and filling in of hollowness | **Description:** Mild to severe excess of the anterior table  
**Treatment:** Osteotomy and frontal sinus bone setback | **Description:** Severe slope of the forehead  
**Treatment:** Forehead is built up to flatten |

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Mandible Contouring and Genioplasty

Like forehead contouring, initial attempts at feminizing the chin and jaw were pioneered by Ousterhout, with a focus on reducing mandibular angles and narrowing the chin. There are many methods of reducing the mandible. Removing bone from any portion of the mandible is a popular option, including removal of the lateral, anterior, and inferior aspects, and this can be accomplished by cutting, burring, and/or rasping the bone with or without cutting guides (Morrison et al., 2016). Prominent mandibular angles can be corrected by ostectomy (i.e., excision of bone). The goal is to soften the mandibular angle and create an ovoid shape. The surgeon should use intraoral gingivobuccal and gingivolabial sulcus incisions to minimize overt scars (Van Boerum et al., 2019). A masseter reduction can also be performed to narrow the posterior portions of the mandible.

Although the chin and jaw can be treated separately, to match the contour of the jaw to that of the expected chin, the chin and jaw tend to be addressed together (Deschamps-Braly, 2018). A male chin is taller and more square-shaped than a female chin. As such, performing vertical reduction to feminize the face is oftentimes crucial. Currently, genioplasty (i.e., reshaping the chin bone) is performed to narrow a male jaw, which tends to be wide and long due to a pronounced lateral flare and protuberance of the mandible (Morrison et al., 2016). The mandibular angle and upward flares in the parasympathetic region of the mandible support this effect. A “T” genioplasty is considered the most effective approach for creating a chin with a female shape as it has the ability to change the overall width, height, and contour of the chin in both the horizontal and vertical dimensions (Deschamps-Braly, 2019). Genioplasty is used to narrow a masculine chin in the transverse dimension and decrease height to create a tapered, female appearance. Minor changes can be executed via burring and contouring. Approximately 85% of patients are good candidates for chin surgery as part of their facial feminization procedures (Deschamps-Braly, 2018).

During a genioplasty procedure, the surgeon must take care to avoid injuring the mental nerve by performing the ostectomy 6 mm below the inferior border of the mental nerve canal (Deschamps-Braly, 2019). It is critically important for the surgeon to excise the appropriate amount of bone as excessive bone removal can lead to a deformed chin, loose tissue, and other abnormalities (Morrison et al., 2016). In addition, the surgeon must repair and resuspend soft tissues. Genioplasties have been characterized by excellent outcomes with great patient satisfaction; however, complications can occur that include damage to the mental nerve and tooth roots, damage to the mentalis muscle, and resorption of osteotomized bone segments (Morrison et al., 2016).

Chondrolaryngoplasty

Chondrolaryngoplasty, or “tracheal shave,” is an impactful feminizing procedure that was first described aesthetically in 1975 and later refined (Deschamps-Braly et al., 2017). The laryngeal prominence, or “Adam’s apple,” results from the anterior borders of the thyroid cartilage laminae merging and pushing the skin outward (Morrison et al., 2016). The surgeon burns the laryngeal prominence of the thyroid cartilage to reduce its protuberance and create a seamless contour. To avoid evident scarring, the surgeon generally makes the access incision at the cervical junction or crease (Van Boerum et al., 2019). An incision directly over the cartilage is generally avoided to reduce any scarring that might be considered revealing or obvious to the patient’s history.

Flattening of this typically masculine prominence results in good aesthetic outcomes and significant patient satisfaction (Cohen et al., 2018). However, it is vital to understand that in some very thin patients, the protrusion of concern is actually not the laryngeal prominence but, instead, the cricoid cartilage (Morrison et al., 2016). Resecting cricoid cartilage could impact the safety of the airway. Surgeon preference varies on the access area, but some suggest using video guidance to ensure patient safety and protect vocal cord attachments (Morrison et al., 2016). Potential complications are serious and may include damaging the vocal cords and/or compromising the airway due to hematoma formation.

Rhinoplasty and Lip Lift

Although the history of the aesthetic rhinoplasty can be traced back to the late 1800s, it has now become a routine part of FFS. Being located at the center of the face, the nose plays a critical role in creating a feminine appearance. The objective of a feminizing or reduction rhinoplasty is to reduce the overall size of the nose while changing the angles to a more feminine contour. This includes creating feminine transition between the forehead and the nose and positioning the radix posterior to the glabellar prominence (Safa et al., 2019). A rhinoplasty is a highly individualized procedure. When performing any feminizing rhinoplasty, the surgeon should incorporate a threefold objective that includes (1) feminization of the nose, (2) harmonization of the nose with other facial features, and (3) achieving an aesthetically pleasing result regardless of gender differences (Bellinga et al., 2017). The surgeon should also consider the patient’s ethnicity, age, and desires.
The male nasal bone tends to be wider, with nostrils that are slightly more flared, and an acute nasolabial angle, approaching a right angle, whereas the female nose has a more obtuse nasolabial angle with a tip that is slightly pointed up. The surgeon’s goal is to deproject, deemphasize, and reduce notable contours of the nose so that it is a less noticeable feature of the face (Morrison et al., 2016). To achieve this, the surgeon generally uses a traditional open approach to address the nasal dorsum and width of the vault as well as the nasal length, tip projection, and alar width (Van Boerum et al., 2019). Performing nasal bone osteotomies and infracturing narrows the bony nasal vault, whereas a dorsal hump reduction increases concavity of the dorsum and frontonasal transition, creating an obtuse nasolabial or nasofrontal angle (Van Boerum et al., 2019). Performing caudal septal reduction can reduce the length of the nose, whereas suturing of the alar domes can narrow and refine the tip. Including a rhinoplasty as part of a gender-affirming surgery produces few complications and high patient satisfaction (Morrison et al., 2016).

A female face has a shorter distance between the inferior edge of the nose and the vermilion border of the upper lip than a male face. The goal of a lip lift is to narrow the lip-to-nose space while creating some incisor show. Desirable incisor show for a male is approximately 1 mm compared with 3 mm for females. Performing a subnasal lip lift simultaneously with a rhinoplasty can help achieve a shortened upper lift and incisor show, creating a more feminine appearance (Morrison et al., 2020). Potential complications associated with lip lifting include wound breakdown, over- or underexcision, and lip swelling for several days after the operation (Morrison et al., 2016).

SUMMARY

FFS is defined as a broad category of procedures designed to create a feminine facial appearance and shape. FFS is a powerful tool that has been shown to improve the quality of life of transfeminine individuals. Health care providers should understand that FFS is a treatment of gender dysphoria to successfully assist in their transition.

REFERENCES


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