Face Lift after Facial Feminization Surgery: Indications and Special Considerations

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Summary: Iatrogenic jowling can be an unintended consequence of facial feminization surgery. Reduction of the mandible and chin without overlying changes to the soft tissue can lead to a redundant and deflated soft-tissue envelope, requiring a face lift to address jowling, cervicofacial laxity, and/or lower facial rhytids. Prospective quality-of-life outcomes data support this hypothesis, as patients who underwent mandible contouring with or without angle osteotomies were significantly more likely to express interest in face lift following facial feminization surgery on univariable analysis (90.0 percent versus 10.0 percent, $p = 0.038$). Patients with inherent skin laxity are at particularly high risk, such as those with advancing age, extrinsic skin damage (e.g., sun exposure, cigarette smoke), and history of massive weight loss. Before facial feminization surgery, the authors recommend comprehensive patient counseling that includes a discussion of the possible future need for a face lift, preferably around 1 year after facial feminization surgery. When performing a face lift after facial feminization surgery, technical considerations include those related to sequelae of prior facial surgery, anatomical differences between cismale and cisfemale facial soft tissue, and the mechanism of jowling after facial feminization surgery versus normal facial aging. The authors believe that these considerations can set more realistic expectations for facial feminization surgery patients, improve surgeons' ability to skillfully execute this procedure, and ultimately contribute to ongoing quality-of-life improvements in facial feminization surgery patients. (*Plast. Reconstr. Surg.* 149: 107, 2022.)

Facial feminization surgery is a key component of the gender affirmation process that has demonstrated quantifiable improvements in patient-reported quality of life.[1] The overarching goal of facial feminization surgery is to produce a harmonious facial appearance that is congruent with the patient's gender identity.[2] Facial characteristics associated with a patient's facial gender dysphoria vary on a case-by-case basis, and may involve aspects of both the craniofacial skeleton and facial soft tissues that are perceived as characteristic of a "masculine" or "feminine" facial appearance.[3] Though the selection and number of facial feminization procedures performed will vary by individual, the total spectrum includes procedures to feminize the brow and forehead, eyes, cheeks, nose, lips, chin and mandible, laryngeal prominence, and skin and soft tissue.[1,3]

Anthropometric features characteristic of male and female faces have been the subject of scholarly investigation for several decades.[4,5] Ousterhout's pioneering work applied this line of inquiry to efforts to feminize the masculine face in transgender individuals.[6–8] Feminine faces are characteristically heart-shaped, with prominent, anterior, and high cheeks that triangulate with a narrow and short chin.[3,9] This is in contrast to male cheeks, which are typically flatter.[9] In terms of the lower face, a masculine jaw is characteristically

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more prominent, angulated, and wider with bulky masseter muscle[1,10]; on cephalometric analysis, this equates to a larger mandibular angle and smaller angle between the Frankfort horizontal and the mandibular plane (i.e., the mandibular plane angle; 26.2 degrees in white men versus 29.6 degrees in white women).[11] A masculine chin is long, square, and more pronounced compared with the softer and more trapezoid-shaped feminine chin.[2,10]

Facial feminization surgery of the lower third of the face generally involves mandibular contouring with or without sliding genioplasty. Feminization of the chin and jaw is achieved largely through volume reduction, as the masculine mandible is thicker and larger in both the vertical and transverse dimensions.[12] This is in contrast to feminization of the cheeks, for instance, in which volume addition through cheek augmentation with fat grafting, implants, or osteotomies confers a feminine appearance.[3,7] For the mandible, reduction and contouring are accomplished through burring of the gonial angle and oblique ridge to the mental foramen; with larger mandibular angles, ostectomies are often needed.[2,3] Genioplasty is performed via a lower mandibular osteotomy with potential segmental bone removal and setback for reduction of width, height, and projection, depending on the needs of the patient.[2,3]

Typically, facial feminization surgery is approached via a "hard-then-soft" sequence, with procedures to modify the underlying bony structure preceding those on the skin and soft tissues.[1,3] Some of the subsequent soft-tissue procedures are planned to address elements of facial form that are characteristically masculine, while others are performed in response to unintended consequences of changes in the craniofacial skeleton. Hair transplantation, blepharoplasty, and skin rejuvenation are examples of the former.[3] Face lift and neck lift are examples of the latter, as the reduction in bony volume can unmask or accentuate excess skin in the lower third of the face, leading to iatrogenic jowling (Fig. 1).[2,3] Ousterhout described this issue succinctly with the observation that "[t]he basic issue is that the female skull is smaller than the male skull."[8] In reducing the bony volume of the chin and jaw, the skin and subcutaneous tissue that fit the underlying skeletal architecture are now without support; depending on skin quality and elasticity, this can manifest as a deflated soft-tissue envelope.

Given the relative novelty of facial feminization surgery, the role of the face lift following facial feminization surgery has not been widely recognized or established. Iatrogenic jowling following facial feminization surgery may not only be aesthetically displeasing but also distract from the feminizing aspects of the surgery, leading to a less pronounced effect on facial gender dysphoria. As interest in facial feminization surgery continues to grow and more surgeons offer these services,[13] outcomes research and associated implications are increasingly important. We aim to share our experience regarding the need for a face lift after facial feminization surgery, in addition to discussing the importance of preoperative counseling, logistical and technical considerations, and future

Fig. 1. Jowling after mandibular contouring and angle reduction. (*Left*) Masculine mandible before mandibular contouring and angle reduction, with osteotomy sites indicated by the *dotted line*. (*Center*) Feminized mandible following mandibular contouring and angle reduction. (*Right*) Final appearance of soft tissue after mandibular contouring and angle reduction, demonstrating the jowling that follows bony reduction. (Illustrations by Muhammad Harirah.)

directions. Institutional review board approval was obtained from the Schulman Institutional Review Board (SAIRB-14-0056), now the Advarra Institutional Review Board.

INDICATIONS FOR FACE LIFT AFTER FACIAL FEMINIZATION SURGERY

Examples from Analogous Surgical Scenarios

Though relatively unexplored in the context of facial feminization surgery, the role of a face lift following skeletal reduction has been well-described in the Asian aesthetic literature. In Asian culture, a wide and sharp facial contour resulting from prominent zygomas and broad mandibles is considered unattractive, particularly for women.[14–16] Compared to the white face, the Asian facial skeleton generally has a wider malar width and stronger malar eminence[17]; this disparity in width is further exacerbated by bony changes that accompany facial aging.[18] Isolated reduction malarplasty, mandible anglectomy, and genioplasty in the Asian population have been associated with worsening ptosis of the soft tissues, particularly cheek descent in relation to reduction malarplasty.[14,16,17] To reestablish proportional relationships of the facial skeletal and soft tissues, several authors have described performing concurrent face lift with skeletal reduction procedures in Asian individuals.[14,16,17,19]

Similarly, the need for soft-tissue alteration following orthognathic surgery in cisgender patients, particularly after maxillary and/or mandibular setback, has been discussed previously. Several analyses have demonstrated a positive correlation between soft- and hard-tissue changes of the chin in orthognathic surgery.[20–22] In many instances, particularly those involving younger patients or modest skeletal reduction, the soft tissue adapts to the skeletal change and surgical alteration is unnecessary. In other cases, including scenarios with pre-existing asymmetry, large anteroposterior differences, and/or minor aesthetic problems at baseline that are exacerbated by orthognathic surgery, associated aesthetic enhancement of the soft tissues may be warranted.[23,24] Submental liposuction can be utilized as an adjunct procedure to improve the contour of the submental angle following orthognathic surgery. Face lift and neck lift have also been described, either concurrently or in a delayed fashion.[23,25–27]

Lessons from Quality-of-Life Outcomes Study

Though patients demonstrate significant quality-of-life improvements following facial feminization surgery, a substantial proportion report a desire for additional facial procedures, particularly among those who have undergone mandible reduction. Our group previously published the results of a prospective, international, multicenter cohort study in which transgender and gender-diverse patients undergoing facial feminization surgery were administered a validated survey to generate a facial feminization outcome score.[1] Among the 66 study participants, median facial feminization outcome score was found to significantly improve following facial feminization surgery (42.7 preoperatively versus 80.6 at 6 months postoperatively, $p < 0.0001$). The survey additionally contained several free response questions about self-perception of outcomes, in which 10 participants indicated interest in pursuing a future face lift at 1 year postoperatively. On univariable analysis, patients who had undergone mandible contouring with or without angle ostectomies were significantly more likely to be interested in a face lift than those who had not (90.0 percent with mandible procedure versus 10.0 percent without, $p = 0.038$; Fisher exact test). Older age was also significantly predictive of interest in face lift (mean age 48.0 years for interest in face lift versus 37.7 years, $p = 0.013$; Mann-Whitney test). On multivariable logistic regression, only older age remained a significant predictor (OR, 1.08; 95 percent confidence interval, 1.01 to 1.15; $p = 0.019$; model p value, 0.006; c statistic, 0.83).

Role of Skin Quality

Factors that predispose to inherent skin laxity confer a higher risk of iatrogenic jowling following facial feminization surgery. For instance, in our early quality-of-life study, older age was a significant negative predictor of facial feminization outcome score and patient satisfaction ($R = -0.390$, $p = 0.006$), as well as a significant predictor of interest in face lift in our adjunct analysis.[1] For reasons equivalent to those in the cisgender population, the natural aging process is associated with intrinsic skin changes consisting of atrophy and deterioration of skin components such as collagen and elastin, leading to laxity and rhytids.[28] This is further compounded by diminishing mechanisms to repair damage.[28] Accordingly, as the skin ages, patients undergoing facial feminization surgery with significant mandible and/or chin reduction become increasingly vulnerable to postoperative jowling.

Patients with alternative etiologies of poor skin quality are similarly at risk for jowling. Extrinsic skin aging occurs as a consequence of

environmental factors, such as sun damage (i.e., photoaging), pollution, and cigarette smoke, which lead to an increase in reactive oxygen species that cause direct damage to and accelerate the breakdown of skin components.[28] Patients with a history of massive weight loss also deserve special consideration; these patients often present with cervicofacial skin excess with poor elasticity, and may benefit from a face lift to address jowling irrespective of facial feminization surgery.[29,30]

ROLE OF PREOPERATIVE COUNSELING

Counseling about the possible need for future face lift is critical before facial feminization surgery. At the time of initial consultation, a comprehensive facial analysis should be performed to determine whether a large bony reduction of the mandible and chin is anticipated, and whether the patient has any of the aforementioned risk factors (i.e., older age, recent smoker, sun damage, history of massive weight loss) for iatrogenic jowling. We recommend advising all facial feminization surgery patients undergoing substantial bony reduction of the chin and mandible who are older than age 40 years and/or have inherent skin laxity about the possible need for additional soft-tissue procedures to address jowling.[2] Upon review of his approximately 30 years of performing facial feminization surgery, Ousterhout determined that his patients ranged in age from 17 to 73 years, with an average age of around 47 years.[8] In our aforementioned quality-of-life study of 66 patients who underwent facial feminization surgery, mean age was 39.3 years (SD, 11.9 years).[1] Considering this age distribution, a substantial proportion of facial feminization surgery patients fall into the high-risk category based on age alone, highlighting the importance of counseling regarding jowling before facial feminization surgery.

Transgender patients seek facial feminization surgery to address their gender dysphoria; however, they should be counseled that jowling may lead to greater or equal dissatisfaction than before the surgery. Rhytids are generally considered to be a masculine feature; males have thicker skin and a lesser quantity of subcutaneous fat in comparison to females, which leads to greater visibility of minor muscular movements and associated rhytids.[12,31] In cisgender face lift patients, face lift has been shown to improve quality-of-life and self-esteem, largely due to dissatisfaction with the aesthetically displeasing appearance of jowls and rhytids.[32,33] Thus, either due to concerns related to persistent gender dysphoria or cosmetic appearance, patients with jowling after facial feminization surgery may experience no net gain in satisfaction.

Lastly, patients should be made aware that, based on the current health care landscape, insurance is unlikely to cover face lift to address jowling after facial feminization surgery. Over the past several years, there has been progress in the number of insurance providers covering facial feminization surgery, though coverage still remains patchy in the United States in comparison to gender-affirming chest and genital procedures.[34] The face lift has historically been considered a cosmetic procedure, and thus is financed entirely on an out-of-pocket basis. Patients should be aware that even if an insurance provider offers coverage of facial feminization surgery, an ancillary face lift later to address jowling is unlikely to be included in this coverage. Yet, due to the detrimental effects that iatrogenic jowling can have on the expected feminine outcome and associated worsening of gender dysphoria, we believe that face lift for iatrogenic jowling following facial feminization surgery should be considered noncosmetic and a medical necessity.

TIMING OF FACE LIFT AND ADJUNCT PROCEDURES

Face lift can be performed either immediately at the time of facial feminization surgery or in a delayed fashion. The present body of literature on facial feminization surgery contains two studies in which face lift was performed, both in an immediate fashion. Gupta et al.[35] published a review of 25 transwomen who underwent facial feminization surgery consisting of combined forehead contouring with brow lift, cheek augmentation, rhinoplasty, mandible contouring, and face lift via superficial musculoaponeurotic system (SMAS) plication or Fanous optimum mobility technique. The authors' primary objective was to evaluate local postoperative complications of necrosis and wound dehiscence, due to concerns regarding operating within multiple facial planes in a single operation. They reported no such issues and concluded that all patients had aesthetically favorable results based on the authors' and patients' subjective assessment. Di Maggio et al.[36] described a two-stage approach to facial feminization surgery in which patients who desired procedures on both the upper and lower face underwent mandible reduction and immediate face lift during an initial procedure, followed 7 to 10 days later by frontal bone surgery and rhinoplasty. The authors did

not report any outcomes, though they surmised that dividing facial feminization surgery into two smaller procedures decreases morbidity and improves patient comfort. Lastly, Raffaini et al.[37] reported performing a face lift on four patients (12.1 percent of their study population) who underwent staged facial feminization surgery, though the timing of face lift in relation to other facial feminization procedures was not specified.

To our knowledge, there is no published outcomes research specifically examining delayed face lift after facial feminization surgery, though this is the senior authors' (R.J.R. and T.S.) preference. We present our typical sequence of facial feminization surgery, face lift, and adjunct procedures in Table 1. Volumetric analyses of edema resolution following rhinoplasty and orthognathic surgery demonstrate that edema obscures the final result for several months postoperatively and is nearly resolved at 1 year.[38,39] Similarly, it has been our experience that edema associated with facial feminization surgery can mask ultimate facial appearance, especially intraoperatively but also extending several months into the postoperative period. In order to achieve the most predictable results with face lift, we recommend a delay of at least 6 to 9 months, and preferably 1 year, following facial feminization surgery before face lift (Fig. 2). For analogous reasons, we recommend that this delay period also extend to subsequent procedures on the neck, such as a neck lift.[31] This delay period also reduces the initial operative time for facial feminization surgery, which can approach 8 to 10 hours depending on the number of procedures performed and result in significant surgeon fatigue. Furthermore, it provides for a second opportunity to perform revisions and additional soft-tissue work, such as scar revision, fat grafting, and blepharoplasty.

Adjunct soft-tissue procedures should also be carefully planned in relation to the timing of face lift. Hair removal should be performed before face lift.[31] We also recommend that patients avoid facial procedures 2 weeks before and 6 weeks after face lift.[31] Noninvasive methods of tightening and lifting lower facial and neck skin, such as microfocused ultrasound therapy, radiofrequency therapy, and laser and light therapy, can also be attempted for minor amounts of jowling.[40]

Table 1. Sequence and Timing of Facial Feminization Surgery*

Stage 1	Stage 2	Ancillary Procedures
Forehead reduction	Face lift	Hair transplantation
Brow lift	Neck lift	Skin rejuvenation
Genioplasty	Blepharoplasty	
Rhinoplasty†	+Fat grafting	
Mandibular contouring		
Thyroid cartilage reduction		
Hairline lowering		
Lip lift		
+Fat grafting		

*Procedures done during the first stage are predominantly of the hard tissue, followed at least 6 to 9 months later by procedures on the soft tissues. Ancillary procedures can be performed either with the second stage or at a later time. Fat grafting is performed during both the first and second stages due to an expected loss of ~50 percent of grafted fat in each stage.
†One of the senior authors (R.J.R.) prefers to perform rhinoplasty at the second stage to allow for more optimal healing of the hard tissue surgery.

OPERATIVE PEARLS

Technical considerations regarding face lift after facial feminization surgery can be divided into three general categories: considerations based on earlier facial feminization procedures, lessons from face lifts on cismale patients, and implications based on the etiology of jowling after facial feminization surgery versus normal facial aging. In terms of the former consideration, this is perhaps most pertinent in relation to incision placement. If the patient has undergone prior hairline advancement and/or open brow lift, the temporal incision for face lift can be made along this scar.[31] Depending on the face lift technique utilized and, accordingly, the tissue plane of dissection, the surgeon may encounter areas of scar tissue from prior facial feminization procedures. However, we have not observed this to be a significant challenge in our respective practices.

In addition to differences in the craniofacial skeleton, the soft tissues of cismale patients and cisfemale patients have anatomic and structural differences that must be considered while performing face lift following facial feminization surgery. While we have observed that estrogen can lead to some remodeling and texturizing of the facial skin, and thus recommend that our patients take hormones for at least 1 year before facial feminization surgery,[2] it is unclear to what extent this occurs, making considerations from cismale face lift still pertinent. The cismale epidermis and dermis are thicker than those in cisfemales, and the subcutaneous tissue is generally more fibrous.[41–43] As a result, skin resurfacing, especially laser resurfacing, becomes more critical in the midface and perioral area in face lift after facial feminization surgery. In addition, lifelong skin care, both preoperatively and postoperatively, is critical. Patients with especially thick skin

Fig. 2. Face lift following mandibular contouring in a transwoman patient. (*Above*) Preoperative views before facial feminization surgery. (*Center*) Six months following facial feminization surgery, which consisted of frontal setback, forehead contouring, brow lift, rhinoplasty, genioplasty, mandible contouring, mandible angle reduction, and fat grafting to the lips and cheeks. (*Below*) Nine months following face lift, demonstrating improvement in jowling and greater definition of mandible and chin.

should be evaluated for treatment with retinoids, typically under the supervision of a dermatologist. Tretinoin can be used topically as a first-line agent, though oral agents (e.g., isotretinoin) may be needed depending on the severity of sebaceous hyperplasia. Isotretinoin should not be administered perioperatively due to its deleterious effects on wound healing.[44]

In terms of operative technique, more extensive undermining of the nasolabial folds is required during face lift after facial feminization surgery, as the nasolabial folds of cismales are generally deeper compared to those of cisfemales.[41] In addition, the SMAS of cismales is thicker and heavier than that of cisfemales, with greater redundancy along the jawline and neck; we have noted that this is generally true for facial feminization surgery patients as well. In these cases, the key is to be more aggressive in the SMAS. SMASectomy may be performed, though extended SMAS dissection with a turnover flap may be needed for adequate fixation. Though infrequently performed in cismales, SMAS stacking can also be utilized at the lateral malar eminence to add projection.[41] In face lift after facial feminization surgery, we also generally use more fat grafting in the malar, forehead, and temporal areas, the latter of which is frequently needed as hallowing can be significant. Lastly, cismales have greater platysmal banding and cervical fascial laxity, necessitating a more aggressive approach to the neck than in cisfemales. Specifically, neck contouring often involves medial and lateral platysmal work, with medial plication or resection and lateral wide and extended platysma window plications.[41] Direct neck defatting may also be needed.

Perioperatively, differences in skin vascularity and implications for hematoma formation are critical considerations. In addition to being thicker, the cismale epidermis and dermis are more vascular than those of cisfemales, in part related to the dense vascularity around hair follicles in cismale skin.[42,43] Doppler flow analyses have demonstrated 56 percent higher skin blood perfusion in cismales compared to cisfemales, largely due to a greater number of perfused microvessels.[45] Accordingly, the rate of postoperative hematoma in cismales is approximately twice the rate in cisfemales, approaching 13 percent in some studies.[43,46] Several groups focusing on the cismale face lift have stressed the importance of preoperative, intraoperative, and postoperative blood pressure management to prevent hematoma formation.[41,43] Preoperatively, patients should be screened for hypertension and referred to a primary care physician if management is needed. Some authors have additionally advocated for routine pretreatment with clonidine to lower blood pressure.[41,43,47] Intraoperatively, blood pressure control and meticulous hemostasis are essential. Postoperatively, management of rebound hypertension may be needed, in addition to aggressive control of nausea and vomiting that can lead to associated elevations in blood pressure. Additional measures to reduce perioperative bleeding include holding anticoagulant and antiplatelet agents both preoperatively and postoperatively, though the patient's underlying medical conditions necessitating these medications must be factored into the risk/benefit analysis of such perioperative medication management. We also recommend, but do not require, that patients perform permanent hair removal (electrolysis or laser) before facial feminization surgery; this will ablate the follicles and, theoretically, decrease vascularity of the skin, which will help to minimize bleeding, inflammation, and potential hematomas. Postoperatively, we utilize prolonged compressive dressings to minimize hematoma formation and swelling.

Feminizing hormone management is an additional consideration before these procedures. Though studies have shown an increased risk of venous thromboembolism in cisgender women taking hormone replacement therapy or oral contraceptive pills, similar results are not fully delineated in the gender-diverse population.[48] Anecdotally, estrogen therapy is often continued during facial feminization procedures due to the concern for increased dysphoria with stopping hormones. However, an informed conversation is needed with all patients receiving feminizing hormone therapy about the possible complications of continuing hormones. Patient-physician shared decision-making should be utilized to determine the management strategy.

Lastly, additional operative maneuvers may be necessary to address jowling after facial feminization surgery as compared to the aging jowl. In normal facial aging, jowling is caused by several factors: development of skin laxity, atrophy of fat compartments, change in the position of fat compartments, and dehiscence of the mandibular septum that allows soft tissue to descend into the neck.[30] In patients who have undergone facial feminization surgery, particularly those who are older, it is a combination of these aforementioned factors, plus bony volume loss and stripping of normal soft-tissue attachments to the chin and mandible, that may generate lower face sagging and jowling. A patient who undergoes a significant reduction of the chin (height, width, and projection) as well as significant mandible contouring will be prone to developing not just jowling from bony volume loss leading to soft-tissue descent and laxity but also submental laxity and a witch's chin deformity from subperiosteal stripping and violation of normal periosteal, muscle, and soft-tissue

attachments. In such cases, particularly when a T-osteotomy is performed to reduce width, the genioglossus muscle needs to be resuspended, the soft tissue of the chin needs to be appropriately repositioned, and the mentalis muscle needs to be reapproximated.

CONCLUSIONS AND FUTURE DIRECTIONS

Iatrogenic jowling following volume reduction of the mandible as part of facial feminization surgery is a significant concern with the potential to exacerbate gender dysphoria and lead to a displeasing aesthetic result. Counseling of patients at high risk for iatrogenic jowling is critical before the surgery, in terms of setting both cosmetic and financial expectations. Though we present observations and lessons learned from our experience with facial feminization surgery, we acknowledge that there are several lines of inquiry that would benefit from more rigorous scientific evaluation. Such topics include quantitatively evaluating the correlation between volume of bony reduction of the mandible and iatrogenic jowling, measuring the effect of face lift on quality of life following facial feminization surgery, examining complications after face lift in the transfeminine population, and more systematically evaluating the anatomic and physiologic effects of estrogen hormone therapy on cismale skin. A more complete understanding of these topics will help to further improve outcomes following facial feminization surgery.

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PATIENT CONSENT

The patient provided written consent for the use of her images.

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