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Conservative approach to facial upper third feminisation: a retrospective study



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ABSTRACT

The aim of this study was to assess patient satisfaction and postoperative quality of life following the combined procedure of frontal eminence milling and hairline advancement in the upper third feminisation.

This study is based on the assessment of satisfaction data of Transgender adult patients. Postoperative patient quality of life was assessed by the Facial feminisation surgery outcomes evaluation and patient satisfaction was assessed by the Face-Q™.

Forty eight patients were included. The age of the patients ranged from 20 to 63 years. According to the Facial feminisation surgery outcomes evaluation, 67.2% of patients were satisfied with the outcomes. 56.3% of the patients found the appearance of their faces “very much” and “completely” feminine. According to the Face-Q™, 79% of patients were satisfied or very satisfied with the position of their eyebrows post-operatively. 83.4% found their foreheads natural, 81.3% found their foreheads younger and 77.1% were satisfied or very satisfied with the smoothness of their forehead.

Within the limitations of the study it seems that a combined procedure of frontal eminence milling and hairline advancement is an adequate treatment option for patients with typically masculine features of the forehead and moderate to slight frontal eminences.

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1. Introduction

Trans-identity is common in the general population, but few studies have been carried out about this hard-to-reach population. Chappell et al. (Chappell 2016) showed 0.6% of transgender patient in a population from the United States. Transgenderism represents 0.2–0.6% of the UK adult population (Joseph et al., 2017).

Gender identity is determined by physical appearance, and more specifically by facial appearance. For example, in the upper third of the face, the hairline, the eyebrows, the forehead and the supraciliary arches are important in frontal and lateral views. (van de Ven, 2008).

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Many feminisation techniques of the upper third of the face have been described. At the end of the 20th century, Becking et al. showed the effects of facial feminisation surgery (FFS) on transgender patients. However, the authors did not report data about patient satisfaction (Becking et al., 1996). Between 2008 and 2012, Capitán et al. carried out a review of forehead feminisation techniques by evaluating patient satisfaction. These studies described the reproducibility of the different surgical procedures, providing predictable and satisfactory outcomes. FFS is part of the transformation process of transgender-patients, easing professional, social and family interactions (Capitán et al., 2014).

Our technique combines hairline advancement, bony prominences smoothing in the upper third of the face and application of cement in the same operative time if necessary. The main objective was to assess patient satisfaction and postoperative quality of life. The secondary objective was to assess the complication rate of the procedure.

2. Materials and methods

The work has been carried out in accordance with the Declaration of Helsinki (2013). This is a retrospective study on pre-existing medical data, therefore not involving the human person and all the criteria of which respect the MR- 04 reference frame of the CNIL. All data were anonymized. Written consents were obtained for every patients included in the study. All patients treated by the combined procedure of frontal eminence milling and hair-line advancement at Henri Mondor Hospital between January 2019 and December 2021 were included. We excluded patients who did not answer to the questionnaires, and patients treated by another surgical procedure. Quality of life was assessed by the facial feminisation outcome evaluation, and satisfaction was assessed by the Face-Q™. The patients answered the questionnaires at least 6 months post-operatively.

The first questionnaire, the Facial feminisation surgery outcomes evaluation described by Ainsworth and Spiegel (2010), assesses transgender women reported quality of life and how quality of life is affected by facial feminisation and sex reassignment surgery. This facial feminisation outcome evaluation questionnaire was modified and adapted from a previously published facial plastic surgery outcomes evaluation questionnaire (Alsarraf 2002).

The answer to each of the nine questions is a score ranging from 0 to 4, with 0 representing the most negative response and 4 the most positive response. Dividing the total score by 36 and multiplying by 100 gives the scaled score. This scale ranges from 0 to 100, with 0 representing the lowest patient satisfaction score and 100 the highest (Table 1).

The second questionnaire, the FACE-Q™ was described by Klassen and al (Klassen et al., 2010). It combines multiple questionnaires assessing different sub-units of the face. The FACE-Q™ allows the assessment of the impact and effectiveness of facial aesthetic procedures from a patient's perspective. In this study, we used the FACE-Q™ "satisfaction with forehead and eyebrows". (Table 2). Use of this Questionnaire, authored by Drs. Klassen, Pusic and Cano, was made under license from Memorial Sloan Kettering Cancer Center, New York, USA.

Questionnaires were systematically offered to the patients during postoperative clinic appointments. In order to carry out a 6 months post-procedural assessment, each patient was seen in clinic or contacted and asked to answer the same questionnaires via paper, mail or telephone.

We have identified the following complications during the 6 post-operative months: osteomeningeal breach, infection, of the surgical site, palpable bony prominence, and chronic frontal sinusitis with mucocele, anaesthesia in the territories of the V.1 nerve, frontal skin necrosis, and sensitivity disorder of the scalp.

Table 1
Questionnaire « Facial feminisation surgery outcomes evaluation » Ainsworth et Spiegel.

I like the appearance of my face	Not at all 0	Somewhat 1	Moderately 2	Very Much 3	Completely 4
The appearance of my face is feminine	Not at all 0	Somewhat 1	Moderately 2	Very Much 3	Completely 4
My friends and loved ones perceive my face as feminine.	Not at all 0	Somewhat 1	Moderately 2	Very Much 3	Completely 4
My current facial appearance limits my social activities	Never 4	Rarely 3	Sometimes 2	Usually 1	Always 0
My current facial appearance limits my professional activities	Never 4	Rarely 3	Sometimes 2	Usually 1	Always 0
In public I am confident my facial appearance is perceived as feminine	Not at all 0	Somewhat 1	Moderately 2	Very Much 3	Completely 4
I would like to alter the appearance of my face.	Not at all 4	Probably not 3	Possibly 2	Most likely 1	Definitely 0
Facial feminisation surgery is/was important to live as a woman	Not at all 0	Somewhat 1	Moderately 2	Very Much 3	Completely 4
Body surgery is/was important to live as a woman.	Not at all 0	Somewhat 1	Moderately 2	Very Much 3	Completely 4

2.1. Technique description

Surgery is scheduled after a bone window scans of the face and a 3D reconstruction of the images. All patients signed a consent form for the use of the photographs. The department's surgical technique combined forehead humps milling and cement-based smoothing and coronal hairline advancement. This technique was mainly offered for groups 1 and 2.

2.1.1. Approach

The surgical procedure was performed under general anaesthesia; the patient was installed in a dorsal decubitus and oro-tracheal intubation was performed. The head was placed on the edge of the table.

The hair was tied back to ease the operation and closure.

Asepsis of the hair and face was performed. The coronal approach was drawn with a demographic pen. The incision line and the entire scalp were infiltrated with serum and adrenaline.

The incision was trichophytic, carried out into fine hair of the anterior hairline. The incision was perpendicular to the hair. This ensures hair growth through the scar and the possibility of future camouflage (Fig. 1). The incision was irregular in order to be better concealed. Straight lines were more visible. (van de Ven, 2008) (Altman 2012).

The incision was extended laterally and posteriorly just anterior to the temples. In order to obtain sufficient laxity for milling, the incision was extended to a standard coronal incision, which ended inferiorly into the temporal hair at the root of the helix. (Di Maggio and Marcelo, 2019) (Garcia-Rodriguez, Thain, and Spiegel 2020) The dissection of the scalp flap was carried out into the Merckel's space to the supraorbital rim anteriorly and posteriorly into the subgaleal plane to the nuchal crest. The edges of the incision line were stapled with scalp staples to limit blood loss. (Flowers and Adil, 2008) An incision to the frontal periosteum 5 cm above the supraorbital rims and an incision to the fascia of the temporal muscles was carried out. Care was taken to preserve the frontal branch of the facial nerve. The periosteum and fascia flap was reclined to expose the supraorbital rims, the supraorbital bundle, the glabella and the lateral orbital column (Habal 1990). Indeed, as described by A.J. Kleinberger et al. in their retrospective series, a coronal approach with deep temporal fascia dissection offers a reliable technique to access the upper craniofacial skeleton without damaging the frontal branch of the facial nerve (Kleinberger et al. 2015).

2.1.2. Fronto-orbital reshaping

Fronto-orbital remodelling was performed through a ball bur and good irrigation. The surgeon would assess the results from the

Table 2
Questionnaire « Measuring patient-reported outcomes in facial aesthetic patients: development of the FACE-Q™ » Klassen et al.

	Very Dissatisfied	Somewhat Dissatisfied	Somewhat Satisfied	Very Satisfied
a The <u>position</u> of your eyebrows?	1	2	3	4
b How <u>even</u> (well-matched) your eyebrows look?	1	2	3	4
c The <u>height</u> of your forehead (distance between your eyebrows and hairline)?	1	2	3	4
d How <u>natural</u> does your forehead look?	1	2	3	4
e How <u>youthful</u> does your forehead look?	1	2	3	4
f How <u>smooth</u> does your forehead look?	1	2	3	4

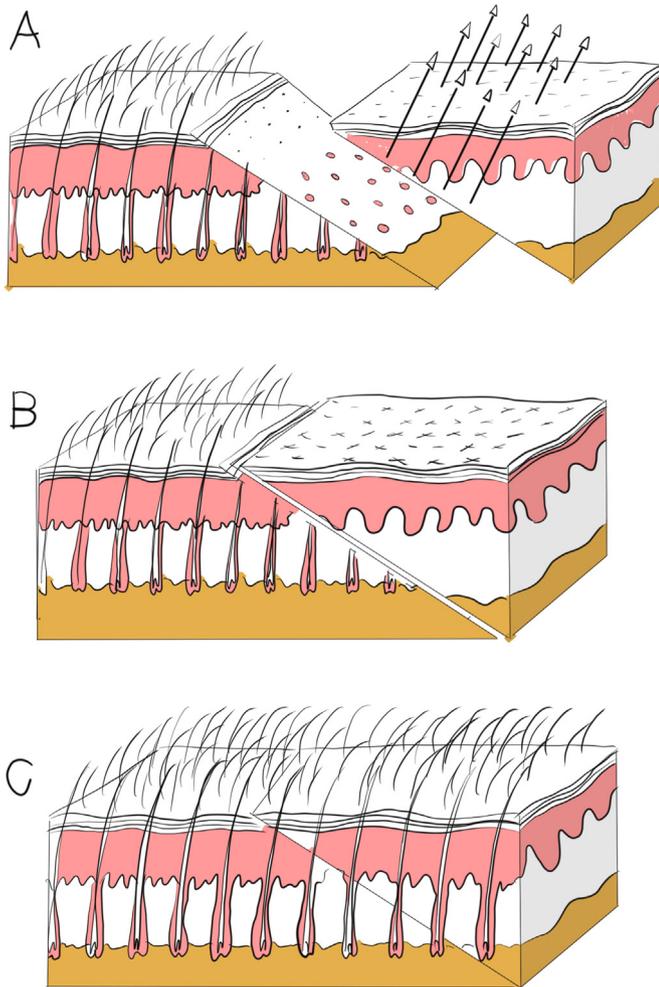


Fig. 1. A. Trichophytic incision at 90° to the hair.
B. Alopecia is secondary to the incision.
C. Secondary regrowth within the scar thanks to the preserved hair follicles.

patient’s head and feel and appreciate the prominences to ensure symmetry. Frontal sinuses would not be opened (Fig. 2). The areas treated by milling would be located pre-procedurally on a CT scan of the facial mass with 3D reconstruction (Louis et al., 2021). The supraorbital humps, the supraorbital rims, the glabella and the external orbital columns would be usually addressed. (Krastinova-Lolov and Darina, 1995) (Becking et al., 2007) In order to regularise or symmetrise the prominences and in case of frontal sinus opening, hydroxy-apatite cement (HAC), a tetra-calcium phosphate and di-calcium phosphate compound, could be used (Hoenig 2011) (Vilpelet et al. 2018).

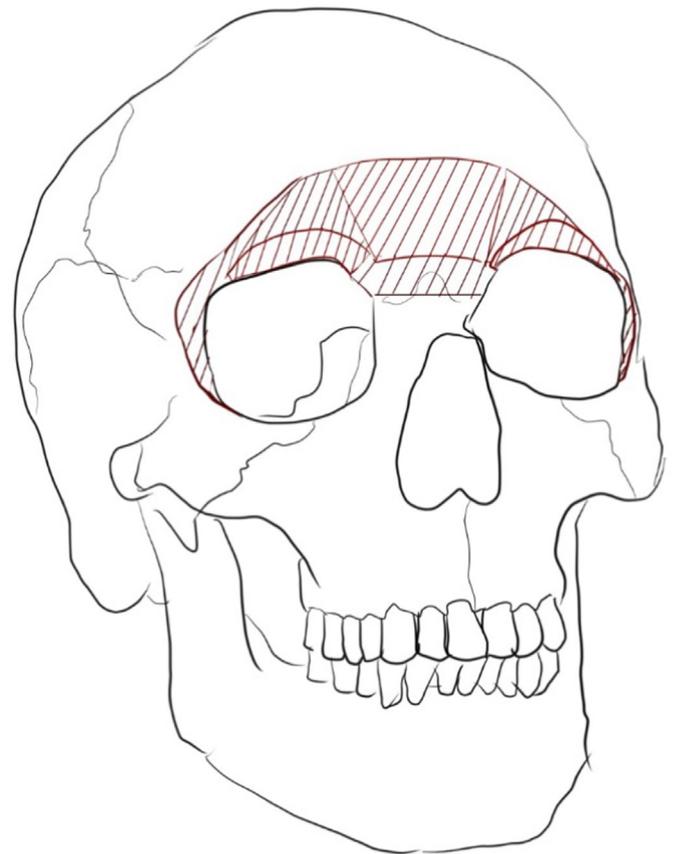


Fig. 2. Fronto-orbital remodelling area.

2.1.3. Galeotomy and hairline advancement

Galea incisions parallel to the skin incisions would be carried out if necessary to obtain further advancement. As a general rule, each galeotomy would add 1–2 mm of advancement. After determination of the maximum scalp advancement, a beveled incision overlapping with the original trichophytic incision was carried out. The scalp would be attached to the bone through an absorbable device (Guyuron and Rowe 2008). (Flowers and Adil, 2008) Tension-free advancement would be generally possible up to 2 cm (Ramirez et al. 2009) (Marten 1999). L Garcia-Rodriguez et al. described in a forehead feminisation study a statistically significant average advancement of 2.01 cm (Guyuron and Rowe, 2008).

2.1.4. Closure and dressing

Copious saline wash out would be performed before closure. Periosteum and fascia flaps were repositioned and sutured with Vicryl rapid 3.0.

The incision line was closed in two planes: a subcutaneous plane (Vicryl 2.0) and a cutaneous plane sutured with (Vicryl 4.0 running suture) (Bachelet et al., 2016). Redon drains would be left in place for 24–48 h to minimise the risk of haematoma in the detachment plane (Capitán et al., 2014).

2.1.5. Post-operative care

Level 1 and 2 analgesia were prescribed. Ice packs application on the area of milling was advised in the post-operative time. Patients would benefit from daily care with shampoo (soap and water) and scar irrigation with saline solution. Compression bandages would be applied for the first 48 h post-operatively. Drains were maintained for a minimum of 2 days.

The patient would be usually discharged on the second day, after a radiological assessment: a CT scan of the facial mass or an X-ray of the face and profile. Analgesia, antibiotic prophylaxis and daily local care were prescribed.

Patients were asked not to blow their nose for about ten days after the operation if sinus invasion was described in order to limit the risk of emphysema and frontal sinus infection (Villepelet et al. 2018).

Suture resorption was expected 15 days postoperatively and appreciated on a clinic follow-up appointment (Ramirez et al. 2009) (Hoenig 2011). (Ousterhout and Douglas, 2015).

The study was stratified according to age: 20–30 years, 30–40 years, 40–50 years, >50 years. Statistical analyses of the data were conducted with a multivariate ANOVA test to compare groups. Means were compared through a Student’s t-test using GraphPad Version 9 software. All p-values<0.05 were considered statistically significant.

3. Results

Fifty five patients benefitted from a combined procedure of frontal eminence milling and hairline advancement in our department between January 2019 and January 2022. Seven patients refused to answer the questionnaires and were excluded. Then, 48 patients were finally included (Fig. 3). The age of the patients ranged from 20 to 63 years, with an average age of 36 ± 10 SD years. All patients had started the hormone therapy more than 2 years before the surgery and had been assessed by a psychiatrist.

The results of the descriptive satisfaction study are as follows: According to the “Facial feminisation surgery outcomes evaluation” (FFS outcomes evaluation), 67.2% of patients were satisfied with the outcomes. 56.3% of the patients found the appearance of their faces “very much” and “completely” feminine. 79.2% of the patients’ entourage found the appearance of the faces “very much” and “completely” feminine. However, 56.3% of the patients definitely wished to change the appearance of their face again and a further 10.4% would most likely undergo a revision surgery.

In almost half of the patients, no limitation of social activity (45.8%) or professional activity (50%) was described. The FFS procedures was described as necessary in 75% of the patients described (Table 3).

According to the Face-Q™, 79% of patients were satisfied or very satisfied with the position of their eyebrows post-operatively. 83.4% found their foreheads natural, 81.3% found their foreheads younger and 77.1% were satisfied or very satisfied with the smoothness of their forehead. 91.7% of the patients declared themselves satisfied or very satisfied with the distance between the eyebrows and the hairline (Table 4).

Among the 48 patients included, 5 presented a post-operative complication: 1 cement-linked infection, 3 unsightly scars and 1 asymmetry of the frontal eminence. All of these patients (10%) required a revision surgery.

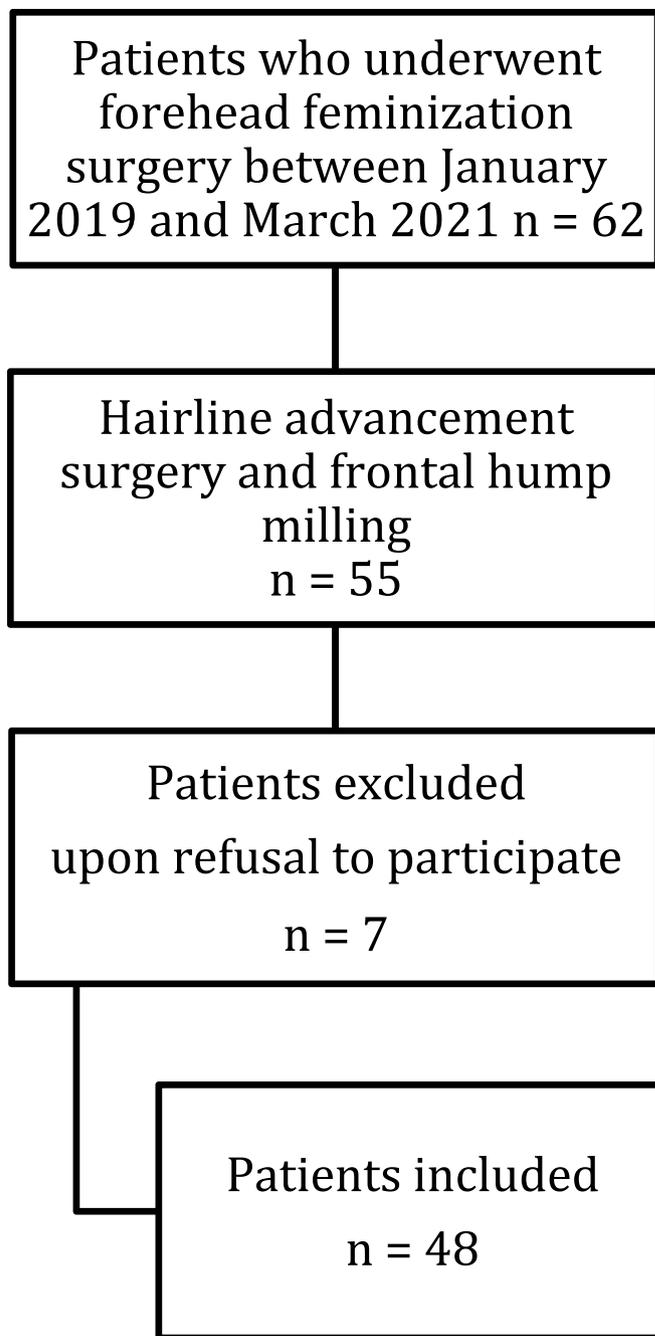


Fig. 3. Flow chart of patient inclusion in the satisfaction study.

Most complications occurred in the 30–40 year old group (20%) compared to other subgroups (Table 5).

Quality of life based on age subgroups showed no difference between the groups, except between the groups [30–40 years old] vs. >50 year old. Patients older than 50 years had a significantly higher FFS outcomes evaluation score than patients between 30 and 40 years. (Table 6). There was no significant differences between the different subgroups in the FACE-Q™ score comparison (Table 7).

We illustrated the clinical results of the combined procedure of frontal eminence milling and hairline advancement by two clinical cases:

Clinical case n°1.

Table 3
Results « Facial feminisation surgery outcomes evaluation »

	Not at all 0	Somewhat 1	Moderately 2	Very Much 3	Completely 4
I like the appearance of my face	N = 7 14,6%	N = 6 12,5%	N = 15 31,3%	N = 14 29,2%	N = 6 12,5%
The appearance of my face is feminine	Not at all 0 N = 5 10,4%	Somewhat 1 N = 5 10,4%	Moderately 2 N = 11 22,9%	Very Much 3 N = 18 37,5%	Completely 4 N = 9 18,8%
My friends and loved ones perceive my face as feminine.	Not at all 0 N = 3 6,3%	Somewhat 1 N = 4 8,3%	Moderately 2 N = 3 6,3%	Very Much 3 N = 17 35,4%	Completely 4 N = 21 43,8%
My current facial appearance limits my social activities	Never 4 N = 22 45,8%	Rarely 3 N = 4 8,3%	Sometimes 2 N = 12 25%	Usually 1 N = 8 16,7%	Always 0 N = 2 4,2%
My current facial appearance limits my professional activities	Never 4 N = 24 50%	Rarely 3 N = 8 16,7%	Sometimes 2 N = 6 12,5%	Usually 1 N = 7 14,6%	Always 0 N = 3 6,3%
In public I am confident, my facial appearance is perceived as feminine	Not at all 0 N = 5 10,4%	Somewhat 1 N = 3 6,3%	Moderately 2 N = 13 27,1%	Very Much 3 N = 16 33,3%	Completely 4 N = 11 22,9%
I would like to alter the appearance of my face.	Not at all 4 N = 5 10,4%	Probably not 3 N = 6 12,5%	Possibly 2 N = 5 10,4%	Most likely 1 N = 5 10,4%	Definitely 0 N = 27 56,3%
Facial feminisation surgery is/was important to my life as a woman	Not at all 0 N = 0 0%	Somewhat 1 N = 2 4,2%	Moderately 2 N = 3 6,3%	Very Much 3 N = 7 14,6%	Completely 4 N = 36 75%
Body surgery is/was important to my life as a woman.	Not at all 0 N = 6 12,5%	Somewhat 1 N = 0 0%	Moderately 2 N = 4 8,3%	Very Much 3 N = 7 14,6%	Completely 4 N = 31 64,6%

Table 4
Results « FACE-Q™ - satisfaction with FOREHEAD and eyebrows »

	Very Dissatisfied 1	Somewhat Dissatisfied 2	Somewhat Satisfied 3	Very Satisfied 4
g The <u>position</u> of your eyebrows?	N = 3 6,3%	N = 7 14,6%	N = 26 54%	N = 12 25%
h How <u>even</u> (well-matched) your eyebrows look?	N = 4 8,3%	N = 9 18,8%	N = 24 50%	N = 11 22,9%
i The <u>height</u> of your forehead (distance between your eyebrows and hairline)?	N = 2 4,2%	N = 2 4,2%	N = 20 41,7%	N = 24 50%
j How <u>natural</u> does your forehead look?	N = 2 4,2%	N = 6 12,5%	N = 19 39,6%	N = 21 43,8%
k How <u>youthful</u> does your forehead look?	N = 2 4,2%	N = 7 14,6%	N = 24 50%	N = 15 31,3%
l How <u>smooth</u> does your forehead look?	N = 4 8,3%	N = 7 14,6%	N = 20 41,7%	N = 17 35,4%

Table 5
Comparison by age group.

	Complication rate	FACE Q™ [mean ± SD]	FFS outcomes evaluation [mean ± SD]
Age: 20–30 years	5,6% (1)	74,5 ± 20,26	21,49 ± 9,08
Age: 30–40 years	20% (3)	69,98 ± 19,45	18,18 ± 11,12
Age: 40–50 years	0	74,22 ± 9,04	20,27 ± 11,13
Age: >50 years	14% (1)	78,58 ± 19,41	27,41 ± 7,4

Table 6
Statistical analysis FFS outcomes evaluation.

Tukey's multiple comparisons test (age in years)	Mean Diff,	Adjusted P Value
[20–30] vs. [30–40]	3,31	0,7104
[20–30] vs. [40–50]	1,22	0,9792
[20–30] vs. >50	–5,92	0,233
[30–40] vs. [40–50]	–2,09	0,9067
[30–40] vs. >50	–9,23	0,02
[40–50] vs. >50	–7,14	0,1065

A 35-year-old female patient who underwent feminisation according hairline advancement, bony prominences smoothing in the

upper third of the face associated with the application of cement in the same operative time (Figs. 4 and 5).

Clinical case n°2.

Table 7
FACE- Q™ statistical analysis.

Tukey's multiple comparisons test (age in years)	Mean Diff,	Summary	Adjusted P Value
[20–30] vs. [30–40]	4,52	ns	0,8498
[20–30] vs. [40–50]	−0,08	ns	>0,9999
[20–30] vs. >50	−4,08	ns	0,8845
[30–40] vs. [40–50]	−4,6	ns	0,843
[30–40] vs. >50	−8,6	ns	0,419
[40–50] vs. >50	−4	ns	0,8903



Fig. 4. Clinical case n°1, profile and ¾ pre-operative photos.



Fig. 5. Clinical case n°1, profile and ¾ post-operation photos.

A 28-year-old female patient who underwent feminisation according hairline advancement, bony prominences smoothing in the upper third of the face associated with the application of cement in the same operative time. (Figs. 6 and 7.

4. Discussion

In the present study, patients were mostly satisfied with the results of the upper third surgeries, finding the outcomes feminine. Social and professional activities were only partially limited after surgery. Moreover, a majority of patients demanded the



Fig. 6. Clinical case n°2, profile and ¾ pre-operative photos.



Fig. 7. Clinical case n°2, profile and ¾ post-operation photos.

optimisation and completion of the feminisation of the lower and middle thirds of the face illustrating the good tolerance of the surgery.

Few studies described patient satisfaction.

Ainsworth et al. (Ainsworth and Spiegel 2010) showed satisfaction study, based on the same questionnaire as our study, a higher quality of life in terms of physical, mental and social functioning after FFS. The author showed that mental health and quality of life in an operated transgender patient was significantly poorer compared to the general population. To the opposite, transgender women who had undergone facial reassignment and/or feminisation surgery had comparable mental health quality of life scores to those of the general female population.

The explanation lies in the fact that the 30–40 groups underwent more complications and more dissatisfaction.

Morrison et al., (2016a) in a literature review on facial feminisation procedures based on 15 retrospective studies or case series/reports showed that most studies reported a high satisfaction, although most studies did not use validated or quantified approaches to assess satisfaction.

Altman et al. (Altman 2018) described high general satisfaction with forehead reduction and orbital reshaping post-procedural results and described little long-term morbidity and few complications.

Hoening et al. (Hoening 2011) analysed the clinical outcomes after frontal bone remodelling with Hydroxy-Apatite Cement (HAC) in transgender patients. This case series of 21 patients described very satisfactory results. The surgery was easily performed, and HAC application and tailored molding could meet individual needs. Overall satisfaction rates were very high.

The present study showed a low rate of serious complications, which was confirmed by the literature. Villepelet et al. (Villepelet et al. 2018) described no complications for the fronto-orbital milling technique ± eggshell technique. However, this procedure was only offered to eight patients.

Morrison et al., (2016b) in their literature review described total of 1121 patients undergoing FFS were described and only seven complications were reported, although many articles did not accurately report complications.

In the current literature there is a large study on 168 patients who underwent feminising frontal cranioplasty aimed at

evaluating surgical techniques and complications (Spiegel, 2011). Three surgical techniques were used: bony prominences milling (38%), island or eggshell (29%) osteotomy/osteosynthesis of the anterior sinus wall (33%). Only three complications were reported and the overall complication rate was 1.8%. Bone non-union was described after the “island” bone repositioning technique (complication rate of 3/49 or 6%) (Spiegel 2011).

Dempf and Eckert (2010) discussed a case of a 26-year-old transgender woman. The study was aimed at demonstrating that frontal eminence milling combined with rhinoplasty was a safe and reliable procedure leading to a significantly feminine appearance. By contrast, for group II patients the following procedure was preferred: frontal bone and anterior sinus wall osteotomy and osteosynthesis.

Ousterhout et al., (Ousterhout and Douglas, 1987) presented a case series of 26 patients undergoing FFS. All patients were satisfied with the outcomes and no complications were described. The FFS procedures were based on the same technique as our study which is very reliable. The operating time was short (2 h).

According to Jeffrey H. Spiegel's (Spiegel 2008) statement, Internet has allowed transgender patients instant access to a vast amount of information about FFS. Their high level of knowledge about FFS procedures is both an advantage and a disadvantage. Patients often upload photographs of the results and sequela of surgical procedures and share their personal experience regarding their transition journey. This trend makes the surgeon vulnerable.

Regarding planning, the use of a pre-operative 3D modeling software described by La Padula (La Padula et al., 2019) is a reliable solution. Tailor-made surgery is particularly suitable for complex procedures. However, surgical planning requires a significant amount of hardwares including a photographic simulation software and a 3D printer. Moreover, the increased difficulty of planning a procedure on soft tissue and bone and the costs limit the use of these tools.

Multiple techniques have been described such as the frontal bone flap procedure, based on the reshaping and fixation by osteosynthesis plate (Komuro et al., 1999) or the frontal sinus collapse into “eggshells” or “islands” after milling described by A. Villepelet (Villepelet et al. 2018). These techniques are mainly indicated in Ousterhout's group III foreheads, presenting with a much pneumatized frontal sinus and with thin cortical bone. (Ousterhout and Douglas, 1987).

Dang et al. stated that 90% of patients were to be classified in group III and required a frontal bone osteotomy and recoil (Dang et al., 2021).

B. Habal et al. used methyl methacrylate, in restricted indications. In fact, the use of a custom-made implant was associated with a high number of complications, especially infection. Such complications occurred up to 15 years after implantation. Post-operative satisfaction depended on the realistic expectations of the patient and the practitioner's correct indication (Habal 1990).

By contrast, Ousterhout and Zlotolow used preformed methyl methacrylate implants. The results were reliable, complications were rare and patient satisfaction was very high thanks to an aesthetically pleasing result (Ousterhout and Zlotolow 1990).

Cho et al. reported the case of a 39-year-old transgender woman patient undergoing a FFS procedure based on osteotomy, bilateral supraorbital ridge milling and hairline lowering. No complications were described on a one-year follow-up. The patient was very satisfied with the outcomes. (Cho and HongJin, 2012).

These articles described a high overall patient satisfaction rate. However the reported complication rate was high, while the present study showed a low complication rate combined with very satisfactory results.

Multiple limitations to this study were noted. Patient's follow-up was particularly difficult after the first 6 months. Moreover, patient subgroups were divided based on age. Each subgroup had a limited number patients (not enough to be statically significant). Moreover, the subgroups were not homogeneous in terms of population numbers, which made data difficult to be analysed.

Lastly, very few studies were conducted about this subject. A further prospective study could include the subjective analysis of pre- and post-procedural satisfaction rates associated with upper third feminisation surgery as well as objective pre- and post-procedural scanographic measurements.

5. Conclusion

Within the limitations of the study it seems that a combined procedure of frontal eminence milling and hairline advancement is an adequate treatment option for patients with typically masculine features of the forehead and moderate to slight frontal eminences.

Declaration of competing interest

The authors declare that they have no conflict of interest.

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