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PRS GLOBAL OPEN

ORIGINAL ARTICLE
Gender Affirming Surgery

Impact of Gender-confirming Chest Surgery on Sexual Health: A Prospective Study

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Background: Few studies have evaluated the improvement of the sexual well-being of transgender patients after breast augmentation or bilateral mastectomy. This prospective study aims to assess the potential improvement in body awareness during sexual intercourse, as well as the nipple-areolar complex (NAC) sensitivity recovery after gender-confirming chest surgery.

Methods: From October 2019 up to April 2021, all transgender patients eligible for gender-confirming chest surgery in our institution were asked to fill out two questionnaires, namely BREAST-Q (a patient-reported outcome measure for use in reconstructive breast surgery and clinical practice) and Body Exposure during Sexual Activities Questionnaire (scientifically validated self-report assessments of body-image experiences in the context of sexual relations). The Semmes-Weinstein monofilament test was used to evaluate NAC sensitivity recovery. Different follow-ups were considered: preoperative and 4 and 12 months postoperative.

Results: Twenty-one transmasculine and 12 transfeminine patients met the inclusion criteria. For both groups, the preliminary 4-month postoperative evaluations showed significant improvement in psychological well-being and chest/breast satisfaction compared with preoperative values. Body awareness during sexual intercourse improved significantly at 4 months postoperative in the transmasculine groups ($P \leq 0.001$) and at 12 months postoperative in the transfeminine group ($P \leq 0.01$). No correlation between body awareness during sexual intercourse and NAC sensitivity was observed among either group, transmasculine and transfeminine patients.

Conclusions: Although aesthetic and psychological well-being increased quickly postoperatively, sexual health remained low among transfeminine patients until they completed their transition with vaginoplasty. NAC sensitivity recovery was found to not contribute to the improvement of the sexual health of transgender patients.
(Plast Reconstr Surg Glob Open 2024; 12:e6014; doi: 10.1097/GOX.0000000000006014; Published online 1 August 2024.)

INTRODUCTION

Transgender persons have an identified gender that does not correspond to their biological sex.[1] This can potentially lead to gender dysphoria, defined as discomfort or distress caused by incongruence between gender and sex assigned at birth.[2,3]

The progressive rise of transgender individual awareness in society has led to increased acceptance and demand for medical intervention for the one in need.[4] There are multiple treatment possibilities for patients dealing with gender dysphoria. The most common are hormonal therapy, gender-confirming chest surgery (ie, mammary augmentation and mastectomy), genital surgery, body contouring, and facial surgery.

After psychiatric and endocrinologist evaluations, most patients opt for chest surgery, such as mammary augmentation for male-to-female (transfeminine) patients or mastectomy for female-to-male patients (transmasculine). Aside from obtaining a cosmetically satisfying result,[5–9] the sensation of the chest/breast and the nipple-areolar complex (NAC) sensation should be considered, as it could be one aspect of the success of gender-confirming chest surgery.[10] Despite the NAC being an erogenous zone,

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Received for publication February 20, 2024; accepted May 30, 2024.

Presented at the Swiss Plastic Surgery Congress, September 11–12, 2020, Lausanne, Switzerland; and the European Plastic Surgery Research Council annual meeting, August 27–29, 2021, Helsinki, Finland; and the European Association of Plastic Surgeons, May 25–27, 2023, Stockholm, Sweden.

DOI: 10.1097/GOX.0000000000006014

Disclosure statements are at the end of this article, following the correspondence information.

surgeons usually focus on the global cosmetic result, often underestimating its importance in sexual life.

Indeed, many studies have demonstrated the importance of gender-confirming chest surgery in improving the well-being of transgender patients.[11–18] Nevertheless, hardly any research has extensively evaluated the improvement in the sexual life of transgender patients after breast augmentation/breast removal.[19,20] Moreover, to our knowledge, no study examined differences between transfeminine and transmasculine patients' perceptions of chest surgery outcomes. No study quantified and compared the NAC sensitivity recovery after gender-confirming chest surgery among transfeminine and transmasculine patients.[21]

Considering the lack of literature in the field, this study aims to assess the potential improvement of body-image representation during sexual intercourse and the NAC sensitivity recovery after a gender-confirming chest surgery in transgender patients, as well as to compare eventual differences between groups (transmasculine and transfeminine patients).[22] The results could help clinicians to better perceive the needs of transgender patients in terms of sexual well-being and to appropriately advise them before complex procedures such as surgical sex reassignment.

PATIENTS AND METHODS

All patients who underwent gender-confirming chest surgery from October 2019 to April 2021 at the University Hospital of Lausanne (Centre Hospitalier Universitaire Vaudois) were included in a prospective longitudinal study evaluating the aesthetic aspect of the surgery, body-image representation related to sexual activity, and NAC sensitivity. Nonbinary individuals, identifying themselves neither as male nor female, irrespective of their sex at birth, were excluded from the study.

Before the study, all patients started hormonal therapy under a strict follow-up by specialized endocrinologists. The hormonal regimen is the following: intramuscular injection of testosterone with a trough level of 8–12 nmol/L for transmasculine patients and oral estradiol with a target of 0.3–0.7 nmol/L and a GnRH analogue (leuproreline) administered subcutaneously for transfeminine patients.

Preoperative BREAST-Q, Body Exposure during Sexual Activities Questionnaire (BESAQ), and NAC sensitivity measurements were conducted during consultation 2 weeks before the surgery at the same time as surgical consent and ethical consent for practical reasons. Follow-up assessments after the surgery were set at 4 and 12 months postoperative.

Gender-confirming chest procedures were performed by the same surgeon (O.B.), specialized in sex reassignment surgery. Several surgical techniques were used depending on the patient's anatomy and desires. All transfeminine patients underwent breast augmentation surgery with round microtextured silicone implants (Arion) inserted by inframammary incision.[8] Two mastectomy techniques were performed to masculinize the chest of transmasculine patients—circular technique and free nipple grafting.[23–25]

Takeaways

Question: Is gender-confirming chest surgery enough to improve sexual health of transgender men and women?

Findings: Before and after their surgery, transgender patients were asked to fill out two questionnaires evaluating their satisfaction in terms of aesthetic outcomes, psychosocial well-being, and sexual well-being. Aesthetic and psychological well-being increased quickly postoperatively in both groups. Sexual well-being remained low among transgender women until they completed their transition with vaginoplasty.

Meaning: Although sexual well-being after gender-confirming chest surgery improves significantly among transgender men, transgender women need to complete their transition with genital reassignment.

Ethical Approval

According to the study's prospective design, an institutional review board inspection was performed, and the patient's consent and ethical review committee approval were obtained (ID 2019-01226).

Aesthetic Satisfaction, Psychological Well-being, and Outcomes

The aesthetic aspect evaluation of the surgery was quantified using a modified BREAST-Q questionnaire. The BREAST-Q (initially made to evaluate the satisfaction of cisgender female patients who undergo breast augmentation, mastectomy or reduction/mastopexy)[26] was adapted to suit transgender male or female patients. As an example, all feminine pronouns were changed to masculine pronouns, and the word "chest" was used instead of "breast" in the questionnaire for transgender male patients. The modifications were submitted to and validated by a transgender specialist (Erika Volkmar, director of Agnodice Foundation, which promotes the acceptance of gender identity variations in the Swiss society). From the original BREAST-Q questionnaire, only the sections pertinent to this study were included, namely on psychosocial well-being (eg, "During the past week, how often did you feel confident in a social setting?"), satisfaction with chest/breast (eg, "During the past week, how often have you been satisfied with how you look clothed in the mirror?"), and the satisfaction with general outcomes (eg, "I have no regrets about having surgery").

Body Acceptance during Sexual Intercourse

To evaluate gender dysphoria's impact on body-image representation related to sexual intercourse, the short-form BESAQ was chosen.[27] The inclusive wording of the survey allows all patients to perceive themselves through the questions, as it does not refer to specific sexual orientation or gender identity.[28] The short-form BESAQ includes 18 statements regarding thoughts and behaviors an individual may experience or engage in during sexual intercourse. The patient characterizes each statement with "never," "rarely," "sometimes," "often," or "always." Examples of statements include "During sexual

Table 1. Results of the BREAST-Q and the BESAQ

	Transmasculine			Transfeminine		
	Preoperative (%)	4 Months Postoperative (%)	12 Months Postoperative (%)	Preoperative (%)	4 Months Postoperative (%)	12 Months Postoperative (%)
BREAST-Q: psychological well-being	37.48	73.38§	76.59§	50.46	68.91*	79.10†
BREAST-Q: satisfaction with chest/breast	24.57	78.10§	76.44§	29.77	76.45§	82.90§
BESAQ: body acceptance during sexual intercourse	30.76	51.9‡	52.39†	36.85	42.45	78.00‡

Results are expressed as the percentage of the maximum score that could be obtained on questionnaires. *P* values of postoperative scores compared to preoperative scores are represented by:
*$P<0.5$.
†$P<0.01$.
‡$P<0.001$.
§$P<0.0001$.

activity, I try to hide certain areas of my body" or "I am self-conscious about my body during sexual activity." When talking about the BESAQ, we will refer for clarity to "body acceptance during sexual intercourse."

Sensory Recovery of the NAC

The sensitivity of the NAC was assessed by the Semmes-Weinstein monofilament test, as previously described,[29,30] to provide quantified and repeatable information about NAC sensory recovery and the patient's detection of touch.

Results were converted from grams to grams/square millimeter for statistical analysis with the Aesthesio Precision Sensory Evaluator Data Chart.

Statistical Analysis

After data extraction, the questionnaire scores were statistically analyzed. Patient groups were compared using independent two-sided *t* tests for means. Statistical significance was considered for *P* values of less than 0.05. Statistical analysis was performed using GraphPad Prism (version 8.0, GraphPad Software, La Jolla, Calif.).

RESULTS

All patients had begun hormonal therapy at the time of referral. None of the patients underwent genital surgery before the study.

Twenty-one female-to-male patients were included, of whom 14 had a free nipple graft mastectomy, and seven had a circular technique mastectomy. Twelve male-to-female patients were included; all had a breast augmentation with retroglandular implants inserted by inframammary incision.

BREAST-Q: Psychosocial Well-being

The psychosocial well-being was assessed through a specific section of the BREAST-Q questionnaire dedicated to this purpose. Scores obtained on the psychosocial well-being section of the BREAST-Q were converted into a percentage. Maximal psychosocial well-being was a score of 100%, and minimal psychosocial well-being was a score of 0% (Table 1 and Fig. 1A).

Preoperative BREAST-Q did not differ significantly between groups, with mean scores of 37.48% ± 4.18% versus 50.46% ± 6.19% (average ± standard error of mean [SEM], $P > 0.05$) for transmasculine and transfeminine patients, respectively.

Significantly higher scores were obtained for both groups at 4 months postoperative compared with preoperative, with a transmasculine group score of 73.38% ± 3.29% 4 months postoperative versus 37.48% ± 4.18% preoperative (average ± SEM, $P < 0.0001$) and transfeminine group score of 68.91% ± 5.30% 4 months postoperative versus 50.46% ± 6.19% preoperative (average ± SEM, $P < 0.05$). The results did not show significantly higher scores at 12 months postoperative compared with 4 months postoperative in either the transmasculine or transfeminine group (Table 1 and Fig. 1A).

BREAST-Q: Breast/Chest Satisfaction

The breast/chest satisfaction scores obtained on the modified BREAST-Q were converted into percentages. Maximal satisfaction was a score of 100%, and minimal satisfaction was a score of 0% (Table 1 and Fig. 1A, B). No significantly different results were found between transmasculine and transfeminine groups preoperatively, with a mean score of 24.57% ± 2.71% versus 29.77% ± 4.40% (average ±SEM, $P > 0.05$) in the transmasculine and transfeminine groups, respectively.

The 4-month postoperative scores were significantly higher compared with preoperative scores in both groups, with the transmasculine group mean score of 78.10% ± 2.73% 4 months postoperative versus 24.57% ± 2.71% preoperative (average ± SEM, $P < 0.0001$) and transfeminine group mean score of 76.45% ± 3.66% 4 months postoperative versus 29.77% ± 4.40% preoperative (average ± SEM, $P < 0.0001$). At 12 months postoperative, the results stabilized, showing no significantly higher scores compared with 4-month postoperative assessments in both groups (Table 1 and Fig. 1B).

BREAST-Q: Outcomes

The outcomes section of the BREAST-Q showed no significant differences between the 4-month postoperative assessment and 12-month postoperative assessment in the transmasculine group (with mean scores of 93.24% ± 2.21% at 4 months postoperative and 90.22% ± 3.22% at 12 months postoperative), as well as in the transfeminine group (with mean scores of 94.82% ± 2.67% at 4 months

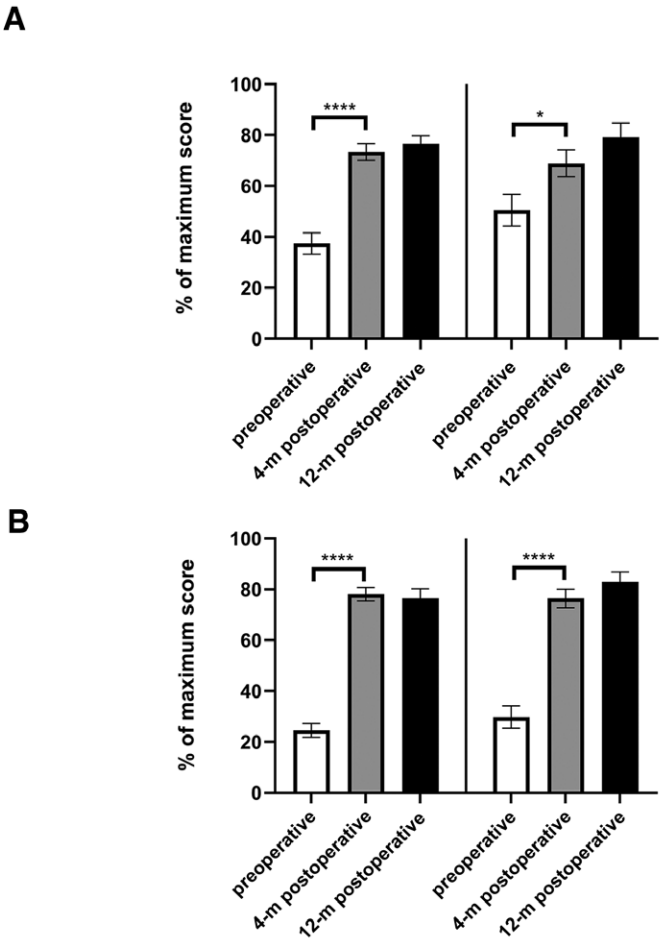

Fig. 1. Results of the BREAST-Q questionnaire for the transmasculine and transfeminine patients: psychological well-being section (A) and chest/breast satisfaction (B). Transmasculine patients are represented by the plots on the left side, and transfeminine patients are represented by the plots on the right side. Plots represent the means; error bars are the standard error of mean (SEM). *P* values are represented as follows: *$P \leq 0.05$, ****$P \leq 0.0001$.

Table 2. Results of the Outcomes Section of the BREAST-Q

	Transmasculine		Transfeminine	
	4 Months Postoperative (%)	12 Months Postoperative (%)	4 Months Postoperative (%)	12 Months Postoperative (%)
BREAST-Q: outcomes	93.24	90.22	94.82	92.09

Results are expressed as the percentage of the maximum score that could be obtained.

postoperative and 92.09% ± 2.68% at 12 months postoperative; average ± SEM, $P > 0.05$) (Table 2).

BESAQ: Body Acceptance during Sexual Intercourse

The scores obtained on the BESAQ were converted into a percentage. Maximal body acceptance during sexual intercourse was a score of 100%, and minimal body acceptance was a score of 0% (Table 1 and Fig. 2). No significant differences were found between transmasculine and transfeminine groups preoperatively, with a mean score of 30.765 ± 4.15% versus 36.85% ± 6.27% (average ± SEM, $P > 0.05$) in the transmasculine and transfeminine groups, respectively.

Similarly to the aesthetic satisfaction and the psychosocial well-being results, the score of the transmasculine group was significantly higher at 4 months postoperative compared with preoperative, 51.90% ± 4.22% versus 30.76% ± 4.15%, respectively (average ± SEM, $P < 0.001$). This score further improved at 12 months postoperative, but not significantly compared with the 4-month postoperative score (Table 1 and Fig. 2).

On the contrary, the transfeminine group did not show a higher score at 4 months postoperative compared with preoperative, with a mean score of 42.45% ± 9.22% versus 36.85% ± 6.27%, respectively (average ± SEM, $P > 0.05$). It was only at 12 months postoperative that a significantly

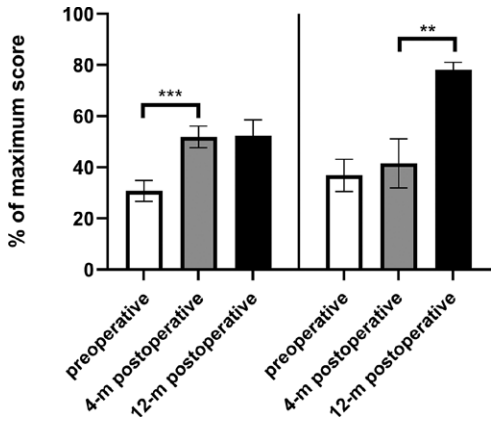

Fig. 2. Results of the BESAQ questionnaire (body awareness during sexual intercourse) for the transmasculine and transfeminine patients. The plots on the left and right sides represent transmasculine and transfeminine patients, respectively. Plots represent the means; error bars are the standard error of mean (SEM). *P* values are represented as following: $^{**}P \leq 0.01$, $^{***}P \leq 0.001$.

higher score was found in this group, with a mean score of 78.00% ± 3.01% (average ± SEM, $P < 0.01$).

Sensory Recovery of the NAC

No correlation was observed between body awareness during sexual intercourse and NAC sensitivity in either group, transmasculine and transfeminine patients, either preoperatively or at 4 or 12 months postoperatively ($P > 0.05$) (Fig. 3A–C). Preoperatively, a significant difference between the two groups was found with a sensitivity threshold mean of 25.67 g/mm^2 ± 0.75 in the transmasculine group and a sensitivity threshold mean of 21.42 ± 1.56 in the transfeminine group (average ± SEM, $P < 0.01$).

Procedures Done during the Follow-up Time

During the 12-month follow-up, 55% of transmasculine patients did not undergo other procedures related to gender reassignment, 30% underwent hysterectomy and ovariectomy, and 15% had scar corrections (eg, dog ears, scar hypertrophy). None of the patients underwent phalloplasty during the follow-up period (Fig. 4A).

Among transfeminine patients, 64% underwent vaginoplasty, and 18% had facial feminization surgery (eg, Adam apple removal, jawline remodeling). Only 18% of transfeminine patients did not have any surgery related to gender reassignment during the follow-up (Fig. 4B).

Surgeries Plan after the Follow-up

Twelve-month postmastectomy, 44% of transmasculine patients planned to undergo phalloplasty. Twenty-eight percent planned to undergo a hysterectomy, and 28% did not plan any other procedures (Fig. 5A).

In the transfeminine group, 30% of patients planned to undergo a vaginoplasty, 40% planned facial feminization, 10% a colon vaginoplasty (as a second step after penile inversion), and 20% did not plan any other procedures (Fig. 5B).

Relationships

Among transmasculine patients, 67% were in a relationship with cis-female individuals, and 33% were single. No patient in our cohort was dating a cis-male individual. In the transfeminine patient group, 50% had a cis-male partner, 20% a cis-female partner, and 30% were single. No patient in the present study had a sexual relationship with another transgender individual.

DISCUSSION

Today, most transgender patients request gender-confirming chest surgery as the first surgical intervention of their gender transition. A recent review of literature on gender-confirming chest procedures assessed evidence of their benefits on the social well-being and mental health of transgender individuals with gender dysphoria.[21] It also pointed out the lack of literature on the impact of chest surgery on the sexual well-being of both transfeminine and transmasculine patients.[31] This understudied aspect of gender-confirming chest surgery could drastically impact patients' decisions to undergo other surgical procedures, such as genital reassignment.

As highlighted in other literature, a significant improvement in psychosocial well-being and patient satisfaction with breast or chest aesthetics was found among transfeminine and transmasculine patients already at 4 months postoperative. Interestingly, these improvements stabilized at 12 months postoperative, showing no significant higher or lower scores in both variables and among the two groups. These results support the evidence that gender-confirming chest surgery can improve the dysphoria of transgender individuals in a relatively short and lasting period. Moreover, it allows surgeons to reassure their patients of having satisfying results in terms of psychosocial well-being and satisfaction with breast or chest aesthetics already at 4 months postoperative.

The body-image awareness during sexual intercourse assessment, reflecting the impact of gender dysphoria on sexual health, showed interesting differences in results when comparing transfeminine to transmasculine patients. Although a significant improvement was found at 4 months postoperative in the transmasculine group, it was only at 12 months postoperative that a significant improvement was observed in the transfeminine group. This difference in postoperative time interval before obtaining an increase in sexual well-being could be explained by the need to undergo genital surgery. Vaginoplasty seems to be an essential step for transfeminine patients to improve their sexual health. Indeed, in this study, the majority (7, 64% overall, Fig. 4B) of transfeminine patients underwent vaginoplasty between the 4-month postoperative and the 12-month postoperative assessments. When asked, transfeminine patients who did not undergo vaginoplasty during the follow-up period (3, 30% overall, Fig. 5B) affirmed feeling the need to complete their transition with vaginoplasty in the future to diminish their gender dysphoria and be able to have a satisfying sexual life with their partner.

On the contrary, most transgender men expressed having a satisfying sexual life with their partner without having undergone phalloplasty during the follow-up.[32]

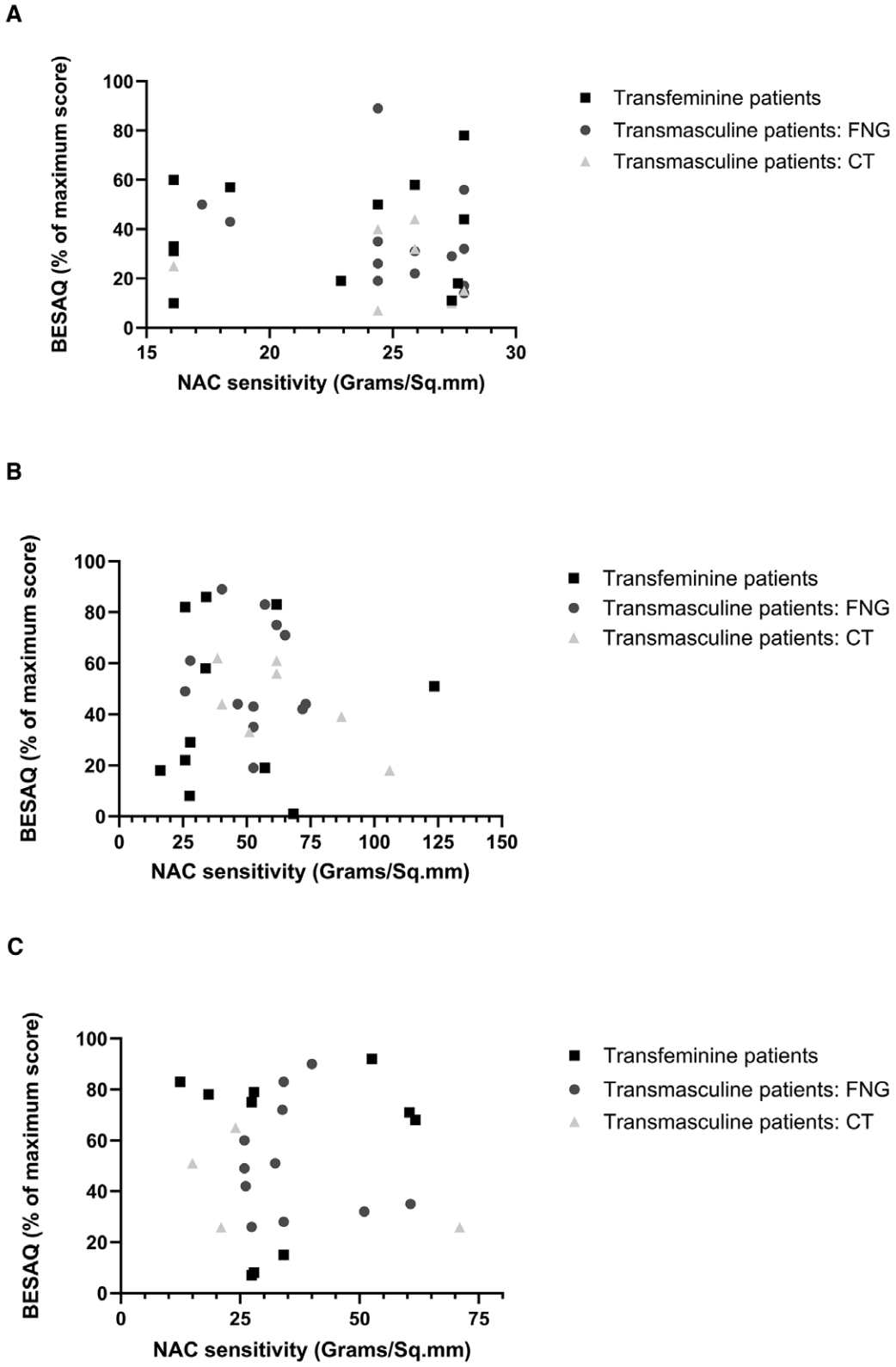

Fig. 3. Correlation between BESAQ questionnaires and NAC sensitivity: preoperative (A), 4 months postoperative (B), and 12 months postoperative (C). The *y* axis represents the BESAQ score, and the *x* axis represents the NAC sensitivity. Two mastectomy techniques were performed. CT, circular technique; FNG, free nipple grafting technique.

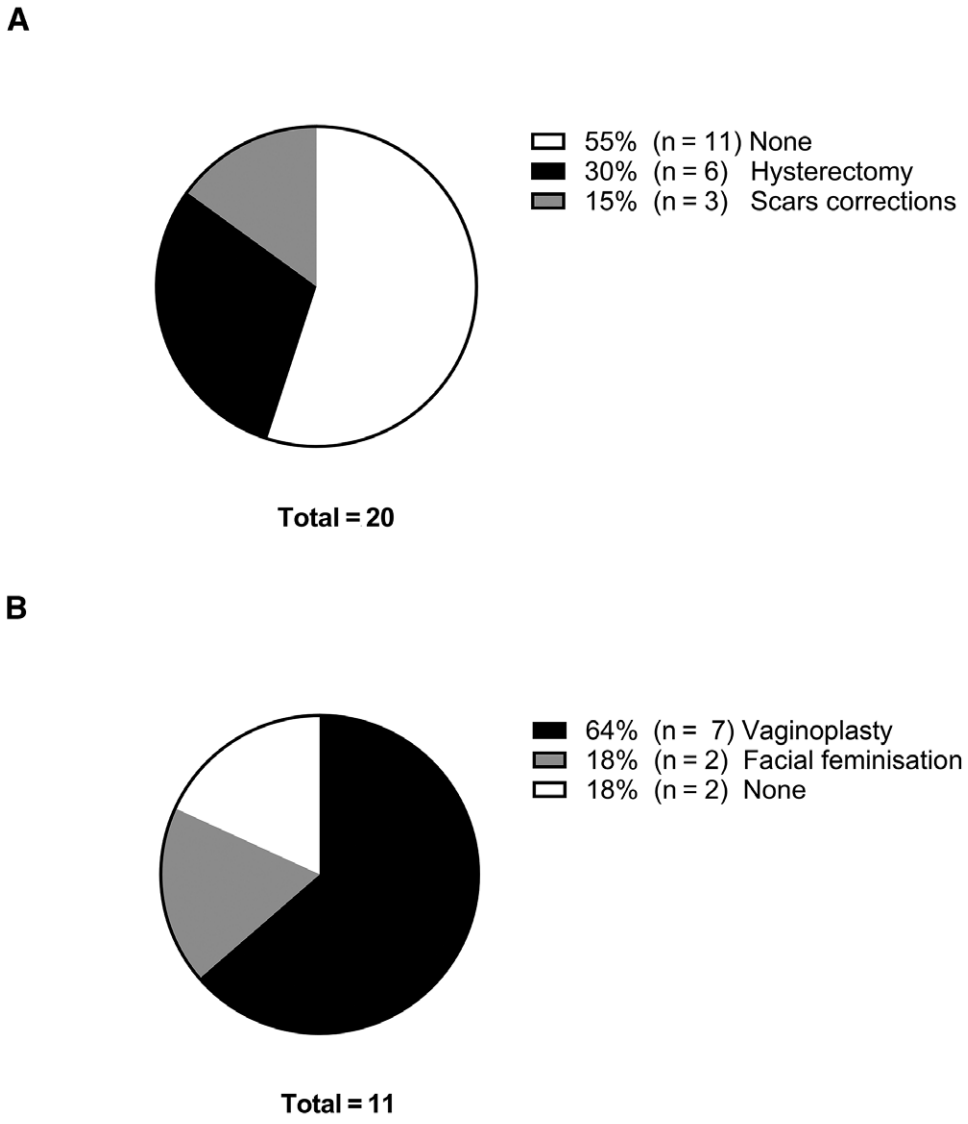

Fig. 4. Procedures done during the 12-month follow-up period: (A) transmasculine patients and (B) transfeminine patients.

Indeed, at 12-month postmastectomy, only 44% of the patients who completed follow-up were willing to undergo phalloplasty in the future. The complexity and potential complications related to phalloplasty may explain why most transmasculine patients choose not to undergo genital surgery.[32,33] Nevertheless, this decision seems to vary widely from patient to patient.[34]

The NAC is known to be an erogenous zone. Nevertheless, no correlation was found between body awareness during sexual intercourse and NAC sensitivity either preoperatively or 4 months postoperatively. Therefore, good sensory recovery of the NAC seems not to have a critical role in influencing the sexual well-being of transgender patients, contrary to their cisgender counterparts.[35] This poor impact of NAC sensitivity on the sexual health of transgender patients gives a critical role to the genitals as the central and maybe only erogenous zone.[36] In the future, it would be interesting to evaluate the NAC sensitivity recovery in mastectomy flap with neurotization and its impact on sexual health.[10]

The difference in sensitivity threshold between the two groups preoperatively has several explanations. First, the hormonal treatments, estrogen for transfeminine patients and testosterone for transmasculine patients, induce mammogenesis or mammary atrophy, which could change the sensitivity of the NAC.[37] Second, the ptosis of the breasts experienced by transmasculine patients with significant breast volume previous to testosterone treatment induces a stretch of the sensitive nerve fiber and damages them. Third, to flatten their chest, most transmasculine patients bind their chests with bandages, multiple sports bras, commercial binders, or even scotch tape. This constant pressure applied to the skin of the NAC injures it, making it less sensitive.[38]

Patients in both groups reported more than 90% satisfaction regarding the general outcomes (such as regrets

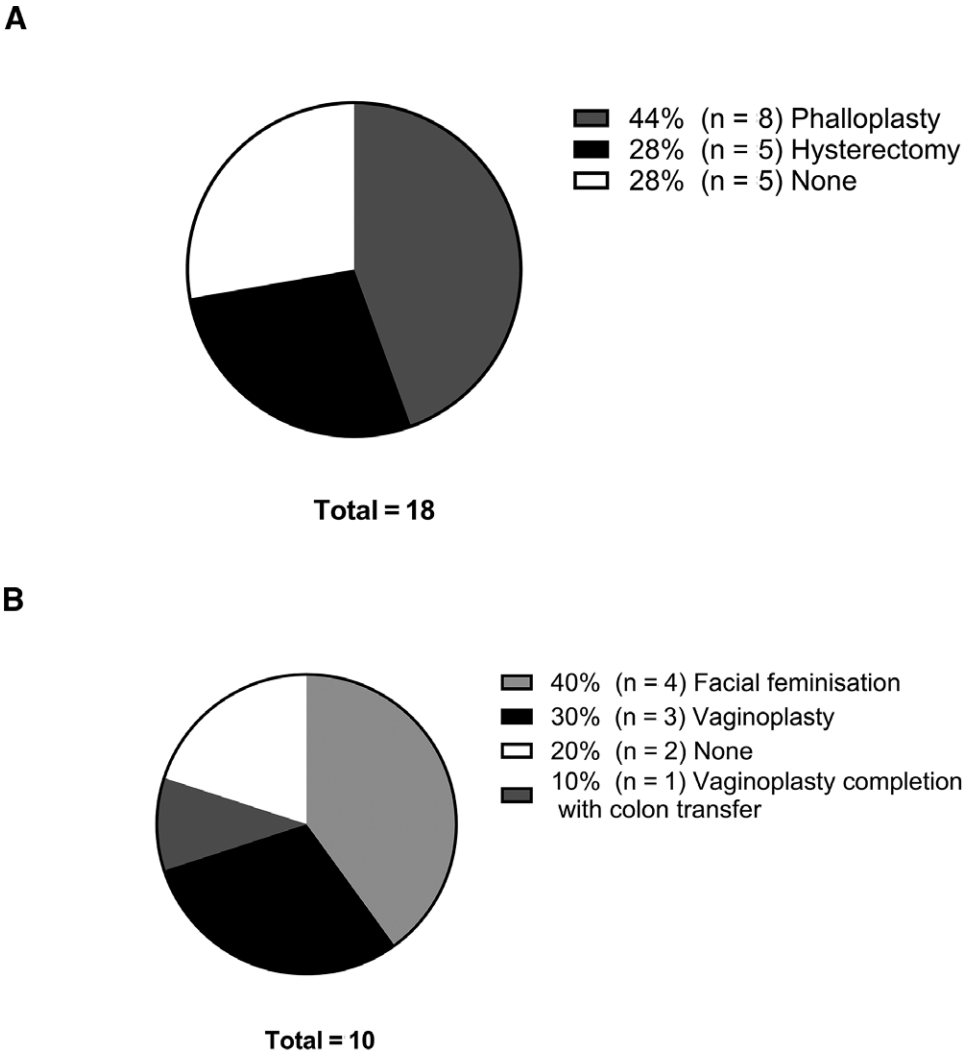

Fig. 5. Procedures planned after the 12-month postoperative follow-up: (A) transmasculine patients and (B) transfeminine patients.

after the surgery or matching surgical results with patients' expectations) of the surgery at 4 months postoperative. This satisfaction rate remains at 12-month postopertive follow-up among transfeminine and transmasculine patients. These results confirm the low percentage of patients experiencing regrets after gender-confirming chest surgery, as found in previous literature. Although gender-confirming chest surgery did not improve transfeminine patients' body awareness during sexual intercourse, they reported comparable general outcomes to transmasculine patients at both 4- and and 12-month postoperative assessments. Therefore, the absence of sexual well-being improvement in transgender women, as found in this study, should not question the eligibility of these patients to undergo mammary augmentation.

In our groups, transfeminine patients had greater diversity in sexual partnership compared with transmasculine patients. As transfeminine patients had cis-male or cis-female sexual partners, transmasculine patients were exclusively in relationships with cis-female partners. These findings are consistent with the literature but poorly explained.[39] A study by Fein et al[40] suggested that cisgender women might have more favorable attitudes toward transgender individuals, explaining the vast majority of transmasculine patients having cis-female partners despite their female genitals.

Limitations of this study include the small sample size that resulted from recruiting participants from a single specialized center. Although the two questionnaires used in this study (BREAST-Q and BESAQ) are validated by the scientific community, they are not yet validated for the transgender population. The prospective nature of the study and the homogenous transgender population that a single surgeon operated on nevertheless add strength to the conclusions derived from this work.

CONCLUSIONS

This prospective study reports long-term outcomes of gender-confirming chest surgery in both transgender female and male patients using two different validated questionnaires and a monofilament testing of the NAC sensitivity. Although aesthetic and psychological well-being outcomes increased quickly postoperatively in both

groups, sexual health remained low among transfeminine patients until they completed their transition with vaginoplasty. This work highlights for the first time the different surgical needs between transfeminine and transmasculine individuals regarding surgical sex reassignment. NAC sensory recovery was found to be noncontributory to the improvement of sexual health of transgender patients after gender-confirming chest surgery.

These findings could help clinicians to better advise their transgender patients in deciding whether to undergo genital surgery. To obtain reliable surgical practice guidelines, more research is needed on the sexual needs and expectations of the transgender population before gender reassignment surgery.

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DISCLOSURES

The authors have no financial interest to declare in relation to the content of this article. The breast implants used in the following study are from the Arion brand. Arion did not financially support this study in any way.

ACKNOWLEDGMENT

The authors thank the study participants who enabled us to conduct this research.

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