

Gender-Affirming Mastectomy: Psychosocial and Surgical Outcomes in Transgender

Adults

AA Bertrand, MD¹, Michael R DeLong, MD¹, Sean P McCleary, MD¹, Edward H Nahabet MD¹, Ginger C Slack, MD¹, Andrew L DaLio, MD¹, Amy K Weimer, MD², Lorna Kwan, MPH³, Jessica Bernacki, PhD², George H Rudkin, MD¹

1. Division of Plastic & Reconstructive Surgery, University of California, Los Angeles; Los Angeles, CA
2. Department of Internal Medicine, University of California, Los Angeles; Los Angeles, CA
3. Department of Urology, University of California, Los Angeles; Los Angeles, CA

Disclosure Information: Nothing to disclose.

Corresponding author: George H. Rudkin, MD Division of Plastic Surgery, Department of Surgery University of California, Los Angeles 200 Medical Plaza Driveway Los Angeles, CA 90095 Email: genderresearch@mednet.ucla.edu

Brief Title: Outcomes After Gender-Affirming Mastectomy

Abstract

Background: Limited literature exists examining the effects of gender-affirming mastectomy on transmasculine and nonbinary patients that is prospective and uses validated survey instruments.

Study Design: The psychosocial functioning of transmasculine and nonbinary patients was compared between patients who underwent gender-affirming mastectomy and those who had not yet undergone surgery. Participants were enrolled in a single-site, combined study of surgical and psychosocial outcomes, including a cross-sectional cohort of preoperative and postoperative patients, as well as separate prospective cohort. Participants completed the BREAST-Q Psychosocial and Sexual Well-Being modules, the BODY-Q Satisfaction with Chest and Nipples modules, the Body Image Quality of Life Inventory, the Transgender Congruence Scale, the Patient Health Questionnaire-9, and the Generalized Anxiety Disorder-7 scale before and after surgery. We also examined how patient demographic factors correlated with postoperative surgical and psychosocial outcomes.

Results: A total of 111 transmasculine and nonbinary patients 18 to 63 years of age (mean [\pm SD], 26.5 \pm 8.0) underwent mastectomy and were included in the study. All were included in the cross-sectional cohort, and 20 were enrolled in the prospective cohort. Over one-third (34.2%) of patients were nonbinary. Following surgery, psychosocial and sexual well-being, satisfaction, body image-related quality of life, and gender congruence were increased ($p < 0.001$) in both cohorts, and depression ($p < 0.009$ cross-sectional), and anxiety ($p < 0.001$ cross-sectional) were decreased. The most common adverse event was hypertrophic scarring, which occurred in 41 participants (36.9%).

Conclusions: In this study of transmasculine and nonbinary adults, gender-affirming mastectomy was followed by substantial improvements in psychosocial functioning.

Keywords

Mastectomy, Top Surgery, Transgender, Nonbinary, Gender Dysphoria, Patient-Reported Outcome Measures

ACCEPTED

Introduction

Transgender and nonbinary individuals comprise over 0.5% of adults in the United States.(1) It is estimated that the prevalence of people identifying as transgender or gender diverse has been growing over time, as the concept of gender identity has gained visibility and societal recognition.(2, 3) Many transgender and nonbinary people experience gender dysphoria, or persistent psychological discomfort and anguish due to incongruence between their physical characteristics, the gender they were assigned at birth, and their internal sense of self.(4) The chest is an especially sexually dimorphic anatomic region that is a focal point for patients experiencing gender dysphoria.(5, 6) Increasingly, transmasculine (i.e., persons designated female at birth who identify along the masculine spectrum) and many nonbinary individuals are seeking out surgical care via mastectomy, or “top surgery,” to masculinize their chest contour, improving the alignment between their internal gender identity and physical appearance.(3, 7) Mastectomy is usually the first – and often the only – gender-affirming surgery that transmasculine and nonbinary patients undergo in their lifetime.(8-11)

In recent years, there has been a growing body of evidence demonstrating that gender-affirming mastectomy is associated with improvements in quality of life (QOL) and psychosocial functioning.(12-15) Much of this evidence has been generated using patient-reported outcome measures (PROMs), survey instruments designed to assess a patient’s perceptions of their outcome without external bias, such as the clinician’s interpretation.(16, 17) With the exceptions of Agarwal et al. 2018 and Lane et al. 2022, previously published studies often rely on questionnaires that have limited or no formal validation process, or were validated in cisgender populations.(18, 19) Most are cross-sectional in their design.(14, 20-23) Evidence has been limited to date from studies quantifying the impact of gender-affirming mastectomy on trans

patients' psychosocial outcomes and QOL that control for preoperative status and that use validated survey instruments.

We examined surgical outcomes and psychosocial functioning in patients designated female at birth with a diagnosis of gender dysphoria who underwent gender-affirming mastectomy at our institution over a period of five years and eight months. We hypothesized that satisfaction, QOL, and gender congruence would be greater after surgery, and that depression and anxiety symptoms would be lower. We also explored the potential association of patients' demographic characteristics, including age and body mass index (BMI), on postoperative surgical and psychosocial outcomes.

Methods

Study Design and Participant Recruitment

This combined cross-sectional and prospective study evaluated the surgical and psychosocial outcomes of gender-affirming mastectomy for gender dysphoria in transmasculine and nonbinary patients in two distinct cohorts. The first was a cross-sectional cohort comparing the psychosocial functioning of patients who had undergone mastectomy to a control group of patients who were candidates for, but who had not yet undergone, top surgery. The second cohort evaluated patients prospectively, before and after top surgery. Participants were recruited from the Plastic & Reconstructive Surgery Clinic at UCLA Medical Center from January 2017 to November 2022. The Plastic & Reconstructive Surgery Division at UCLA works in collaboration with the UCLA Gender Health Program, which employs a multidisciplinary team of medical, surgical, and mental health providers who provide patient-centered, individualized care to patients with gender incongruence and dysphoria. All patients were assessed for surgical readiness according to the guidelines set out by the World Professional Association for Transgender Health (WPATH) Standards of Care.(24)

Inclusion criteria for the present study were patients over 18 years of age who were designated female at birth, with a confirmed diagnosis of gender dysphoria, and who underwent or would undergo masculinizing top surgery. Patients were not excluded based on past or current testosterone therapy. However, patients who had undergone any prior breast operation or any other gender-affirming operation were excluded from the study. Approval was granted by the Institutional Review Board of the University of California, Los Angeles (IRB# 19-001571). All patients provided written informed consent.

Measures

Patient information and demographic data were obtained via medical chart review. These variables included age, race and ethnicity, BMI, pre-existing medical diagnoses, smoking habits, and mental health history. Data collected from standardized physical examinations included measurements of sternal notch to nipple distance, inframammary fold to nipple distance, breast size, skin elasticity, and grade of breast ptosis. Information about patients' gender-related medical history was also obtained, including past or current use of hormones and chest binding practices.

The surgical technique chosen by one of the three operating surgeons was based on patients' physical characteristics and preferences. The surgeon, in consultation with the patient, would evaluate patients' medical history and preoperative anatomy (e.g., breast size, degree of ptosis, skin elasticity) and determine which technique would facilitate the patient achieving their goals in obtaining a masculine chest contour. Surgical techniques included the double incision technique with free nipple grafting and periareolar resection. For a more extensive description of the surgical techniques performed, we refer to Monstrey et al. and Knox et al.(8, 25) The standard protocol included drain placement, chest compression until 2 weeks postoperatively, and outpatient clinic visits at 1 week, 3 weeks, and 4 months after surgery.

Postoperative surgical outcome variables for both cohorts were also obtained via medical chart review. These included the total mass of breast tissue removed (in grams) and the incidence of complications like hematoma, seroma, and infection, as well as adverse events such as hypertrophic scarring. Information about revisions or secondary procedures was also recorded when such operations were performed or deemed appropriate by the surgeon and the patient. The presence of one or more complication was considered a single event and was counted once per breast for our calculation of complication rates.

With respect to psychosocial functioning and QOL, participants completed the BREAST-Q Psychosocial Well-Being and Sexual Well-Being modules, the BODY-Q Satisfaction with chest and Satisfaction with nipples modules, the Patient Health Questionnaire-9 (PHQ-9), the General Anxiety Disorder-7 (GAD-7), the Body Image Quality of Life Inventory (BIQLI), and the Transgender Congruence Scale (TCS). (16, 26-30) All PROM instruments were distributed digitally using Qualtrics survey software (Seattle, WA). In both cohorts, PROM survey instruments were administered 1-2 weeks before surgery and at least 8 weeks after surgery. Survey instruments and scoring information for each PROM are provided in the Supplemental Digital Content, <http://links.lww.com/JACS/A334>. Higher scores on the BREAST-Q and BODY-Q modules, BIQLI, and TCS reflect greater psychosocial and sexual well-being, satisfaction, QOL, and gender congruence, respectively. Lower scores on the PHQ-9 and GAD-7 reflect less severe depression and anxiety, respectively.

Statistical Analysis

Psychosocial functioning was compared between preoperative patients and patients who underwent gender-affirming mastectomy using nonparametric tests for independent and paired samples. Inverse probability of treatment weighting was used to balance relevant covariates, including age, gender identity, BMI, surgical technique, testosterone use, depression, and anxiety. In the cross-sectional cohort, the Mann-Whitney U test was also used to compare PROM scores of patients who had undergone mastectomy to a group of preoperative controls. In the prospective cohort, the Wilcoxon Signed-Rank test was used to compare scores within patients before and after mastectomy.

Patients whose scores for depression and anxiety were below the level of clinical significance (i.e., PHQ-9 < 5 or GAD-7 < 5) were excluded from the analysis for these respective diagnoses.

Multivariate logistic regression analyses were performed to evaluate the potential association between individual patient factors and surgical technique on postoperative events like revisions, as well as adverse outcomes like hypertrophic scarring, seroma, hematoma, and infection. The association between patient characteristics and surgical factors on patient postoperative psychosocial outcomes was analyzed via multivariate linear regression. Covariates for multivariate models were determined *a priori*. All the following assumptions were met for each model: linearity and homoscedasticity using a residual versus predicted values plot, and collinearity using a variance inflation factor of <2.

The primary hypotheses were tested by calculating p-values at an overall alpha level of 0.05, and Bonferroni correction for multiple comparison adjustment was applied to determine statistical significance. All statistical analyses were performed using STATA/IC, Version 16.1 (College Station, TX).

Results

Patient Characteristics

In total, 111 patients underwent gender-affirming mastectomy and were included in the study. All were examined in the analysis of surgical outcomes. All completed surveys and were enrolled in the cross-sectional cohort. The prospective cohort included 20 patients who were followed longitudinally. Missing data was very rare (<1%). All patients were transmasculine and designated female at birth. Patients ranged from 18 to 63 years of age at the time of surgery (mean [\pm SD], 26.5 \pm 8.0 years) (**Table 1**). Most patients identified as trans male (63.1%), a substantial portion identified as nonbinary (34.2%), and few identified as other (2.7%). Chest binding practices were documented in approximately half of patients, and most patients were on testosterone therapy (74.8%) at the time of surgery. Medical comorbidities were rare overall. Pre-diabetes was present in 2.7% of patients, and hypertension was present in 2.7% of patients. Active smoking was recorded in 4.5% of patients and prior smoking in 13.5% of patients at the time of their initial consultation (patients were asked to refrain from all nicotine products for 4 weeks before and after surgery). Psychiatric comorbidities were much more prevalent. Major depressive disorder was documented in 55.0% of patients preoperatively, anxiety was documented in 45.0% of patients, and other diagnoses like attention deficit/hyperactivity disorder (ADHD), post-traumatic stress disorder (PTSD), and obsessive-compulsive disorder (OCD) were also observed.

Surgical Outcomes

The most common surgical technique was double incision mastectomy (n = 94 [84.7%]), followed by periareolar mastectomy (n = 17 [15.3%]) (**Table 2**). The mean total mass of breast tissue removed was 475.1 ± 318.3 grams (g) when the double incision technique was used and 103.0 ± 61.1 g when the periareolar technique was used. The mass of tissue removed was significantly greater when the double incision technique was used ($p < 0.001$). Complications were rare – hematoma occurred in 3 breasts (1.4%), seroma in 7 breasts (3.2%), and infection in 2 breasts (0.9%) (**Table 3**). All patients who developed hematomas (1.4%) required returning to the operating room. All seromas and infections were minor and managed in the outpatient clinic setting. Hypertrophic scarring was recorded in 36.9% of all patients postoperatively and was exclusively seen in cases where the double incision technique had been used. There was no significant difference in the complication rates between surgical techniques. However, secondary procedures were required more often when the periareolar technique was used, typically for further reduction of the nipple.

Association Between Patient Factors and Surgical Outcomes

Several patient and clinical factors were found to be associated with certain adverse events when evaluated via multivariate logistic regression analyses (**Table 4**). As stated above, the surgical technique chosen was significantly associated with hypertrophic scarring, as hypertrophic scarring was exclusively seen in patients who underwent surgery via the double incision technique. No patient characteristics were found to be significantly associated with postoperative infection, hematoma, or seroma. The association between surgical technique and revisions being performed postoperatively approached significance after Bonferroni correction (odds ratio [OR]= 10.792, $p = 0.023$). Six of the 9 revisions were for nipple reduction following

periareolar resection. No significant association was found between patients' age or gender identity and either complications or revisions postoperatively.

Patient-Reported Outcomes

In the cross-sectional cohort, 96 patients completed surveys who had already undergone gender-affirming mastectomy, which was compared to a group of 35 patients who were candidates for and were scheduled for surgery, but who had not yet undergone the operation. PROM scores among preoperative and postoperative patients are summarized in **Table 5** and **Figure 1** (also see Supplemental Digital Content, <http://links.lww.com/JACS/A334>). Mean scores for the BREAST-Q modules of psychosocial well-being and sexual well-being were significantly higher in the postoperative group compared to the preoperative group (72.2 vs 37.2, $p < 0.001$; 59.9 vs. 39.0, $p < 0.001$, respectively) at a mean of 64.2 weeks after surgery. Significant differences in the BODY-Q modules for satisfaction with chest contour (81.8 vs. 12.9, $p < 0.001$) and satisfaction with nipples (80.5 vs. 27.9, $p < 0.001$) were also demonstrated. Similarly, body image-related quality of life measured by the BIQLI instrument was also significantly higher in the postoperative group (1.3 vs. -0.8, $p < 0.001$), as was gender congruence measured by the TCS (4.1 vs. 2.8, $p < 0.001$). We also observed lower scores in the PHQ-9 instrument for depression (9.2 vs. 5.8, $p = 0.009$) and in the GAD-7 instrument for anxiety (15.0 vs. 5.1, $p < 0.001$) after surgery.

Similar results were seen in the prospective cohort, in which 20 patients were followed longitudinally and surveyed before and after surgery. Psychosocial well-being (72.2 vs. 33.9, $p < 0.001$), sexual well-being (59.0 vs. 37.1, $p < 0.001$), chest contour satisfaction (92.7 vs. 11.7, $p < 0.001$), satisfaction with nipples (87.0 vs. 26.8, $p < 0.001$), body image-related QOL (1.1 vs. -0.8, $p < 0.001$), gender congruence (4.2 vs. 3.0, $p < 0.001$), depression (6.0 vs. 7.3, $p = 0.474$) and anxiety (4.8 vs. 9.2, $p = 0.023$) at baseline (typically 1-2 weeks before surgery) and at a mean of

51.5 weeks after surgery (**Table 5, Figure 1**). Results of these analyses demonstrated that there were significant within-patient improvements in most of these measures after gender-affirming mastectomy. The improvements seen in this prospective cohort were present but not statistically significant for the PHQ-9 and GAD7 instruments, as relatively few patients had depression or anxiety (i.e., PHQ-9 or GAD7 >5) prior to surgery.

Association Between Patient and Clinical Factors and Patient-Reported Outcomes

Certain patient and clinical factors were found to be associated with postoperative psychosocial PROM scores on multivariate linear regression analysis. (See Supplemental Digital Content, <http://links.lww.com/JACS/A334>) Patients with higher BMIs were found to have significantly lower scores on the postoperative BODY-Q chest satisfaction module ($p = 0.004$, coefficient = -1.477) and body image-related QOL scores on the BIQLI ($p = 0.001$, coefficient = -0.094). Patients who underwent revision surgery were found to have significantly lower scores on the BODY-Q chest satisfaction ($p = 0.002$, coefficient = -23.347) and nipple satisfaction ($p = 0.001$, coefficient = -31.896) modules. There was no significant association between testosterone therapy or surgical technique and postoperative PROM scores.

Discussion

Understanding the precise impact of gender-affirming mastectomy on the quality of life and mental health of transmasculine and nonbinary patients is increasingly important in the context of the significant mental health burden these patients face, the large and growing number of patients seeking out gender-affirming surgery, and ongoing national conversations about gender-affirming care and its coverage by payors.(31-33) In our single-center, combined cross-sectional and prospective study of transmasculine and nonbinary adults treated with gender-affirming mastectomy, we found a substantial positive difference in psychosocial functioning and mental health, which were assessed through validated survey instruments. Our findings are

consistent with other cross-sectional studies demonstrating improvement in psychosocial outcomes using non-validated instruments. We replicated these findings in a larger sample, used validated survey instruments, and we also confirmed that within-patient improvements can be seen when patients are followed prospectively. Notably, our prospective findings align with those of Agarwal et al. 2018 and Lane et al. 2022, which observed significant improvements in some of these domains after gender-affirming mastectomy, though without a cross-sectional cohort, a specific analysis of nonbinary patients (34.2%), nor an examination of how preoperative patient factors may impact postoperative surgical and psychosocial outcomes.

We found that among trans patients presenting for consultation for gender-affirming mastectomy, medical comorbidities were uncommon, but the prevalence of mental health diagnoses was high. The low prevalence of medical comorbidities was likely a function of patients' age (mean \pm SD, 26.5 \pm 8.0 years). Preoperative rates of depression (55.0%) and anxiety (45.0%), however, were comparably high to other studies examining transgender population.(22, 23, 31) As Lane et al. noted in their study, there were also patients who screened positive for depression and anxiety who did not have existing clinical diagnoses.(31) These findings demonstrate the significant mental health burden among transgender and nonbinary patients and suggest mental health disorders may be underdiagnosed in this population.

Surgical complications were rare. The minor adverse outcome that was seen most frequently was hypertrophic scarring, which was noted in one third of patients and exclusively seen in patients who had undergone the double incision technique. Hypertrophic scarring was seen more commonly at the lateral aspects of the mastectomy scar, and all could be managed with one or more steroid injections in clinic. This is consistent with findings in other studies, though we observed a greater incidence of hypertrophic scarring, potentially due to how hypertrophic scarring is defined and reported across studies. We posit that when the double

incision technique is used, the incision is exposed to greater tension postoperatively, particularly when patients abduct their arms, thereby contributing to expansion and hypertrophy of the surgical scar. Revisions or secondary procedures were most often performed to reduce nipple prominence following the periareolar technique. When desired by the patient, nipple reductions are sometimes planned as a second-stage procedure when the periareolar technique will be used.

Regardless of the technique used, gender-affirming mastectomy was followed by substantial improvements in psychosocial functioning and mental health in both the cross-sectional and prospective cohorts of this study. Improvement was apparent across all PROM instruments, indicating greater well-being, satisfaction, QOL, and gender congruence after surgery. Depression and anxiety were also found to decrease, which is likely interrelated with these measures and reduced psychosocial stress. These findings are consistent with other early studies demonstrating improvements in measures of mental health that are not based on self-reporting, including decreased mental health treatment utilization and reduced use of psychotropic medications.⁽³⁴⁻³⁶⁾ Taken together, we believe these data support the conclusion that gender-affirming mastectomy leads to improvements in psychosocial functioning and mental health in appropriately selected patients.

Postoperative psychosocial outcomes were significantly associated with patients' BMI and whether revision surgery was required. Higher BMI was associated with lower postoperative BODY-Q chest satisfaction and BIQLI scores. Lower postoperative chest satisfaction in these patients can potentially be explained by the presence of excess, non-breast, adipose tissue that can remain in the lateral axillary regions after mastectomy. It is also possible that body image in patients with a high BMI is negatively affected by having a high BMI itself, rather than gender dysphoria alone. It is understandable that lower postoperative satisfaction with the chest or nipples was associated with revision surgery.

Our study has certain limitations. The prospective cohort of the study was limited by its sample size. Importantly, improvement in PHQ-9 and GAD7 scores was seen following surgery in both cohorts, but statistically significant differences were only demonstrable in GAD-7 within the cross-sectional cohort. Patients were not randomized or blinded, limiting our ability to definitively establish causality. Also, we believe our results are applicable to transmasculine and nonbinary patients who candidates for mastectomy by WPATH criteria and are also pursuing surgical treatment, rather than the entire transgender population. Finally, participants were recruited from a single urban institution with a comprehensive Gender Health Program, and our findings may not be generalizable to patients without access to interdisciplinary care.

Despite these limitations, our study findings demonstrate large, significant improvements in psychosocial functioning and mental health after gender-affirming mastectomy. These data support mastectomy as a treatment for gender dysphoria and its sequelae in appropriately selected transmasculine and nonbinary patients.

Conclusions

Our results provide evidence that gender-affirming mastectomy is of benefit to transmasculine and nonbinary adults via improvements psychosocial functioning, quality of life, and mental health.

Acknowledgements

Justine C. Lee, M.D., Ph.D.

Catherine T. Cascavita, B.S.

Aura Elias, B.S.

References

1. Herman, J. L., Flores, A. R., O'Neill, K. K. How Many Adults and Youth Identify as Transgender in the United States? : Williams Institute, 2022:25.
2. James, S., Herman, J., Rankin, S., et al. US Transgender survey report on health and healthcare. National Center for Transgender Equality., 2016.
3. Canner, J. K., Harfouch, O., Kodadek, L. M., et al. Temporal Trends in Gender-Affirming Surgery Among Transgender Patients in the United States. *JAMA Surg* 2018;153:609-616.
4. Association, A. P. *Diagnostic and Statistical Manual of Mental Disorders: 5th edition*. Arlington, VA: American Psychiatric Publishing; 2013.
5. Beek, T. F., Kreukels, B. P., Cohen-Kettenis, P. T., Steensma, T. D. Partial Treatment Requests and Underlying Motives of Applicants for Gender Affirming Interventions. *J Sex Med* 2015;12:2201-2205.
6. van de Grift, T. C., Cohen-Kettenis, P. T., Steensma, T. D., et al. Body Satisfaction and Physical Appearance in Gender Dysphoria. *Arch Sex Behav* 2016;45:575-585.
7. Surgeons, A. S. o. P. 2020 Plastic Surgery Statistics Report. In A. S. o. P. Surgeons ed. Arlington Heights, IL, 2020:26.
8. Monstrey, S., Selvaggi, G., Ceulemans, P., et al. Chest-wall contouring surgery in female-to-male transsexuals: a new algorithm. *Plast Reconstr Surg* 2008;121:849-859.
9. Wolter, A., Diedrichson, J., Scholz, T., et al. Sexual reassignment surgery in female-to-male transsexuals: an algorithm for subcutaneous mastectomy. *J Plast Reconstr Aesthet Surg* 2015;68:184-191.

10. Berry, M. G., Curtis, R., Davies, D. Female-to-male transgender chest reconstruction: a large consecutive, single-surgeon experience. *J Plast Reconstr Aesthet Surg* 2012;65:711-719.
11. Kääriäinen, M., Salonen, K., Helminen, M., Karhunen-Enckell, U. Chest-wall contouring surgery in female-to-male transgender patients: A one-center retrospective analysis of applied surgical techniques and results. *Scand J Surg* 2017;106:74-79.
12. Owen-Smith, A. A., Gerth, J., Sineath, R. C., et al. Association Between Gender Confirmation Treatments and Perceived Gender Congruence, Body Image Satisfaction, and Mental Health in a Cohort of Transgender Individuals. *J Sex Med* 2018;15:591-600.
13. Almazan, A. N., Keuroghlian, A. S. Association Between Gender-Affirming Surgeries and Mental Health Outcomes. *JAMA Surg* 2021;156:611-618.
14. Oles, N., Darrach, H., Landford, W., et al. Gender Affirming Surgery: A Comprehensive, Systematic Review of All Peer-reviewed Literature and Methods of Assessing Patient-centered Outcomes (Part 1: Breast/Chest, Face, and Voice). *Ann Surg* 2022;275:e52-e66.
15. Ascha, M., Sasson, D. C., Sood, R., et al. Top Surgery and Chest Dysphoria Among Transmasculine and Nonbinary Adolescents and Young Adults. *JAMA Pediatr* 2022;176:1115-1122.
16. Klassen, A. F., Kaur, M., Poulsen, L., et al. Development of the BODY-Q Chest Module Evaluating Outcomes following Chest Contouring Surgery. *Plast Reconstr Surg* 2018;142:1600-1608.
17. Caprini, R. M., Oberoi, M. K., Dejam, D., et al. Effect of Gender-affirming Facial Feminization Surgery on Psychosocial Outcomes. *Ann Surg* 2022.

18. Barone, M., Cogliandro, A., Di Stefano, N., et al. A Systematic Review of Patient-Reported Outcome Measures Following Transsexual Surgery. *Aesthetic Plast Surg* 2017;41:700-713.
19. Andréasson, M., Georgas, K., Elander, A., Selvaggi, G. Patient-Reported Outcome Measures Used in Gender Confirmation Surgery: A Systematic Review. *Plast Reconstr Surg* 2018;141:1026-1039.
20. Cohen, W. A., Shah, N. R., Iwanicki, M., et al. Female-to-Male Transgender Chest Contouring: A Systematic Review of Outcomes and Knowledge Gaps. *Ann Plast Surg* 2019;83:589-593.
21. Kelly-Schuetz, K. A., Wempe, K., Fritz, G. D., et al. Masculinizing chest surgery for gender affirmation: A retrospective study of outcomes and patient reported satisfaction. *Am J Surg* 2022;223:577-580.
22. Agarwal, C. A., Scheefer, M. F., Wright, L. N., et al. Quality of life improvement after chest wall masculinization in female-to-male transgender patients: A prospective study using the BREAST-Q and Body Uneasiness Test. *J Plast Reconstr Aesthet Surg* 2018;71:651-657.
23. Lane, M., Kirsch, M. J., Sluiter, E. C., et al. Gender Affirming Mastectomy Improves Quality of Life in Transmasculine Patients: A Single-center Prospective Study. *Ann Surg* 2023;277:e725-e729.
24. Coleman, E., Radix, A. E., Bouman, W. P., et al. Standards of Care for the Health of Transgender and Gender Diverse People, Version 8. *International Journal of Transgender Health* 2022;23:S1-S259.
25. Knox, A. D. C., Ho, A. L., Leung, L., et al. A Review of 101 Consecutive Subcutaneous Mastectomies and Male Chest Contouring Using the Concentric Circular and Free Nipple

Graft Techniques in Female-to-Male Transgender Patients. *Plast Reconstr Surg* 2017;139:1260e-1272e.

26. Pusic, A. L., Klassen, A. F., Scott, A. M., et al. Development of a new patient-reported outcome measure for breast surgery: the BREAST-Q. *Plast Reconstr Surg* 2009;124:345-353.
27. Kocalevent, R. D., Hinz, A., Brahler, E. Standardization of the depression screener patient health questionnaire (PHQ-9) in the general population. *Gen Hosp Psychiatry* 2013;35:551-555.
28. Lowe, B., Decker, O., Muller, S., et al. Validation and standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the general population. *Med Care* 2008;46:266-274.
29. Cash, T. F., Grasso, K. The norms and stability of new measures of the multidimensional body image construct. *Body Image* 2005;2:199-203.
30. Kozee, H. B., Tylka, T. L., Bauerband, L. A. Measuring Transgender Individuals' Comfort With Gender Identity and Appearance: Development and Validation of the Transgender Congruence Scale. *Psychology of Women Quarterly* 2012;36:179-196.
31. Lane, M., Kirsch, M. J., Sluiter, E. C., et al. Prevalence of Psychosocial Distress in Transmen Seeking Gender-Affirming Mastectomy. *Plast Reconstr Surg* 2020;146:1376-1380.
32. Olson, J., Schragar, S. M., Belzer, M., et al. Baseline Physiologic and Psychosocial Characteristics of Transgender Youth Seeking Care for Gender Dysphoria. *J Adolesc Health* 2015;57:374-380.

33. Ngaage, L. M., Knighton, B. J., McGlone, K. L., et al. Health Insurance Coverage of Gender-Affirming Top Surgery in the United States. *Plastic and Reconstructive Surgery* 2019;144:824-833.
34. Branstrom, R., Pachankis, J. E. Reduction in Mental Health Treatment Utilization Among Transgender Individuals After Gender-Affirming Surgeries: A Total Population Study. *Am J Psychiatry* 2020;177:727-734.
35. Branstrom, R., Pachankis, J. E. Toward Rigorous Methodologies for Strengthening Causal Inference in the Association Between Gender-Affirming Care and Transgender Individuals' Mental Health: Response to Letters. *Am J Psychiatry* 2020;177:769-772.
36. Chou, J., Kilmer, L. H., Campbell, C. A., et al. Gender-affirming Surgery Improves Mental Health Outcomes and Decreases Anti-depressant Use in Patients with Gender Dysphoria. *Plast Reconstr Surg Glob Open* 2023;11.

ACCEPTED

Figure Legend

Figure 1. Psychosocial functioning before and after surgery. Shown are changes in patient-reported measures before and after gender-affirming mastectomy. Higher scores on the BREAST-Q Psychosocial Well-being and Sexual Well-being modules, BODY-Q Satisfaction with chest and Satisfaction with nipples modules, the Body Image Quality of Life Index (BIQLI), and the Transgender Congruence Scale (TCS) indicate greater psychosocial and sexual well-being, satisfaction with chest and nipples, quality of life, and congruence, respectively. Lower scores on the Patient Health Questionnaire-9 (PHQ-9) and Generalized Anxiety Disorder-7 (GAD-7) indicate less severe depression and anxiety, respectively. Panels A and B: Cross-sectional cohort demonstrating scores in the preoperative group compared to the postoperative group. Panels C and D: Prospective cohort demonstrating within-patient scores before and after surgery. *Statistically significant difference after correction.

Precis

Gender-affirming mastectomy is a safe operation and is followed by substantial improvements in psychosocial functioning and mental health in transgender and nonbinary adults.

Table 1. Demographic and Clinical Characteristics of Participants

Characteristic	Participants (n=111)	
	Mean	SD
Age, y	26.5	8.0
BMI, kg/m ²	25.4	5.6
	n	%
Gender identification		
Trans male	70	63.1
Non-binary	38	34.2
Other/Not stated	3	2.7
Testosterone use	83	74.8
Comorbidity		
Hypertension	3	2.7
Diabetes	0	0.0
Pre-diabetes	3	2.7
Autoimmune disease	6	5.4
Smoking status		
Non-smoker	91	82.0
Former	15	13.5
Current	5	4.5
Psychiatric history		
Depression	61	55.0
Anxiety	50	45.0
Other		
PTSD	6	5.4
ADHD	7	6.3
ADD	1	0.9

OCD	4	3.6
Bipolar disorder	2	1.8

ADD, attention deficit disorder; ADHD, attention-deficit/hyperactivity disorder; OCD, obsessive-compulsive disorder; PTSD, post-traumatic stress disorder

ACCEPTED

Table 2. Surgeons and Surgical Techniques

Factor	Participants (n=111)	
	n	%
Surgeon		
A	72	64.9
B	28	25.2
C	11	9.9
Surgical technique		
Double incision with free nipple graft	94	84.7
Periareolar	17	15.3

ACCEPTED

Table 3. Postoperative Events

Event	Participants (n=111, breasts=222)	
	n	%
Hypertrophic scarring	41	36.9
Revision	9	8.1
Complication*		
Hematoma	3	1.4
Return to operating room	3	1.4
Seroma	7	3.2
Infection	2	0.9

*Complications are presented on a per-breast basis.

Table 4. Association between Patient Factors and Surgical Technique with Postoperative Events

Event	Participants (n=111)					
	Odds ratio	SE	z	p-value	95% confidence interval	
Hypertrophic scarring						
Age	0.947	0.031	-1.640	0.101	0.887	1.011
BMI	0.945	0.038	-1.420	0.156	0.873	1.022
Hypertension	1.000	-	-	-	-	-
Diabetes	1.589	1.453	0.510	0.612	0.265	9.536
Autoimmune	1.108	0.349	0.320	0.745	0.597	2.056
Smoking	1.021	0.212	0.100	0.920	0.679	1.535
Testosterone	1.050	0.538	0.100	0.924	0.385	2.865
Surgical technique	1.000	-	-	-	-	-
Infection						
Age	0.873	0.142	-0.840	0.403	0.635	1.200
BMI	1.051	0.133	0.390	0.696	0.820	1.346
Hypertension	1.000	-	-	-	-	-
Diabetes	1.000	-	-	-	-	-
Autoimmune	1.000	-	-	-	-	-
Smoking	2.152	1.661	0.990	0.321	0.474	9.770
Testosterone	1.000	-	-	-	-	-
Surgical technique	1.000	-	-	-	-	-
Hematoma						
Age	1.111	0.117	1.000	0.319	0.903	1.365
BMI	0.428	0.270	-1.340	0.179	0.124	1.477
Hypertension	1.000	-	-	-	-	-
Diabetes	1.000	-	-	-	-	-
Autoimmune	1.000	-	-	-	-	-

Downloaded from <http://journals.lww.com/journals> by BhdMfsePhKav1zEum1tQINda+kJLHEZgbsHh04XW10hCy
wCX1AMNnYQpIiQrHD33DOOdRyITV5Ff4C3VC1y0abggQZxgGj2WwZLeI= on 02/20/2024

Smoking	0.819	0.824	-0.200	0.843	0.114	5.886
Testosterone	1.000	-	-	-	-	-
Surgical technique	1.000	-	-	-	-	-
Seroma						
Age	1.059	0.062	0.980	0.327	0.944	1.189
BMI	0.950	0.084	-0.580	0.563	0.798	1.130
Hypertension	1.000	-	-	-	-	-
Diabetes	1.000	-	-	-	-	-
Autoimmune	1.000	-	-	-	-	-
Smoking	0.806	0.526	-0.330	0.741	0.225	2.893
Testosterone	1.699	2.004	0.450	0.653	0.168	17.154
Surgical technique	3.918	3.345	1.600	0.110	0.735	20.885
Revision						
Age	0.981	0.063	-0.300	0.764	0.865	1.112
BMI	0.833	0.107	-1.420	0.155	0.648	1.072
Hypertension	1.000	-	-	-	-	-
Diabetes	1.000	-	-	-	-	-
Autoimmune	1.000	-	-	-	-	-
Smoking	3.230	2.306	1.640	0.101	0.797	13.090
Testosterone	0.281	0.357	-1.000	0.317	0.023	3.388
Surgical technique	10.792	11.312	2.270	0.023	1.383	84.199

Table 5. Preoperative and Postoperative Psychosocial Outcomes

Patient-reported outcomes measure	Participants (n=111)		
	Preoperative	Postoperative	p Value
Cross-sectional			
BREAST-Q Psychosocial Well-being	37.2 ± 14.0	72.2 ± 14.5	<0.001
BREAST-Q Sexual Well-being	39.0 ± 22.2	59.9 ± 19.0	<0.001
BODY-Q Chest	12.9 ± 11.0	81.8 ± 19.7	<0.001
BODY-Q Chest/Nipple	27.9 ± 22.4	80.5 ± 22.3	<0.001
PHQ-9*	9.2 ± 5.8	5.8 ± 4.7	<0.009
GAD-7*	15.0 ± 4.3	5.1 ± 5.0	<0.001
BIQLI	-0.8 ± 1.5	1.3 ± 1.2	<0.001
TCS	2.8 ± 0.9	4.1 ± 0.7	<0.001
Prospective	Participants (n=20)		
BREAST-Q Psychosocial Well-being	33.9 ± 13.5	72.2 ± 12.6	<0.001
BREAST-Q Sexual Well-being	37.1 ± 14.1	59.0 ± 19.3	<0.001
BODY-Q Chest	11.7 ± 10.0	92.7 ± 13.0	<0.001
BODY-Q Chest/Nipple	26.8 ± 18.6	87.0 ± 19.8	<0.001
PHQ-9*	7.3 ± 2.1	6.0 ± 4.9	0.474
GAD-7*	9.2 ± 4.8	4.8 ± 3.5	0.023
BIQLI	-0.8 ± 1.3	1.1 ± 0.9	<0.001
TCS	3.0 ± 0.9	4.2 ± 0.5	<0.001

Data presented as mean ± SD.

*Patients with PHQ-9 or GAD-7 scores less than 5 were excluded.

BIQLI, Body Image Quality of Life Inventory; GAD-7, General Anxiety Disorder-7; PHQ-9,

Patient Health Questionnaire-9; TCS, Transgender Congruence Scale

Figure 1

