



Gender affirming surgery in non-binary patients: The importance of patient-centered care

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Summary Background: Gender-affirming mastectomies are a growing necessity for transgender and gender-diverse patients. The preoperative evaluation and surgical outcome must be tailored to the individual, taking into consideration previous medical history, medications, hormonal therapy, patient anatomy, and expectations. Although non-binary patients constitute a significant portion of patients referring for gender-affirming mastectomies, current literature rarely acknowledges them as a separate patient category from trans-masculine patients.

Methods: Retrospective cohort, demonstrating the single-surgeon experience with gender-affirming mastectomies over the course of 2 decades.

Results: A total of 208 patients were included in this cohort, patients identifying as “non-binary” in gender accounted for 30.8% of the cohort. Non-binary patients were found to be younger (**P value < 0.001**) at the time of surgery, at the time of HRT initiation (**P value < 0.001**), at the first feeling of gender dysphoria, coming out to society, and use of non-female pronouns (**P value = 0.04, < 0.001 and < 0.001, accordingly**). In the non-binary patient group, a shorter period of time passed from the first feeling of gender dysphoria to initiation of HRT and surgery (**P value < 0.001 and < 0.001, accordingly**). However, the average time from HRT initiation to surgery and from the first use of non-female pronouns to HRT initiation or surgery did not statistically differ (**P value = 0.34, 0.06, and 0.08, accordingly**).

Conclusion: Non-binary patients demonstrate a significantly different timeline from trans-masculine patients in terms of gender development. In order to accommodate their needs, caregivers must take the information into consideration and develop appropriate guidelines and courses of action.

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Gender-affirming mastectomies are a growing necessity for transgender and gender-diverse (TGD) individuals in their pursuit of improved quality of life and mental health.¹ Despite the existence of puberty suppression medications and hormonal replacement therapy (HRT), surgical procedures are considered the definitive step in the gender-reassignment journey.²

The peri-operative evaluation of patients should be tailored to the individual and should take into consideration previous medical history, HRT, and its potential implications on laboratory findings and surgical outcomes, patient anatomy, and previous chest surgery.³⁻⁶

Non-binary patients report similar rates of psychological distress and gender dysphoria related to the development of secondary sexual characteristics. Gender-affirming care is crucial in improving their mental well-being and preventing potential self-harm and suicidality.⁷⁻⁹

Although the spectrum of patients referring for gender-affirming mastectomies, is very gender-diverse, current literature rarely acknowledges the impact of gender on the surgical management of individual patients.

In this manuscript, we aim to define the peri-operative and operative characteristics of the non-binary patient while comparing it to patients defining themselves as “binary trans-masculine,” and understand the implications of gender on surgical outcomes and patient satisfaction. A better understanding of the different individuals opting for gender-affirming mastectomies is a crucial step in ensuring quality patient-centered care and improving surgical outcomes.¹⁰

The importance of a single-surgeon experience, as described in our manuscript, is in the elimination of variable confounders that bear the potential to modulate the study's results and conclusions.

Patients and methods

A total of 207 individuals operated for gender-affirming mastectomies by the senior author (Y.W.) during an 18-year period, from 2003 until 2021, were evaluated and analyzed for the purpose of this cohort.

The study has been approved by the local institution IRB (00.9-22-HYMC).

The inclusion criterion was patients that underwent bilateral mastectomies as part of a gender-affirming transition. Patients with a follow-up period shorter than 60 days and patients with incomplete or unreliable medical records, were excluded.

Patient demographics, comorbidities, hormonal replacement therapy (HRT), smoking status, presurgical “Female-to-Male Transgender Breast” group according to Wolf's classification,⁷ and previous surgical procedures were extracted. Surgical characteristics including the nature of the procedure, resected tissue weight, and intra-operative use of liposuction, were recorded alongside postoperative follow-up, adverse events, and revision procedures.

Gender identity, as well as social and sexual parameters, were obtained using a questionnaire. Questions that required numerical answers were answered non-categorically. Whereas gender identity was assessed using categories and

open questions in the following form: “1) Transgender male, 2) Non-Binary, 3) Rather not answer, 4) Other (Please explain: ____).”

Patient satisfaction was recorded twice on a five-point Likert scale, at follow-up visits in the outpatient clinic, and 30 and 90 days postoperatively. The information was inquired by the study's research assistant in an as possible objective and consistent language. The average score was calculated and reported in the study.

The satisfaction of patients opting for revision procedures was evaluated after each procedure.

Statistical analysis

Statistical analysis was performed using the commercial software Statistical Package for Social Science (SPSS Version 22.0, IBM Corp, Chicago, IL, USA), and descriptive statistics analysis was computed for each sample size. Continuous variables were expressed as mean \pm SD, and categorical variables were expressed as frequencies and percentages.

Categorical variables were tested using the chi-square test or Fisher's exact test, as appropriate. Continuous variables were examined using the student's t-test if normally distributed and Mann-Whitney test if not. To identify variables associated with the primary outcome measure, univariate analysis was performed.

Surgical techniques

Preoperatively, patients are evaluated and classified according to Wolf's classification system. The allocated class guides the surgeon to the most suitable minimal surgical operation.¹¹ Four surgical approaches of female breast mastectomies in transgender men were performed in this cohort; peri areolar with superiorly based nipple-areola complex (NAC) flap, omega-shaped resection (NAC on scar), spindle-shaped simple mastectomy with NAC inferiorly based flap (vest over pants), and spindle-shaped total simple mastectomy with free NAC graft. The approaches differ in their scar design and in the process of NAC relocation. The two main techniques for NAC relocation are inferiorly based dermal flap and free NAC graft. The location and size of the nipple were determined preoperatively during an open discussion between the surgeon and the patient, conforming with the individual patient's preference. Preoperative prophylactic intravenous antibiotics were administered 30-60 min before the first skin incision, during induction of anesthesia. Postoperatively, a single drain is left, only removed when drainage reduces to less than 25 ml over a 24-hour period. The patient's chest and operative field are covered in an elastic strap for a period of 1 month postoperatively. Patients are discharged home on the first postoperative day. Antibiotics (Ciprofloxacin 500 mg twice daily) are continued for 3 days.

Results

A total of 208 patients were reviewed for the purpose of this cohort. Patients identifying as transgender accounted for 69.2%, and the rest as non-binary.

Table 1 Demographical characteristics of cohort population.

Variable	Trans-gender N = 144	Non-binary N = 64	P-value
Age (Average, STD)	19.5,7.5	17.5,1	< 0.001
BMI (Average)	24.8	25.2	0.04
History of Tobacco Consumption	57	23	0.62
Thrombophilia	2	2	0.4
Hypertension	2	2	0.4
Hypothyroidism	9	2	0.35
Diabetes Mellitus	8	3	0.80
Inflammatory Bowel Disease	1	0	0.68
Psychiatric diagnosis	26	6	0.1
Epilepsy	2	1	0.92
Asthma	14	2	1
Fibromyalgia	4	0	0.42
Pre-operative Laboratory Test:	86.2	87.1	0.14
- Glucose	14.0	13.9	0.09
- Platelets	271.3	273.6	0.32
- Hemoglobin			

*Bold indicates statistical significance.

Table 1 details the demographical characteristics and medical comorbidities of the study cohort and divides the study cohort upon the participants' self-proclaimed gender.

Non-binary patients were seen to be younger, with an average age of 17.5 years, in comparison to 19.5 of the transgender patients (**P value = < 0.001**). Additionally, non-binary patients were found to have a richer history of previous surgeries for various indications. Although the proportion of patients with psychiatric diagnoses was larger in the transgender group (18% and 9.4%, accordingly), it was not statistically significant (**P value = 0.1**).

Table 2 details the analysis of the group, based on a set of socio-sexual characteristics. Although the groups did not statistically differ in proportions of hormonal replacement therapy (HRT) use, patients identifying as of non-binary gender, reported earlier age of HRT initiation (**P value = < 0.001**). Non-binary patients reported earlier feelings of gender dysphoria and at a younger age came out to society

and began using non-female pronouns (**P value = 0.004, < 0.001, and < 0.001, accordingly**).

Secondary analysis of these timelines revealed that in the non-binary group, shorter periods of time passed from first feelings of gender dysphoria to initiation of HRT and surgery (**P value = < 0.001 and < 0.001, accordingly**). However, the average time from HRT initiation to surgery and from the first use of non-female pronouns to HRT initiation or surgery did not statistically differ (**P value = 0.34, 0.06, and 0.08, accordingly**).

Table 3 details the surgical procedures and postoperative period characteristics.

The study group did not statistically differ in surgical management, with similar average resection weight, proportion of intra-operative liposuction, and weight. Complications, as well, were encountered in a similar proportion. Non-binary patients, reported higher average satisfaction from the surgical outcome (4.2/5), as compared to their transgender counterparts (3.94/5), with statistical significance (**P value = 0.001**).

Discussion

Patient-centered care in the field of gender-affirming surgery is of utmost importance. Understanding the patients and recognizing their unique characteristics, desires, and expectations, is crucial for ensuring optimal results and patient satisfaction.

Previous studies have begun to recognize the individual needs and wishes of the non-binary community in gender-affirming surgery and distinguish it from those of binary transgender patients.

In a previous study, McTernan et al.,¹² acknowledged the difference in the surgical expectation and operative planning between non-binary and trans-masculine patients. The authors noted that non-binary patients preferred their nipple-areola complex (NAC) to be larger, rounder, and more proximal to the median part of the chest when compared to other genders. Additionally, non-binary patients have indicated that preserving nipple sensation is of the highest importance.

The higher level of attention to the appearance and size of NAC was also noted in our cohort.

Table 2 Socio-sexual characteristics of study participants.

Variable	Trans-gender N = 144	Non-binary N = 64	P-value
History of Hormonal Replacement Therapy (HRT)	93	48	0.14
Age at first HRT	19.4	15.7	0.0001
Average age at first feeling of gender dysphoria, years.	7.0	5.7	0.004
Average age of first coming out to society, years.	19.0	13.7	< 0.001
Average age of first use of non-female pronouns, years.	19.1	13.7	< 0.001
Average time from first feelings of gender dysphoria to initiation of HRT, years.	13.1	9.9	< 0.001
Average time from first feelings of gender dysphoria to surgery, years.	15.7	11.4	< 0.001
Average time from use of non-female pronouns to surgery, years.	3.7	3.5	0.083
Average time from use of non-female pronouns to initiation of HRT, years.	2.2	1.9	0.057
Average time from HRT to surgery, years.	1.66	1.52	0.34

*Bold indicates statistical significance.

Table 3 Surgical and post-operative characteristics of study participants.

Variable	Trans-gender N = 144	Non-binary N = 64	P-value
Average resection weight, grams	475.2	461.93	0.17
Intra-operative ancillary liposuction	43	16	0.47
Average intra-operative ancillary liposuction volume, milliliters	427.1	375	0.15
Procedure	18	6	0.59
- Peri-areolar	5	2	0.51
- NAC over scar	41	14	0.77
- NAC flap	80	42	0.32
- Free NAC graft			0.17
Post-operative drains	130	60	0.68
Elimination of nipples	0	4	0.01
Average surgery duration, hours	2:04	2:04	1.00
Complications	64	24	0.35
- Hematoma	14	7	
- Seroma	18	4	
- NAC ischemia	2	0	
- Wound dehiscence	4	3	
- Infection	0	0	
- Hypertrophic scarring	18	9	
Average patient satisfaction (range 1-5)	3.94	4.2	0.001

*Bold indicates statistical significance.

The rate of surgical revisions did not statistically differ between the groups in our cohort, and yet, a sub-analysis demonstrated that revisions to correct the appearance of the NAC were more common in non-binary patients. Interestingly, in our cohort, the only patients to request complete elimination of the NAC were of non-binary gender.

Friedman et al.,¹³ continued to elaborate on the different expectations of the non-binary community on the basis of their single-institution experience. The authors witnessed that non-binary patients typically requested a more androgynous chest with small de-projected breasts, mimicking, an appearance on the spectrum between a “masculine” and a “feminine” chest.

Unlike the results reported by the authors, in our experience, all patients requested complete mastectomies or near-total breast reductions. To allow for a more flattened chest appearance, liposuction was used in selected patients. The rate/proportion of liposuction in the study, alongside the volume of liposuction, did not differ significantly between the study groups.

Despite the similar surgical procedures and characteristics between non-binary and trans-masculine patients in our cohort, non-binary patients reported higher post-operative satisfaction at their follow-up visits.

Although patient satisfaction was significantly higher in the non-binary patients in our cohort, no previous studies have addressed similar findings. To better understand the reasons behind the higher satisfaction, a qualitative study should be conducted. We hypothesized that a potential contributor to the higher satisfaction observed was the perception of surgery as a means to “undefine” themselves from the historically accepted gender terms. By liberating themselves, the surgery could have allowed them to not be defined by societal terms.

To enrich the literature on the subject and widen the understating of the importance of patient-centered care in

the field of gender-affirming surgeries, we aimed to additionally describe the unique psychological and pre-operative characteristics of non-binary patients.

The effect of testosterone on gender-affirming chest surgery outcomes has been previously reported in numerous studies. Although not one of the studies has yet to find unfavorable outcomes with HRT, a double-blind randomized controlled trial (RCT) is required to draw definite conclusions. The non-binary patients in our cohort mandated special attention to this aspect. The proportion of HRT consumers did not differ from the trans-masculine patients, but the average age at which HRT was first prescribed was substantially younger.

HRT is recognized as a crucial and important milestone in the gender transition process, but it demonstrates only one part of a larger equation.

Non-binary patients in our cohort were also of younger age at the time of the surgery, reported earlier feelings of gender dysphoria, “came out” to society, and began using non-female pronouns younger. The younger feeling of gender dysphoria resulted in shorter periods of time from the first appearance of these feelings to the initiation of HRT and to the definitive step of surgery.

Understanding the need for a more expedited and tailored gender-affirming process is a necessary step in ensuring patient-centered care.

Recognizing the shorter timeline of gender-affirming therapy observed in non-binary patients is important, but understanding the factors potentially contributing to it, is necessary. Koehler et al.¹⁴ conducted a qualitative study, utilizing questionnaires, to better describe the gender-affirming treatment progress in non-binary patients. The authors found that binary patients were more likely to access gender-affirming care, have, on average, undergone more affirming procedures, and require more procedures and interventions to reach complete transition.

Trends in the Proportion of Transgender and Non-Binary Among Study Patients Throughout The Cohort (2003-2023)

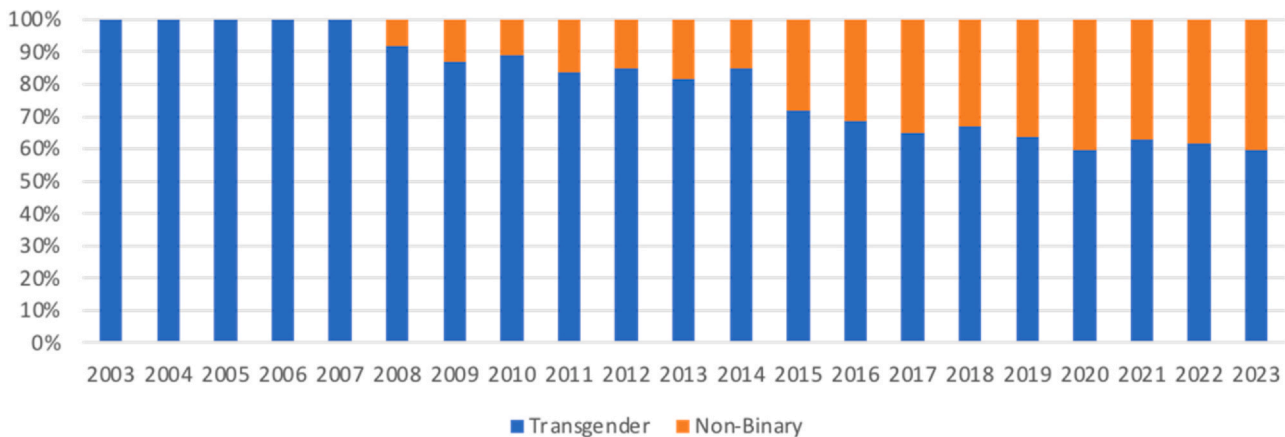


Figure 1 Demonstration of trends in composition of study cohort participants with respect to their gender identity throughout the duration of the study, represented as proportion of yearly total.

Furthermore, they assumed that a potential factor in the shorter transition process observed in non-binary individuals could be related to the perception of non-binary being a transitional phase among young trans individuals during a developmental process to a binary gender. Another potential factor is the recent recognition of non-binary genders by the media and society.^{15,16} The latter allows young trans individuals, who are in the process of exploring their gender, to refrain from constraining to a binary gender, and define themselves as non-binary, unlike previous generations.¹⁷

These findings correspond with our observations of the non-binary individuals being of younger age, and of their reporting of earlier gender dysphoria, use of non-female pronouns, and coming out to society.

It is important noting that over the duration of our study, a societal shift occurred. As depicted in [Figure 1](#), the representation of non-binary patients among those opting for surgery in our institution has vastly increased. With reports demonstrating similar trends worldwide, it must be accounted for in the interpretation of our results. We found the non-binary patients to be younger than transgender patients, which could add to the understanding of the trend of younger patients opting for gender-affirming mastectomies previously reported in the literature.⁶

Additionally, non-binary patients reported higher postoperative satisfaction in comparison to transgender patients. Although it could potentially be interpreted that the surgery served as a means to achieving a non-binary appearance, that in return resulted in higher satisfaction. It could also correspond with previous reports of higher postoperative satisfaction rankings among patients undergoing gender-affirming mastectomies at a younger age.⁶

Our study does not come without limitations. First, the retrospective and descriptive nature of the study. Additionally, the single-surgeon experience. Although it eliminates numerous confounding factors that relate to the surgery itself, it is prone to potential bias in light of the learning curve that is to be expected over time. The satisfaction recording in our study was done on the “Likert 1-5

satisfaction scale”. A more thorough and objective tool to measure patient satisfaction could further elaborate on various factors affecting patient satisfaction.

In conclusion, the results of our study demonstrate the unique characteristics and preferences of non-binary patients in the journey of gender affirmation. Our study added to the scarce literature on the matter of chest masculinization in non-binary patients and was the first to report their psychological experiences and emotional timeline from birth to surgery. We believe that recognizing all the unique aspects of non-binary patients and distinguishing them from binary trans-masculine patients, is a crucial step in improving the medical care we provide and ensuring true patient-centered care.

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Ethical approval

Not required.

Declaration of Competing Interest

None of the authors have a conflict of interest or financial interest in any of the products, devices, or drugs mentioned in this manuscript.

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