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Gender-Affirming Surgery

Reported Pain in Cisgender Female and Transmasculine Patients Seeking Benign Breast Surgery

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Background: Benign breast surgery aims to treat the physical and psychological discomfort that may be associated with excess breast tissue. In this investigation, we present the first systematic examination and comparison of the determinants of pain and related symptomology in cisgender women and transmasculine individuals presenting for benign breast surgery.

Methods: To complete this study, we abstracted the intake forms of 128 transmasculine and 62 cisgender female patients who presented for benign breast surgery between August 2016 and July 2020.

Results: Increasing chest size was associated with significantly increased odds of reporting rash (OR 1.10 95% CI [1.01–1.10], $P < 0.03$), difficulty playing sports (OR 1.19 95% CI [1.09–1.29], $P < 0.001$), and difficulty finding clothes that fit (OR 1.21, 95% CI [1.11–1.33], $P < 0.001$). For individuals who bound their chests, size was also associated with difficulty exercising in a binder (OR 1.14 [1.01–1.29], $P < 0.03$). Looking separately at the two populations, the only factors that remained associated with pain in multivariate models were BMI ($\beta = 0.10$ [0.01–0.18], $P < 0.03$) for cisgender women and history of binding ($\beta = 1.95$ [0.37–3.52], $P < 0.02$) for transmasculine people.

Conclusions: Pain does not seem to be associated with chest size in either cisgender female or transmasculine patients seeking benign breast surgery. The association between chest binding and pain in transmasculine people supports the provision of gender-affirming chest surgery to eliminate the need to bind and reduce both physical and psychological distress. *(Plast Reconstr Surg Glob Open 2022;10:e4140; doi: 10.1097/GOX.0000000000004140; Published online 18 February 2022.)*

INTRODUCTION

Benign breast surgery aims to treat the physical and psychological discomfort that may be associated with excess breast tissue. Breast development may be considered excessive if it causes physical symptoms. For example, macromastia is the incapacitating enlargement of one or both breasts with no discernable pathologic cause. Symptomatic macromastia can lead to chronic pain, fatigue, rashes, and paresthesias.[1] Breast development may also be considered excessive if it causes psychological discomfort related to chest appearance. For example, gender dysphoria is the distress caused by a discrepancy between a person's gender identity and sex assigned at birth.[2,3] For many transmasculine individuals, any breast tissue development may be considered excessive.

In the United States, there is a high demand for surgeries to treat both macromastia and gender dysphoria associated with excess breast development. Reduction mammoplasty for the treatment of macromastia is common, with over 86,000 procedures performed in 2019.[4] Gender-affirming mastectomy for gender dysphoria, sometimes referred to as chest reconstruction or top surgery, is also performed with increasing frequency, and prior studies have documented a prevalence among transmasculine individuals ranging from 25% to 50%.[5,6] Given the increasing demand for these types of breast surgeries, there is a significant need to clarify patients' reasons for seeking surgical intervention.

Pain may be a key driver of an individual's decision to seek breast surgery. Pérez-Panzano et al found that pain

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was the most common reason for surgery in their sample of patients with symptomatic macromastia.[7] Prior studies have also demonstrated that pain is among the most common symptoms resulting from chest binding in transmasculine individuals. Peitzmeier et al identified that 53.8% of individuals who bound their chests endorsed back pain, whereas 48.8% endorsed chest pain.[8] Jarrett et al showed that 74.8% of surveyed transmasculine adults who practiced chest binding endorsed at least one pain symptom.[9]

Although there is evidence demonstrating the prevalence of pain in people with excess breast development, little is known about the determinants of this pain. More specifically, there have been no prior studies comparing presentations of breast pain in cisgender women with macromastia seeking reduction mammoplasty and transmasculine individuals with gender dysphoria seeking gender-affirming mastectomy. In this investigation, we present the first systematic examination and comparison of the determinants of pain in cisgender women and transmasculine individuals presenting for surgical intervention for excess breast development. We hypothesized that breast size would be the primary determinant of pain and other chest symptoms in transmasculine and cisgender female individuals seeking chest surgery and that binding would also be associated with symptoms in the transmasculine population.

Takeaways

Question: Do transmasculine individuals and cisgender women seeking benign breast surgery have different risk factors for pain and other symptoms?

Findings: Chest size is associated with rash, difficulty playing sports, and difficulty finding clothes that fit, but not pain. Pain was primarily associated with a history of binding in transmasculine individuals and higher BMI in cisgender women.

Meaning: Chest size is not associated with pain but does affect other symptoms. Surgeons should be aware of the many nuances in how benign breast surgery can alleviate discomfort.

METHODS

As part of clinical care at our center, patients seeking any form of chest or breast surgery are required to complete an intake form. Two versions of the intake form are administered, including one designed for cisgender women and one for binary and nonbinary transmasculine patients. Both forms contain largely identical breast symptom inventories (yes/no) and spaces to collect chest measurements. The transmasculine form also collects information about binding history, symptoms associated with binding, and history of gender-affirming hormone use. The cisgender female form collects information about bra size, menstrual history, and menstrual suppression. Patients were included in the analysis if their chest form had been scanned into the chart.

To complete this study, we abstracted the intake forms of patients who had consults for chest or breast surgery from August 2016 to July 2020. Information about mass of breast tissue removed was abstracted from the pathology note. All information was abstracted into a structured data table that included information about social and behavioral history and pain risk factors. For transmasculine patients, chest size was recorded as the measured maximal chest circumference and the circumference at the inframammary fold (IMF), whereas for cisgender women, chest size was recorded as the cup size and band size. To make these measurements consistent and to account for overall differences in body size/IMF, a proxy size variable was used to convert cup size in letter to centimeters based on D = 4 inches and adding one inch per cup size. This was then converted to centimeters by multiplying by 2.54. Individuals reported back, shoulder, and neck pain separately on scales from 0 to 10. As back, shoulder, and neck pain scores were highly correlated (>70% collinearity) but not identical, an average pain score was created.

χ^2 was used to test for differences in distribution of demographic variables between groups. Univariate logistic regression was used to test if chest size was associated with specific symptoms, and odds ratios with confidence intervals (CI) were reported. Factors hypothesized to be associated with the combined pain score were entered into univariate and adjusted linear regression models, and regression coefficients were reported. All analyses were performed in STATA 16. Associations were considered significant at a *P* value less than 0.05. This protocol was declared as exempt by the Boston Children's Hospital institutional review board.

RESULTS

A total of 190 patients (128 transmasculine patients and 62 cisgender women) were included in this study. In both groups, the majority of the patients were White, non-Hispanic, but cisgender women were significantly more racially diverse ($P < 0.003$). As would be expected based on surgical eligibility requirements, cisgender women were significantly more likely to have used painkillers to address breast pain ($P < 0.000$) and have a greater average volume of tissue removed per breast at the time of surgery ($P < 0.001$). They also reported significantly more pain ($P < 0.001$), larger chests ($P < 0.001$), and first noticed breast growth at a later age ($P < 0.003$). There was no significant difference in the proportion of patients seeking to access surgery while under the age of majority ($P < 0.265$) (Table 1).

Researchers hypothesized that size of the chest would be associated with the report of breast symptoms listed on the symptom inventory. For these analyses, chest size was calculated as the difference between the breast measurement and the measurement at the IMF, to account for overall differences in body size. Across the whole population, increasing chest size (in cm) was associated with significantly increased odds of reporting the following symptoms listed on the inventory: rashes/skin breakdown around or underneath breasts (OR 1.10 95% CI [1.01–1.10], $P < 0.03$), difficulty

Table 1. Study Demographics

	Transmasculine, n (%) (n = 128)	Cisgender Woman, n (%) (n = 62)	χ^2, *P* <
Race			**0.003**
White	59 (47)	24 (39)	
Black	6 (5)	10 (16)	
Other	9 (7)	12 (20)	
Multiracial	1 (1)	0 (0)	
Unknown	50 (40)	15 (25)	
Hispanic			**0.003**
Yes	7 (5)	13 (21)	
No	67 (52)	31 (50)	
Unknown	54 (42)	18 (29)	
History of painkillers for chest pain			**0.001**
No	68 (94)	23 (39)	
Yes – OTC	4 (6)	34 (58)	
Yes – prescribed	0 (0)	2 (3)	
<18 at surgery			0.26
Yes	49 (38)	33(53)	
No	79 (62)	29 (47)	
Average mass of breast tissue removed			**0.001**
<250 g	26 (20)	0 (0)	
250–500 g	41 (32)	19 (31)	
500–750 g	33 (26)	16 (26)	
750–1000 g	12 (9)	12 (19)	
>1000 g	16 (12)	15 (24)	
History of nicotine use			0.06
Yes	7 (6)	0 (0)	
No	118 (94)	59 (100)	
	Mean (SD)	Mean (SD)	
Average pain score	2.2 (2.7)	6.5 (2.2)	**0.001**
Proxy size	12 (3.6)	15 (3.7)	**0.001**
BMI at consult	28 (6.7)	31 (6.2)	0.19
Age noticed breast growth	10.9 (1.6)	11.3 (2.9)	**0.003**

Values in bold are significant at $p < 0.05$.

participating in sports (OR 1.19 95% CI [1.09–1.29], *P* < 0.001), and difficulty finding clothes that fit properly (OR 1.21, 95% CI [1.11–1.33], *P* < 0.001). However, increasing chest size was not significantly associated with reporting any pain, nipple discharge, or breast lump. Among the subgroup of transmasculine patients who had ever bound their chests (n = 114), increasing chest size was associated with significantly increased odds of reporting difficulty exercising in a binder (OR 1.14 [1.01–1.29], *P* < 0.03), but not chest pain while binding or having problems breathing while binding (Table 2).

Table 2. Effects of Chest Size (cm) on Odds of Reported Chest Symptoms

	Affected, N (%)	OR [95% CI]	*P* <
Rashes/skin breakdown around or underneath breasts	48 (25)	1.10 [1.01–1.19]	0.03
Pain	44 (23)	1.10 [0.98–1.16]	0.15
Difficulty participating in sports	97 (51)	1.19 [1.09–1.29]	0.001
Difficulty finding clothes that fit properly	95 (50)	1.21 [1.11–1.33]	0.001
Nipple discharge	4 (2)	1.00 [0.78–1.29]	0.98
Breast lump	2 (1)	1.12 [0.83–1.53]	0.46
Binding symptoms (only those who bind or have a history of binding, n = 114)			
Chest pain while binding	56 (50)	1.03 [0.92–1.15]	0.59
Problems breathing	43 (39)	0.95 [0.84–1.06]	0.23
Difficult to engage in physical activity	64 (59)	1.14 [1.01–1.29]	0.03

Linear regression models were used to assess the degree to which factors hypothesized to be associated with chest/breast/back pain were associated with the combined pain score across those domains. Reported β represents the change in reported pain for each increasing increment in the predictor variable. Factors hypothesized to be associated with pain were first assessed in univariate regression models and then factors that reached statistical significance were assessed using stepped, adjusted, multivariate regression to address possible sources of confounding. In the full population, individuals for whom gender dysphoria was the indication for surgery had pain scores that were 4.23 (95% CI [−5.01 to −3.44]) points less than cisgender women (*P* < 0.001). For every 1 cm increase in breast size, patients reported a 0.30 point (95% CI [0.18–0.41]) increase in pain (*P* < 0.001), and for every 1 point increase in BMI, a 0.16 point (95% CI [0.09–0.23]) increase in pain (*P* < 0.001). In multivariate models, breast size stopped being significant, and 44% of pain score differences were explained by gender dysphoria as an indication for surgery (β = −3.72 [−7.71 to −83.02], *P* < 0.001) and BMI at the time of consult (β = 0.09 [0.02–0.14], *P* < 0.01) (Table 3).

Looking solely at the transmasculine population, in univariate models, breast size (β = 0.19 [0.05–0.32], *P* < 0.006), BMI at consult (β = 0.09 [0.03–0.17], *P* < 0.008), and history of binding (β = 1.89 [0.97–3.41], *P* < 0.02) were all associated with significant increases in reported pain. However, in multivariate models, only history of binding (β = 1.95 [0.37–3.52], *P* < 0.02, R^2 = 0.12) remained significant (Table 4). In cisgender women, the only factor significantly associated with pain was BMI (β = 0.10 [0.01–0.18], *P* < 0.03, R^2 = 0.07) (Table 5).

DISCUSSION

Macromastia in youth and young adults is known to cause significant physical and psychosocial problems. Many individuals with macromastia describe back, neck, and shoulder pain, and experience significant emotional distress and issues with self-confidence.[1,7,10] Transmasculine individuals are also known to experience significant distress due to the perception of breasts as feminine.[11] For them, the negative impact may include both the physical manifestations associated with macromastia and the emotional and social manifestations associated with gender dysphoria.

Table 3. Factors Affecting Average Pain Score (Full Population)

	β [95% CI]	*P* <	R^2
Dysphoria	**−4.23 [−5.01 to −3.44]**	**0.001**	**0.38**
Proxy size	**0.30 [0.18–0.41]**	**0.001**	**0.14**
BMI at consult	**0.16 [0.09–0.23]**	**0.001**	**0.11**
Age noticed breast growth	0.13 [−0.09 to 0.38]	0.25	0.00
Multivariate models			
Model 1:			0.41
Dysphoria	**−3.87 [−7.71 to −3.02]**	**0.001**	
Proxy size	**0.11 [0.01–0.22]**	**0.03**	
Model 2:			**0.44**
Dysphoria	**−3.72 [−4.57 to −2.87]**	**0.001**	
Proxy size	0.08 [0.02–0.19]	0.11	
BMI at consult	**0.09 [0.02–0.14]**	**0.01**	

Values in bold are significant at $p < 0.05$.

Table 4. Factors Affecting Average Pain Score in Transmasculine Patients

	β [95% CI]	*P* <	R^2
Proxy size	0.19 [0.05–0.32]	0.006	0.06
BMI at consult	0.09 [0.03–0.17]	0.008	0.06
Taking testosterone	−0.23 [−1.61 1.14]	0.74	0.00
Time on testosterone	−0.01 [−0.07 to 0.05]	0.69	0.00
History of binding	1.89 [0.97–3.41]	0.02	0.04
Multivariate models			
Model 1:			0.09
Proxy size	0.16 [0.01–0.30]	0.03	
BMI at consult	0.06 [−0.02 to 0.14]	0.17	
Model 2:			0.12
Proxy size	0.11 [−0. 04 to 0.26]	0.14	
BMI at consult	0.04 [−0.04 to 0.12]	0.30	
History of binding	1.95 [0.37–3.52]	0.02	

Table 5. Factors Affecting Average Pain Score in Cisgender Females

	β [95% CI]	*P* <	R^2
Proxy size	−0.01 [−0.16 to 0.14]	0.86	0.00
BMI at consult	**0.10 [0.01–0.18]**	**0.03**	0.07
Age noticed breast growth	0.15 [−0.05 to 0.35]	0.15	0.03
History of menstrual suppression	1.11 [−0.07 to 2.28]	0.06	0.05

Values in bold are significant at $p < 0.05$.

Many transmasculine individuals start chest binding after puberty. Binding is the act of flattening, compressing, and moving the breasts more laterally to achieve a more masculine appearance. There are a number of binding methods. Although the use of specially designed tapes and garments is the safest approaches to binding, financial constraints and limited access to binding resources may lead some individuals to bind unsafely using less suitable items such as duct tape or ace bandages.

There are several potential negative side-effects associated with chest binding. Many individuals report chest pain, back, neck, and/or shoulder pain as well as difficulty participating in sports, respiratory issues, and/or skin problems.[8,9] Similar problems are reported in the cisgender macromastia population, and one of the purposes of this study was to determine if the risk factors for reported pain were similar in cisgender and transgender individuals seeking breast reduction or removal.

Contrary to our expectations, breast size was not significantly associated with pain in either the cisgender female or transmasculine populations but was associated with reporting a history of skin rash. This may be expected, as heavier breasts tend to be more ptotic, causing stretch marks on the upper chest while compressing against the upper abdomen and causing rashes, intertrigo, and skin breakdowns around the inframammary fold. People with larger breasts were also significantly more likely to report difficulty participating in sports and finding clothes that fit. Looking only at patients who reported binding, chest size was significantly associated with difficulty exercising in a binder but not pain from binding or breathing issues.

The greatest risk factor for reporting pain in the full study population was cisgender female identity. This would be expected, as pain is a requirement for accessing a breast reduction but not for accessing chest reconstruction.[12,13] For the cisgender population, the only measured factor associated with pain was BMI. Higher BMI patients also reported significantly more pain, with every increase in BMI being associated with a 0.1 increase in pain score.

For transmasculine participants, the only factor that remained significantly associated with pain in multivariate models was history of binding. Those who bound reported a two-point increase in pain over those who did not. Although breast size and BMI were significant in univariate models, they were highly correlated with a history of binding, and were nonsignificant in the final model. This is consistent with our data showing that chest size is not associated with binding pain. People with larger chests are more likely to bind, but it is the binding itself associated with discomfort.

The cisgender female and transmasculine populations compared in this study had some significant differences. Our population sizes were approximately 2:1 transmasculine:cisgender woman. The transmasculine patients were more likely to be White and non-Hispanic. They were much less likely to have ever used painkillers for chest pain. Interestingly, they were also likely to have less tissue removed than the cisgender macromastia population, despite fundamental differences in the surgical procedure related to the absolute amount of tissue removed where the expectation might be otherwise. During chest masculinization, the majority of the breast tissue is removed, while during breast reduction a substantial portion of the breast is left behind to create a round, feminine, lifted breast.

As with the history of pain reported by the population, the breast size differences may be explained by insurance eligibility differences for the two surgeries. The macromastia cohort had a minimum estimated tissue removal of 300 g per breast, in addition to having documented symptomatology of back, neck, or shoulder pain associated with other manifestations of macromastia.[12,14] In contrast, insurance eligibility requirements for transmasculine surgery are focused solely on gender indications with no tissue size limitations or need to document symptomology.[13,15,16]

This study had several limitations. All study variables with the exception of tissue volume were self-reported. Both populations were overwhelmingly White and non-Hispanic. Finally, none of the subjects in either group paid out-of-pocket for their procedure, and therefore insurance criteria were met for all patients. Although this does not inherently seem like a limitation, the need to qualify for surgery based on insurance requirements may have driven certain differences between the two populations, including the level of reported pain.

CONCLUSIONS

Significant differences were observed in the severity of and risk factors for chest pain in cisgender female patients seeking breast reduction and transmasculine patients seeking chest reduction or reconstruction for gender dysphoria. Breast size was unexpectedly uncorrelated with reported pain levels in both groups. In cisgender women, the only association with pain was BMI. In transmasculine patients, the only characteristic significantly associated with pain was history of binding. This study contributes evidence to support the hypothesis that binding alone is an independent risk factor for upper body pain, even where no macromastia is involved. Gender-affirming surgical interventions that eliminate the need to bind may therefore reduce both physical and psychological distress in transmasculine patients.

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