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Implant Attributes or Patient Characteristics? Factors Affecting Outcome after Breast Augmentation in Transgender Women

Alexander Kamali, MD*†
Helena Sackey, MD, PhD*‡
Isak Gran, MD*§
Hannes Sigurjónsson, MD, PhD*
Filip Farnebo, MD, PhD*§
Kalle Lundgren, MD, PhD*
Fredrik Granath, PhD¶
Pehr Sommar, MD, PhD*§

Background: Implant-based breast augmentation is a valuable tool for treatment of gender dysphoria in transgender women. The aim was to assess whether implant attributes, plane selection, and patient characteristics had an impact on the surgical outcome, and to compare these parameters between transgender and cisgender breast augmentations.

Methods: A cohort of transgender women who underwent breast augmentation at our department during 2009–2018 were retrospectively studied. The cohort was also compared with a cohort of 12,884 mainly cisgender women registered in the Swedish breast implant registry (BRIMP) during 2014–2019.

Results: A total of 143 transgender individuals were included, with a median follow-up of 5.7 years. Complications occurred in 20 patients (14.0%), four patients (2.8%) underwent acute reoperation, and 20 patients (14.0%) had secondary corrections. No differences were seen in complication rates when comparing prepectoral with subpectoral placement (15.1% versus 12.9%; $P = 0.81$); size, less than 400 mL versus greater than or equal to 400 mL (14.7% versus 13.3%; $P = 0.81$), or the shape of the implants, round versus anatomic (10.7% versus 22.2%; $P = 0.10$). In comparison with the cohort from BRIMP, the transgender cohort had more round implants (72.0% versus 60.7%; $P < 0.01$), larger implants (44.1% had volumes of 400–599 mL, compared with 25.4%; $P < 0.0001$), and more prepectoral placement (51.0% versus 7.3%; $P < 0.0001$). The risk of reoperation less than 30 days was 1.2% in BRIMP and 2.8% in the transgender cohort ($P = 0.08$).

Conclusions: In transgender women, implants are often larger, round, and placed prepectoral, compared with cisgender women. Despite these differences, complication rates were equivalent. Implant attributes, surgical techniques, and patient characteristics were not independently associated with the rate of complications
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INTRODUCTION

Gender dysphoria is a general term that refers to the psychological distress a person may feel when their gender is misaligned with their sex assigned at birth. The prevalence of gender dysphoria appears to be increasing worldwide and now represents 0.002%–0.014% of the total population of the world[1,2]; however, the prevalence of self-reported transgender identity is 0.5%–1.3%.[3] Gender-affirming surgery (GAS) is one of the cornerstones in the treatment of gender dysphoria, and has been available in Sweden since the 1960s.

Implant-based breast augmentation is frequently cited as the most important and sometimes the only GAS that transgender women undergo.[4] It has been shown that breast augmentation in transgender women improves their well-being, functioning in society, and quality of life, both short and long term.[5,6] Although a majority of transgender women with gender dysphoria start hormone treatment with antiandrogens and

*From the *Department of Molecular Medicine and Surgery, Karolinska Institutet, Stockholm, Sweden; †Akademiskt Centrum Plastikkirurgi, Department of Plastic Surgery, Stockholm, Sweden; ‡Department of Breast, Endocrine Tumors and Sarcoma, Karolinska University Hospital, Stockholm, Sweden; §Department of Reconstructive Plastic and Craniofacial Surgery, Karolinska University Hospital, Stockholm, Sweden; and ¶Department of Medicine Solna, Clinical Epidemiology Division, Karolinska Institutet, Stockholm, Sweden.*

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estrogen, 50%–70% of transgender women are not satisfied with the size and shape of their breasts and, therefore, choose to undergo implant-based breast augmentation.[5,7,8] Even so, there are only a limited number of studies published on surgical techniques and outcomes of GAS breast augmentation.[9,10] Most studies on breast augmentation have been performed on cisgender women, which explains why many of the fundamental concepts on GAS breast augmentation have been adopted from breast augmentation in cisgender women.[11] There are, however, challenges and limitations when performing breast augmentation on transgender women compared with ciswomen. One difference is that the skin is thicker and tighter in transgender women.[12] Furthermore, the breast tissue is denser and more constricted, the pectoralis muscle hypertrophic, the nipple-areola complex is smaller, ovoid shaped, and lateralized, and the distance from nipple to inframammary fold is shorter in comparison to cisgender women.[12–15] Also, transgender women often have a wider sternum and thorax, which in combination with lateralized areolas, requires large diameter implants to get adequate medial volume.[4]

The Swedish breast implant registry (BRIMP) was introduced in 2014, and since then more than 50,000 breast implants have been included in the registry. The registry includes information regarding shape and surface of implants as well as plane selection and surgical outcomes. There are no legal requirements to register implants in BRIMP; however, all university clinics in Sweden performing reconstructive plastic surgery and 85% of plastic surgeons in private practice participate in BRIMP.

The primary aim of this study was to assess whether the characteristics of the implant and the plane selection have an impact on the surgical outcome. The secondary aim was to assess whether any patient characteristics or comorbidities were associated with the rate of complications.

Takeaways

Question: What has the greatest impact on surgical outcome after breast augmentation in transgender women; implant attributes, plane selection, or patient characteristics? Does it differ from cisgender women?

Findings: In transgender women, implants are often larger, round, and placed prepectoral. Implant attributes, plane selection, and patient characteristics were not correlated to increased risk for complications.

Meaning: Breast augmentation in transgender individuals has low complication rates, equivalent to those in cisgender woman, even though larger implants are used, and comorbidities (including neuropsychiatric diseases) are more prevalent in transgender individuals. Furthermore, implant attributes, surgical techniques, and patient characteristics were independently not associated with the rate of complications.

MATERIALS AND METHODS

Design

A retrospective cohort study was conducted on 143 consecutive cases of transgender women with gender dysphoria undergoing breast augmentation at Karolinska University Hospital in Stockholm from January 1, 2009 to December 31, 2018. All patients had confirmed gender dysphoria diagnosis before surgery. The total cohort were "transgender" women (F64.0 according to ICD-10), none were "other gender identity disorders" (F64.8, including nonbinary individuals). All data were retrieved from hospital medical charts. The median follow-up time was 5.7 years (range, 2.5–12.5).

Variables

Data regarding patient characteristics, including age, smoking habits, body mass index (BMI), and comorbidity, and characteristics of implants (brand, shape, surface, and size), surgical technique (incision site and surgical plane), and complications (including hematoma, infection, capsular contracture, rotation, animation, lateralization, etc) were obtained through medical chart review. Information regarding regrets of transgender surgery, detransition, and mortality was also collected.

Surgical Technique

All procedures were conducted by board-certified plastic surgeons at Karolinska University Hospital or by residents under their supervision. Implants were selected during preoperative consultation according to the TEPID system,[16] a system that addresses the tissue characteristics (T), the envelope (E), the parenchyma (P), the implant (I), and its dynamics (D). In all cases, the inframammary access incision was used, and the incision in the new inframammary fold was calculated according to the Randquist system,[17,18] the ICE principle [implant dimensions (I) - capacity of the breast (C) = excess tissue required (E)],[19] and/or measurements according to Hedén et al.[20,21] The implants were placed either prepectoral/subglandular (including subfascial) or subpectoral/dual plane. The plane was selected according to the pinch test (if >2 cm, the implants were preferably placed prepectoral), the patient's breast shape, footprint, skin quality, and ptosis.

Setting

The plastic and craniofacial surgery unit at Karolinska University Hospital is the largest center in Scandinavia performing GAS. The unit performs both feminizing and masculinizing top and bottom surgeries, and in selected cases, facial feminization surgery.

Registers

Registration of data in the Swedish BRIMP includes information regarding cause of breast augmentation, choice of implant and its specific properties (shape, surface, and filling material), and in which anatomical position the implant has been placed and whether antibiotics were given. Furthermore, the same registration applies for reoperations. Data from BRIMP were retrieved from the 2020 annual report, and only patients with benign breast

conditions (such as aplasia mammae and micromastia) were included in this study.

Statistical Analysis

To eliminate the risk of missing patients, two registries were used to identify the individuals, including a centralized operation database (Orbit) and an internal patient registry (Take Care) for all transgender patients treated at Karolinska University Hospital during January 1, 2009–December 31, 2018. Demographic characteristics, comorbidities, implant attributes, and surgical techniques were compared to identify any differences in surgical outcome. Multivariable regression analysis was used to control for confounders. Analysis was performed using a combination of descriptive statistics and the Fisher exact test for discrete variable comparison. Results are presented as odds ratios with 95% confidence intervals. Analyses were conducted with IBM SPSS Statistics 26 for Mac (IBM Corp., Somers N.Y.) software, and logistic regression analyses were performed using SAS version 9.4 (SAS Institute Inc., Cary, N.C.). The regional ethical review board in Stockholm, Sweden, approved the study (reference number 2015/2225-31).

RESULTS

Patient Demographics

Overall, 143 transgender women underwent implant-based breast augmentation at Karolinska University Hospital during a 10-year period from January 2009 to December 2018. The mean age at surgery was 34.6 years (range, 18–68), and the most common age range was 19–29 years (44.8%) (Table 1). The total cohort were "transgender" women (F64.0 according to ICD-10), none were "other gender identity disorders" (F64.8). Twenty-three individuals (16.1%) were active smokers, 45 (31.5%) had a BMI greater than or equal to 25, and 15 patients (10.5%) had been diagnosed with one or more neuropsychiatric disorders (Table 1). Two patients (1.4%) later underwent detransition and chose to have their implants removed. Six patients (4.2%) became deceased during the study period, all by committing suicide, according to their medical charts. None of these had shown regrets toward the GAS augmentation.

Our data show that 108 patients (75.5%) who underwent breast augmentation had already undergone vaginoplasty (or did the surgery at the same time as the second surgery in a two-staged vaginoplasty), 18 (12.6%) underwent vaginoplasty after having a breast augmentation, 15 (10.5%) did not want to do genital surgery, and in two cases, (1.4%) data are missing (unknown).

Characteristics of Implants (Brand, Shape, Surface, and Size) and Surgical Technique

The most frequently used implants were of the brand Mentor (63.6%), followed by Arion (21.7%) and Allergan (1.4%) (Table 2). In 13.3% of cases, there was no information in the medical charts regarding brand of the implants. Mean size of implant was 398 mL (range, 150–700 mL). There was no significant difference ($P = 0.38$) in mean implant size when comparing the first 5 years of the studied period (2009–2013) to the latter period (2014–2018). All procedures were performed via incision in the inframammary fold. The implants were placed prepectorally in 73 cases (51.0%) and subpectorally in 70 cases (49.0%). Round implants were used in 103 cases (72.0%) and anatomical in 36 cases (25.2%), and in four cases (2.8%), information was missing. The surface of the implants was textured in 122 cases (85.3%), smooth in one case (0.7%), and unknown in 20 cases (14.0%).

Complications

Complications occurred in 20 patients (14.0%), of whom 10 (7.0%) had an infection (of which nine were superficial and one deep to the implant), four (2.8%) had postoperative bleeding, two (1.4%) had seromas, one (0.7%) had prolonged pain more than 1 month, and one (0.7%) developed superficial vein thrombosis in the leg

Table 1. Patient Demographics

	n (%)
All patients	143
Age*	34.6 (±12.8; 18–68)
14–16	0 (0.0)
17–18	3 (2.1)
19–29	64 (44.8)
30–39	29 (20.3)
40–80	47 (32.9)
Smoking	
Nonsmoker	106 (74.1)
Current smoker	23 (16.1)
Missing	14 (9.8)
Diabetes mellitus	5 (3.5)
BMI	
<18.5	3 (2.1)
18.5–24.9	83 (58.0)
25.0–29.9	33 (23.1)
≥30.0	12 (8.4)
Missing	12 (8.4)
ADHD, ADD, and ASD	15 (10.5)
Detransition	2 (1.4)
Deceased	6 (4.2)

*Mean (±SD; range), in years.

Table 2. Implant Characteristics

	N (%)
All patients	143
Brand	
Mentor	91 (63.6)
Arion	31 (21.7)
Allergan	2 (1.4)
Unknown	19 (13.3)
Surface	
Textured	122 (85.3)
Smooth	1 (0.7)
Unknown	20 (14.0)
Shape	
Anatomic	36 (25.2)
Round	103 (72.0)
Unknown	4 (2.8)
Implant size*	
<400 mL	68 (47.6)
≥400 mL	75 (52.4)
Implant placement†	
Prepectoral	73 (51.0)
Subpectoral	70 (49.0)

*Mean size of implant was 398.6 mL (range, 150–700 mL).
†Prepectoral includes subglandular and subfascial placement, while subpectoral includes dual plane placement of implant.

Table 3. Postoperative Complications, Cause of Reoperation, and Secondary Correction

	Cause	n (%)
Complications	Infection (n = 10)	
	Superficial	9 (6.3)
	Deep	1 (0.7)
	Hematoma	4 (2.8)
	Seroma	2 (1.4)
	Wound rupture	1 (0.7)
	Prolonged pain >1 month	1 (0.7)
	Superficial venous thrombosis	1 (0.7)
	Pulmonary embolism	1 (0.7)
	Total	20 (14.0)
Cause of reoperation <30 days	Hematoma	3 (2.1)
	Infection	1 (0.7)
	Total	4 (2.8)
Cause of secondary correction	Malposition	9 (6.3)
	Patient request to change size of implant	3 (2.1)
	Capsular contracture	2 (1.4)
	Late infection >30 days	2 (1.4)
	Rotation of implant	1 (0.7)
	New insertion of implant after previous removal due to infection	1 (0.7)
	Other causes	2 (1.4)
	Total	20 (14.0)

(Table 3). One case (0.7%) of pulmonary embolism was detected and medically treated successfully. No case of breast implant-associated anaplastic large cell lymphoma was reported. Four patients (2.8%) underwent acute reoperation within 30 days, three (2.1%) due to hematoma and one (0.7%) due to infection. Secondary corrections were performed on 20 patients (14.0%), of which nine (6.3%) were due to malposition, two (1.4%) due to infection after more than 30 days, two (1.4%) due to capsular contracture, one (0.7%) due to asymmetry, and two (1.4%) due to other causes. Two patients (1.4%) desired to have larger implants and one patient (0.7%) wanted to downsize the implants. One patient (0.7%) had a new implant inserted after having it previously removed due to infection (Table 3).

Effect of Covariates

No differences were seen in complication rates when comparing prepectoral with subpectoral placement of the implant (15.1% versus 12.9%; $P = 0.811$), size of implant ($P = 0.330$), nor the shape of the implant; round versus anatomic (10.7% versus 22.2%; $P = 0.096$) (Table 4). (**See tables, Supplemental Digital Content 1**, which displays A, Potential risk factors and characteristics of implants and their effect on surgical outcome. B, Effect of covariates C, Multivariate analysis on variables affecting complications and secondary corrections, adjusted for suspicious confounders. D, Multivariate analysis on variables affecting complications and secondary corrections, adjusted for suspicious confounders. **http://links.lww.com/PRSGO/C249**.) Because almost 90% of the implants were textured, no statistical analysis was done on differences in complications between textured or smooth implants. Furthermore, no significant differences were seen in complication rates when comparing individuals with attention deficit hyperactivity disorder (ADHD), attention deficit disorder (ADD), or autism spectrum disorder (ASD) with individuals without these diagnoses (20.0% versus 13.4%; $P = 0.49$); age less than 30 versus greater than or equal to 30 (17.2% versus 23.1%; $P = 0.43$); BMI less than 25 versus BMI greater than or equal to 25 (9.6% versus 53.8%; $P = 0.09$); or smokers versus nonsmokers (17.4% versus 13.2%; $P = 0.74$). There was a significant ($P < 0.02$) increased risk of complications when setting the cut of limit of BMI at 30, that is, BMI less than 30 versus greater than or equal to 30; however, after adjustment for confounders (mutually adjusted for implant

Table 4. Analysis of Patient and Implant Characteristics Associated with Surgical Outcome

Variable	Category	N	Complications			Acute Reoperations			Secondary Corrections		
			N	%	*P*	N	%	*P*	N	%	*P*
Diabetes	No	138	20	14.5	1.000	4	2.8	1.000	20	14.5	1.000
	Yes	5	0	0.0		0	0.0		0	0.0	
BMI	<25.0	86	8	9.3	0.018	3	3.6	0.378	15	17.4	0.594
	25.0–29.9	33	4	12.1		0	0.0		3	9.1	
	≥30	12	5	41.7		0	0.0		2	16.7	
	Missing	12	3	25.0		1	8.3		0	0.0	
Smoking	No	106	14	13.2	0.740	4	3.8	1.000	15	14.2	0.746
	Yes	23	4	17.4		0	0.0		4	17.4	
	Missing	14	2	14.3		0	0.0		1	7.1	
Age	<29	67	11	16.4	0.817	2	3.1	0.853	13	19.4	0.247
	30–39	29	3	10.3		0	0.0		2	6.9	
	40–80	47	6	12.8		2	4.3		5	10.6	
Shape	Round	103	11	10.7	0.096	2	1.9	0.378	12	11.7	0.166
	Anatomical	36	8	22.2		2	5.6		8	22.2	
	Unknown	4	1	25.0		0	0.0		0	0.0	
Implant size	≤300 mL	32	6	18.8	0.330	3	9.4	0.154	5	15.6	0.927
	301–400 mL	48	6	12.5		1	2.1		6	12.5	
	401–499 mL	33	2	6.1		0	0.0		4	12.1	
	≥500 mL	30	6	20.0		0	0.0		5	16.7	
Position*	Prepectoral	73	11	15.1	0.811	2	2.7	1.000	8	11.0	0.339
	Subpectoral	70	9	12.9		2	2.9		12	17.1	
Year	<2014	46	6	13.0	0.757	0	0.0	0.559	9	19.6	0.025
	2014–2016	46	8	17.4		2	4.3		9	19.6	
	2017–2018	51	6	11.8		2	3.9		2	3.9	
All patients	Total	143	20	14.0		4	2.8		20	14.0	

*Prepectoral includes subglandular and subfascial placement while subpectoral includes dual plane placement of implant.

characteristics, position, calendar time, and for smoking and age), the risk was still elevated, but the difference was no longer significant. (**See tables, Supplemental Digital Content 1**, **http://links.lww.com/PRSGO/C249**.) In the multivariate analysis, none of the other variables (patient characteristics, surgical technique, and implant characteristics) were significant independent risk factors for surgical complication, acute reoperation, or secondary correction.

Comparison with the Swedish Breast Implant Registry

A total of 12,884 patients (25,554 implants) who received breast implants due to benign breast conditions were registered in BRIMP during 2014–2019 (Table 5). Incision was placed in the inframammary fold in 79.8%, transaxillary in 12.3%, and periareolar in 0.6%, compared with 100% in the inframammary fold in our transgender cohort. In BRIMP, 92.7% of the implants were placed subpectoral/dual plane, and 5.6% prepectoral/subglandular (1.8% missing data) compared with transgender women, where the implants were placed prepectoral/subglandular in 51.0% of cases ($P < 0.0001$) and subpectoral/dual plane in 49.0% of cases ($P < 0.0001$). In BRIMP, round implants were used in 60.7% of cases in comparison to 72.0% of the cases in our cohort of transgender women ($P < 0.01$). Anatomical implants were used in 37.7% of cases in BRIMP and 25.2% of the cases in the transgender cohort ($P < 0.01$). Textured implants were the most commonly used implants in both cohorts (81.3% in BRIMP and 85.3% in our cohort with transgender women), followed by smooth implants (16.1% and 0.7%, respectively) and unknown (2.1% and 14.0%, respectively). Implants with a volume of 200–399 mL were used in 66.8% of the cohort registered in BRIMP and in 47.6% of the transgender cohort ($P < 0.0001$), while volumes of 400–599 mL were used in 25.4% of the cases in BRIMP and 44.1% in our transgender cohort ($P < 0.0001$). Implants over 600 mL were in BRIMP registered in only 4.0% of the cases and 6.3% of the transgender cohort. In BRIMP, the risk of having a reoperation within 30 days after implant-based breast augmentation (benign breast conditions as indication) was 1.2% and 6.9% within 6 years. However, in the transgender cohort the risk of acute reoperation within 30 days was 2.8% ($P = 0.083$) and 14.0% during the study period (median followup time of 5.7 years; range, 2.5 -12.5). The risk of having a revision surgery due to malposition (which includes bottoming out, dislocation, and lateralization) was 6.3% in the transgender cohort, while dislocation was observed in 8.7% of all revision procedures in BRIMP.

Table 5. Difference in Implant Selection and Surgical Technique When Performing Implant-based Breast Augmentation in Transgender Women Compared with Cisgender Women

	Transwomen	BRIMP*	
Total n (patients)	**143**	**12,884**	
	%	**%**	***P***
Brand			
Mentor	63.6	48.6	
Motiva	0.0	28.8	
Arion	21.7	Unknown	
Allergan	1.4	Unknown	
Unknown	13.3	Unknown	
Surface			
Textured	85.3	81.3	
Smooth	0.7	16.1	
Unknown	14.0	2.1	
Size			
<199 mL	0.0	2.5	
200–399 mL	47.6	66.8	<0.0001
400–599 mL	44.1	25.4	<0.0001
≥600 mL	6.3	4.0	
Unknown	0.0	1.4	
Shape			
Anatomical	25.2	37.7	0.002
Round	72.0	60.7	0.006
Unknown	2.8	1.6	
Incision			
Inframammary	100	79.8	
Transaxillary	0.0	12.3	
Periareolar	0.0	0.6	
Mastopexy with augmentation	0.0	2.8	
Mastectomy scar	0.0	0.6	
Unknown	0.0	4.0	
Placement of implant			
Prepectoral/subglandular	51.0	5.6	<0.0001
Subpectoral/dual plane	49.0	92.7	<0.0001
Unknown	0.0	1.8	

*Data collected from the Swedish BRIMP, 2014–2019, where a total of 12,884 patients (25,554 implants) who received breast implants due to benign breast conditions have been registered.

DISCUSSION

The present study demonstrates significant differences regarding choice of implants and plane selection when performing breast augmentation in transgender women versus cisgender women. In transgender women, larger implants are used, the implants are more often round, and they are more often placed prepectorally. However, despite these differences, this study shows that gender-affirming implant-based breast augmentation is a safe procedure with low complication rates, equivalent to those presented in the Swedish BRIMP.

The vast majority of studies on implant-based breast augmentation have been performed on cisgender women only. Recently, a few studies have been published focusing on complication rates in gender-affirming breast augmentation.[9,22] However, there is a paucity of studies which have presented more detailed aspects of the characteristics of implants used in gender-affirming breast augmentation in relation to surgical outcome and in comparison to breast augmentation in cisgender women. Complication rates for cisgender women undergoing breast augmentation range from 1% to 38% in the literature and vary due to different definitions and follow-up times.[23–25] Sijben et al[23] reported in their recent literature review on gender-affirming breast augmentation that although there was a wide variation regarding follow-up time in the included studies, complications requiring reoperation were hematoma (0%–2.9%), infection (0%–0.9%), capsular contraction (0%–5.6%), and asymmetry (3.6%). These results are in line with the findings in our cohort, where four patients (2.8%) required reoperation within 30 days: three due to hematoma (2.1%) and one due to infection (1.4%). Secondary corrections were performed on 14.0% of the cohort, whereof capsular

contraction and asymmetry represented 1.4% and 6.3%, respectively, in our cohort.

Cuccolo et al[26] showed in their study that the risk-adjusted 30-day postoperative complication rates were equivalent in the transgender and cisgender populations after breast augmentation. These results are also in line with our study, as the risk of having a reoperation within 30 days after implant-based breast augmentation (due to benign breast conditions) was 1.2% in BRIMP and 2.8% in the transgender cohort ($P = 0.083$).

When comparing our results to data from BRIMP, including 12,884 mainly cisgender women, we found that there were significant differences regarding the anatomical placement of the implants between the two cohorts. In BRIMP, a vast majority (92.7%) of the implants were placed subpectoral/dual plane, compared to our cohort of transgender women where the implants were mainly (51.0%) placed prepectoral/subglandular ($P < 0.0001$). In transgender women, implants are preferably placed prepectoral due to many factors.[6,27,28] First, the theory that the most natural outcome of breast augmentation only can be achieved by anatomical implants inserted in a dual plane manner[30] has been rejected.[38] Second, the previous knowledge of reduced risk of capsular contracture if textured implants were used and if implants were placed in a prepectoral pocket is now debatable.[28,30] Another obvious reason for choosing the prepectoral pocket, if possible, is because the pectoralis muscle is usually thicker in transgender women, which can displace the implant laterally and superiorly.[31] Another reason for placing implants prepectoral in transgender women is due to the thicker and tighter skin and more dense glandular tissue compared with cisgender women, which gives better tissue coverage of the implant. According to Tebbett's and Adam's algorithm for choosing the appropriate implant and surgical technique (known as TEPID system), dual-plane placement is recommended in patients with a "pinch test" of less than 2.0 cm.[16] In a recent updated algorithm for plane selection in transgender women, prepectoral/subglandular placement is recommended when the pinch test is more than 1.5 cm.[32]

Current literature indicates that neuropsychiatric disorders (ADHD, ADD, and ASD) can compromise health and may also be more prevalent in individuals with gender dysphoria.[33] However, in our cohort, individuals with theses diagnoses had complication rates similar to those without. This indicates that gender-affirming breast augmentation can safely be performed in individuals with neuropsychiatric diagnoses. Furthermore, in our cohort, none of the patient characteristics or comorbidities (age, BMI, smoking habits, diabetes, etc) independently correlated to increased risk for complications or secondary corrections in the multivariate analysis.

Regrets after GAS and detransitions are uncommon, and the literature suggests that this occurs in less than 1% of patients after transmasculine surgery and in approximately 1% after transfeminine surgery.[34] In this present study, two patients (1.4%) underwent detransition during the follow-up time and chose to have their implants removed. Neither of them had any complications during or after the GAS. One of the two patients had also undergone genital surgery (vaginoplasty). Six individuals (4.2%) died during the study period (2009–2018), all by committing suicide. None of them had shown regrets toward the gender-affirming breast augmentation surgery.

A review article by Dhejne et al[35] indicates that transgender individuals have a higher risk of psychiatric morbidity, which confirms the vulnerability of this population. A systematic review by Marshall et al on suicidality in transgender individuals showed that the suicide death rates varied from 0% up to 4.2%.[36,37] An investigation done by the Swedish National Board of Health and Welfare concluded that individuals with gender dysphoria have a 4.9–13.7 higher risk of suicide than other individuals.[38] The results from our study emphasize the importance of long-term follow-up of this patient group to prevent and diagnose depression and avert self-harm.

Limitations of this study include that it is a retrospective study with low number of complication events. Furthermore, although a majority of the procedures were performed by two surgeons, there were more surgeons involved, which could have affected the outcome. In this study, we did not evaluate the effect of estrogen therapy. However, most of our patients had been treated with hormone therapy before surgery. Also, late complications can occur many years after surgery, and hence, the minimum follow-up time of 2.5 years might not be sufficient to address these. Future research is to follow the same cohort for at least 5 years to evaluate the long-term results. Combining this with patient-reported outcome questionnaires would further contribute to the study by adding the patients' perspective of the surgery.

CONCLUSIONS

The present study demonstrates significant differences when comparing breast augmentation in transgender with cisgender women. In transgender women, larger implants are used, the implants are more often round, and they are primarily placed prepectorally/subglandularly. However, despite these differences, this study shows that gender-affirming implant-based breast augmentation is a safe procedure with low complication rates, equivalent to those after breast augmentation in cisgender women. Furthermore, patient characteristics, comorbidities, implant attributes, and surgical techniques were not associated with the rate of complications, reoperations, or secondary corrections.

Alexander Kamali, MD
Department of Molecular Medicine and Surgery
Karolinska Institutet
Stockholm, Sweden
E-mail: alexander.kamali@ki.se

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