

Improved Surgical Outcome with Double Incision and Free Nipple Graft in Gender Confirmation Mastectomy

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Background: Mastectomy and chest-wall contouring is the most common gender confirmation surgery. With increasing prevalence of transgender individuals, there is a demand for better surgical outcomes and aesthetic results. Our aim was to evaluate surgical techniques used and assess modifications in gender confirmation mastectomies at Karolinska University hospital in Stockholm, Sweden.

Methods: A retrospective cohort study was performed on 464 patients undergoing gender confirmation mastectomies in our department between 2009 and 2018. Patient demographics, psychiatric comorbidity, surgical method, and outcome were analyzed. Follow-up was at least one year.

Results: The most frequently used surgical technique for gender confirmation mastectomies was double incision with free nipple graft (243 patients, 52.4%), followed by periareolar incision (113 patients, 24.4%) and semicircular incision (67 patients, 14.4%). The double incision technique and periareolar technique were associated with 18.9% and 28.3% complications, 3.3% and 12.4% acute reoperations, 28.4% and 65.5% secondary revisions, respectively. The double incision technique increased from being used in 17.8% of all mastectomies during 2009–2013 to 62.9% during 2014–2018, while periareolar incision decreased from 43.0% to 18.5%.

Conclusions: The current study describes a successful transition of surgical technique from periareolar incision to double incision with free nipple graft in gender confirmation mastectomy, leading to significant improvements in the overall outcome with fewer complications, less acute reoperations and less secondary corrections. Hence, we consider the double incision with free nipple graft technique to be the favored technique in the vast majority of cases in female-to-male chest wall contouring. (*Plast Reconstr Surg Glob Open* 2021;9:e3628; doi: [10.1097/GOX.0000000000003628](https://doi.org/10.1097/GOX.0000000000003628); Published online 13 July 2021.)

INTRODUCTION

Transgender individuals generally experience distress resulting from incongruence between assigned sex at birth and the gender they identify themselves with, a condition called gender dysphoria. The prevalence of gender

dysphoria appears to be increasing worldwide,¹ and the incidence in Sweden is now five times higher compared with that in the year 1970.² The evaluation and treatment of gender dysphoria includes an established procedure of diagnostic assessment, hormonal therapy, and surgical procedures in accordance with the standards of care of the World Professional Association of Transgender Health.³

Gender confirmation surgery is one of the cornerstones of the treatment of gender dysphoria and has been available in Sweden since the 1960s. Karolinska University Hospital is one of the three centers in Sweden offering gender confirmation surgery. The most common surgical procedure in female-to-male transgender individuals is removal of breast tissue and excess skin as a masculinization procedure, also called gender confirmation mastectomy (GCM).^{4–7}

Despite the increasing incidence of gender dysphoria and over 50 years of experience in the treatment of

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transgender individuals, there is still some lack of consensus in the surgical field and, therefore, attempts are still made to explore and evolve the current techniques.^{2,8-11} The techniques to achieve a pleasing result are by removing breast tissue and excess skin, reducing and repositioning the nipple areola complex (NAC), and finally, doing so with discrete scars.^{10,12-14} However, there are no publications on the transition of surgical techniques used in female-to-male chest wall contouring in relation to the surgical outcome.¹⁵ The aim of the study was to evaluate all mastectomies performed on transgender patients at Karolinska University Hospital during a 10-year period.

MATERIALS AND METHODS

This is a retrospective cohort study on consecutive cases of 464 female-to-male transgender patients undergoing GCM at Karolinska University Hospital in Stockholm from January 1, 2009 to December 31, 2018. Data regarding patient characteristics, including age, sex, smoking habits, BMI, and comorbidity were retrieved from hospital medical records. Clinical outcomes, including surgical techniques and complications, were registered. The follow-up time was at least 1.5 years, and in average 5 years.

Surgical Technique Selection

All surgeries were conducted by board certified plastic surgeons at Karolinska University Hospital. A majority of the cases were treated by two plastic surgeons. However, another eight surgeons did at least one mastectomy during the study period. The surgical technique was selected according to the patient's breast volume, ptosis, skin quality, shape, and size of NAC and requests of the patient regarding scars and form. The most common surgical techniques were double incision with free nipple graft (also called horizontal incision), periareolar incision (also called circumareolar, double circular, concentric circular or doughnut technique), or semicircular incision (also called subareolar or infraareolar technique) (Fig. 1). The semicircular technique was performed by placing an infraareolar incision. Dissection of glandular breast tissue was carried out using both electrocautery and sharp dissection. Much care was taken to not make the subcutaneous layer too thin to avoid irregularities, but at the same time try to remove most or all of the glandular tissue to avoid the need of a revision surgery. Hence, a thin layer of glandular tissue under the NAC was left to avoid hollowing in this area and at the same time maintain good circulation. Hemostasis was obtained by meticulously using electrocautery on all visible vessels. In cases where bleeding was an issue perioperatively, a drain was installed. The drain was removed after 1–3 days. Skin closure was made with 3-0 monofilaments first in the subdermal layer and then intracutaneously in the skin/NAC. The Periareolar technique was performed by drawing two circles, one inside the areola and the other approximately 2 centimeters outside the first one. The circles were sometimes made more oval to slightly reposition the NAC. The first circle usually had a diameter of approximately 2.5 cm, which also became the dimension for the new areola. The skin between the

circles was deepithelialized. Incision was made through the lower half of the deepithelialized skin down to the glandular tissue. The tissue was then removed using the same technique as described above for the semicircular technique and the skin closure was made in two layers with 3-0 monofilaments. The double incision with free nipple graft was performed by harvesting a 2.5 cm large NAC as a full-thickness graft. Thereafter the glandular tissue was resected as an ellipse shape with the overlying skin. The NAC was then regrafted to its new position on the thorax with the use of the pectoralis muscle, clavicle, and sternum as landmarks.^{7,16,17}

Statistical Analysis

To eliminate the risk of missing patients, two registries were used to identify the patients, including a centralized operation database and an internal patient registry for all transgender patients treated at Karolinska University Hospital. Analysis was performed using a combination of descriptive statistics and the chi-square test (the Fisher exact test) for discrete variable comparison. Demographic characteristics, comorbidities, and complications were compared between surgical techniques. Multivariable logistic regression analyses were performed to assess the risk of different type of complications with respect to type of surgery and patient characteristics. Results are presented as odds ratios with 95% confidence intervals (CI). Because the majority of surgeries were performed from 2014 (particularly “double incision with free nipple graft”) and onward, the complications were analyzed with respect to type of surgery restricted to operations performed from 2014. 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

Over the 10-year study period (2009–2018), a total of 464 bilateral GCMs were performed. Number of mastectomies performed per year increased nearly every year, from 10 mastectomies in 2009 to 163 in 2018 (Fig. 2). Of the cohort, 94.6% were female-to-male transgender (F64.0 according to ICD-10), and 5.4% were nonbinary (F64.8). The mean age at surgery was 24.1 years (range 14–64). In total, 7.1% were active smokers and 29.8% had a BMI ≥ 25 (Table 1). Psychiatric comorbidities in the form of attention deficit hyperactivity disorder (ADHD), attention deficit disorder (ADD), or autism spectrum disorder were diagnosed in 24.1% of the patients. Two patients (0.4%) out of 464 regretted having undergone GCM. One of them reapplied for detransition to the Swedish National Board of Health and Welfare and regained the previous female social security number. She later underwent reconstructive breast augmentation with implants. The other patient is not interested in doing any revision surgery. Four patients (0.9%) passed away, all by committing suicide, according to their medical records. None of these had shown regrets toward the gender confirmation mastectomy.

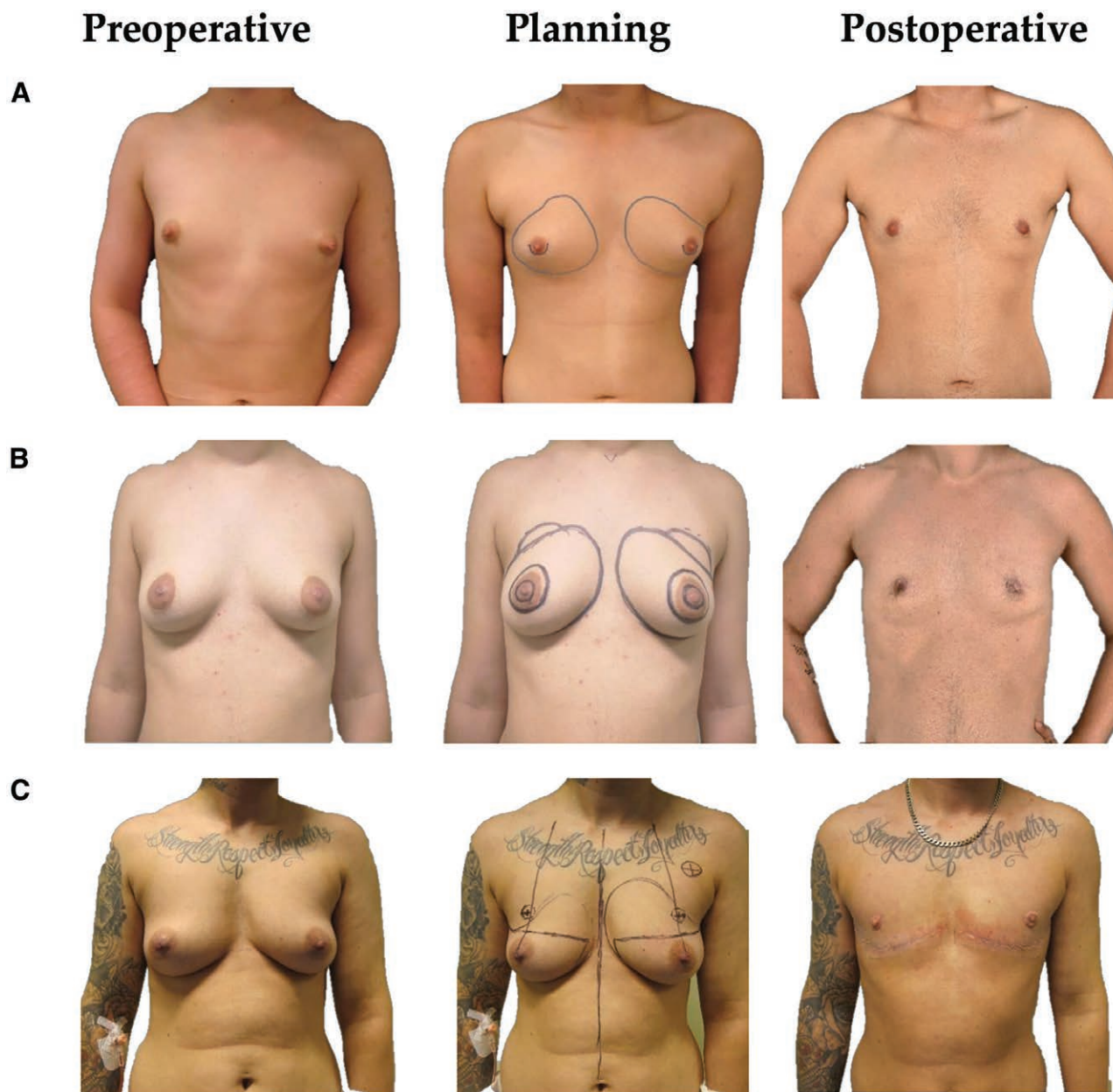


Fig. 1. Display of the 3 most used surgical techniques in gender confirmation mastectomy. A, Semicircular incision. B, Periareolar incision. C, Double incision with free nipple graft.

The most common surgical technique was the double incision with free nipple graft technique (243 patients, 52.4%), followed by periareolar incision (113 patients, 24.4%) and semicircular incision (67 patients, 14.4%) (Table 2). In 41 patients (8.8%), other techniques were used such as extended concentric circular technique¹⁸ and wise pattern (inverted T). Of the 464 mastectomies, 99 patients (21.3%) had some sort of complication such as postoperative bleeding, infection, seroma formation, wound healing problems, or excessive pain. Of these patients, 33 (7.1% of all mastectomies) required reoperation within 30 days. Hematoma was the most common reason ($n = 30$) for reoperation, followed by infection (two patients) and wound rupture (one patient). In the

multivariate analysis, none of the patient characteristics showed a significant association to the rate of complication, acute reoperation, or secondary correction (Table 3).

Surgical Techniques and Complications

Complications ($n = 99$, 21.3%) mainly occurred when mastectomy was performed through periareolar incision (28.3%), followed by semicircular incision (19.4%) and double incision (18.9%) (Table 2). Similarly, acute reoperation (33 patients) occurred at the highest rate in periareolar incision (12.4%), followed by semicircular incision (11.9%) and double incision with free nipple graft (3.3%). According to Clavien-Dindo classification, 7.8% of the patients required medical intervention

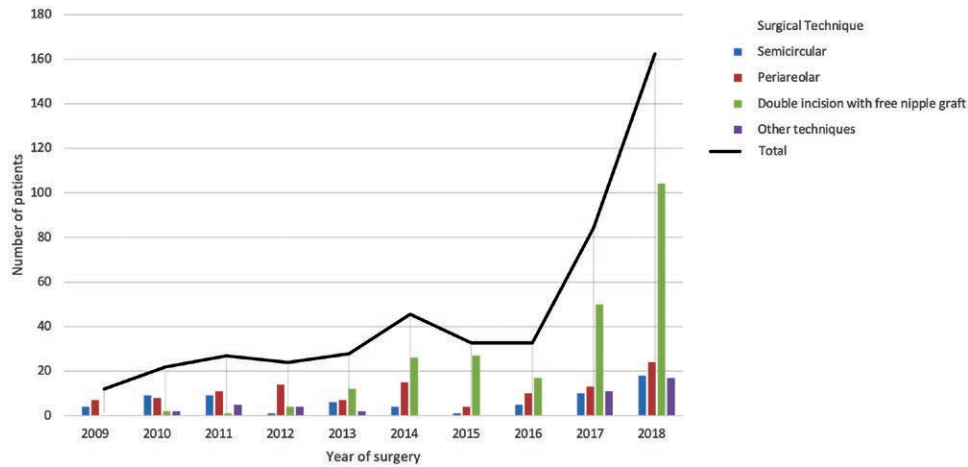


Fig. 2. Number of gender-affirming mastectomies performed per year in relation to surgical technique.

Table 1. Characteristics of the Study Population

	n (%)
All patients	464
Age*	24.1 (14–64)
14–16	20 (4.3%)
17–18	70 (15.1%)
19–29	304 (65.5%)
30–39	53 (11.4%)
40+	17 (3.7%)
Smoking	
Never or previous smoker	330 (71.1%)
Current smoker	33 (7.1%)
Missing	101 (21.8%)
Diabetes mellitus	2 (0.4%)
BMI	
<18.5	8 (1.7%)
18.5–24.9	216 (46.6%)
25.0–29.9	102 (22.0%)
>30.0	36 (7.8%)
Missing	102 (22.0%)
ADHD, ADD, ASD†	112 (24.1%)
Detransition	2 (0.4%)
Deceased	4 (0.9%)

*Mean (range).

†ASD, autism spectrum disorder.

(grade II) and 8.6% required surgical intervention (grade III). Complications that required surgical intervention occurred in 5.8% of the patients who had undergone mastectomy using the double incision technique, 7.5% after semicircular incision, and finally 15.9% of patients in whom periareolar incision was used (Table 4). Secondary corrections for aesthetic improvement were performed in 39.0% of all mastectomies; 65.5% of patients undergoing mastectomy via periareolar incision underwent at least one secondary correction, followed by 37.3% after semicircular incision, and finally 28.4%

were in need of revision after the double incision technique. Double incision with nipple graft was superior to periareolar incision in all aspects of complications [OR 1.95 (95% CI 1.17–3.24)] and also superior to subareolar incision with respect to acute reoperation within 30 days [OR 3.98 (95% CI 1.44–11.1)], as shown in Table 5. The superiority of double incision to periareolar incision was evident even after adjusting for age, ADHD, DM, BMI more than 25 [OR 2.71 (95% CI 1.37–5.39)] as well as after adjusting for time period (2014–2018) and smoking [OR 3.14 (95% CI 1.44–6.84)]. None of the other pairwise comparisons between surgery types were statistically significant.

Necrosis (partial and total) of the nipple-areolar complex was observed in 17 patients (3.7%); eight cases after double incision (3.3%), six after periareolar incision (5.3%), one after semicircular incision (1.5%), and two after other various surgical techniques (4.9%). One case of deep vein thrombosis was detected. No other serious complications were reported.

Differences in Surgical Outcomes between 2009–2013 and 2014–2018

The double incision with free nipple graft technique increased from being used in 17.8% of all mastectomies during 2009–2013 to 62.9% during 2014–2018, in contrast to periareolar incision, which was used less during the second half of the study period (43.0% versus 18.5%) (Table 6). There were no significant differences in acute reoperation rates and surgical techniques when comparing the first half of the study period (2009–2013) to the second half (2014–2018). Revision surgery was done

Table 2. Surgical Techniques and Outcomes

Technique	Count (All Mastectomies)	Complications	Reoperation < 30 Days	Secondary Correction
Double incision with nipple graft	243 (52.4%)	46 (18.9%)	8 (3.3%)	69 (28.4%)
Periareolar incision	113 (24.4%)	32 (28.3%)	14 (12.4%)	74 (65.5%)
Semicircular incision	67 (14.4%)	13 (19.4%)	8 (11.9%)	25 (37.3%)
Other techniques	41 (8.8%)	8 (19.5%)	3 (7.3%)	13 (31.7%)
Total	464 (100%)	99 (21.3%)	33 (7.1%)	181 (39.0%)

Table 3. Effect of Covariates

Variable	Comparison	Any Complication			Clavien-Dindo > 2			Acute Reoperation			Secondary Corr		
		OR*	95% CI	P	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
Age	<17 versus 30–39	1.07	(0.27–4.26)	0.92	0.41	(0.04–4.15)	0.45	0.34	(0.03–3.55)	0.37	0.60	(0.17–2.15)	0.43
	17–18 versus 30–39	0.36	(0.11–1.21)	0.10	0.43	(0.09–2.09)	0.30	0.26	(0.04–1.54)	0.14	0.66	(0.26–1.69)	0.39
	19–29 versus 30–39	0.96	(0.42–2.18)	0.92	0.49	(0.15–1.54)	0.22	0.34	(0.10–1.14)	0.08	0.94	(0.44–2.01)	0.88
	40+ versus 30–39	1.70	(0.43–6.67)	0.45	3.89	(0.67–22.5)	0.13	2.52	(0.35–18.3)	0.36	1.08	(0.29–3.98)	0.91
ADHD+	ADHD versus not ADHD	0.79	(0.42–1.51)	0.48	2.27	(0.95–5.45)	0.07	2.26	(0.86–5.95)	0.10	0.91	(0.52–1.59)	0.74
Smoking	smoker versus nonsmoker	0.72	(0.27–1.91)	0.51	1.64	(0.49–5.50)	0.43	1.68	(0.43–6.57)	0.45	0.61	(0.26–1.45)	0.27
BMI	BMI ≥25 versus BMI <25	0.56	(0.18–1.73)	0.31	1.28	(0.75–2.17)	0.37	0.56	(0.18–1.73)	0.31	1.28	(0.75–2.17)	0.37

*All odds ratios are mutually adjusted for type of surgery, age, ADHD+, period, DM, BMI and smoking.

None of the patient characteristics showed a significant association to the rate of complication, reoperation, or secondary correction.

Table 4. Postoperative Complications according to Clavien-Dindo

		Semicircular	Peri-areolar	Double Incision	Other Techniques	Total
Clavien-Dindo	No complication, <i>Grade 0</i> , n (%)	55 (82.1%)	78 (69.0%)	196 (80.7%)	32 (78.0%)	361 (77.8%)
	No intervention, <i>Grade I</i> , n (%)	4 (6.0%)	9 (8.0%)	11 (4.5%)	2 (4.9%)	26 (5.6%)
	Medical intervention, <i>Grade II</i> , n (%)	2 (3.0%)	8 (7.1%)	22 (9.1%)	4 (9.8%)	36 (7.8%)
	Surgical intervention, <i>Grade III</i> , n (%)	5 (7.5%)	18 (15.9%)	14 (5.8%)	3 (7.3%)	40 (8.6%)
	Life-threatening, <i>Grade IV</i> , n (%)	1 (1.5%)	0	0	0	1 (0.2%)
Total		67	113	243	41	464

significantly more often during 2009–2013 (70.4% of all cases) compared with 2014–2018 (29.5% of all cases) ($P < 0.0001$). During 2009–2013, 80.9% of periareolar incisions and 63.2% of double incisions underwent secondary revision. As a comparison, 54.5% of periareolar incisions and 25.4% of double incisions underwent correction surgery during 2014–2018.

DISCUSSION

To this date, this is one of the largest series of gender confirmation mastectomies presented. After reviewing 464 bilateral mastectomies performed over a 10-year period, we found that subcutaneous mastectomy using double incision with free nipple graft is associated with the least complications (18.9%), acute reoperations (3.3%), and secondary revisions (28.4%).

The distribution of the surgical techniques used in our study and the rate of complications are in line with other studies.^{1,16} In a recent published systematic review,¹⁵ comprising 2400 patients, 58.4% underwent mastectomy via double incision, 24.1% semicircular incision, and 15.5% periareolar incision. During our study period of 10 years, the double incision technique increased from being used in 17.8% to 62.9% of all mastectomies, in contrast to periareolar incision, which was used less during the second half of the study period (43.0% to 18.5%). Wess et al could further show in their systematic review on chest contouring in transgender individuals that overall complication rates were 10%–21% (one article reported a rate of 35%).¹⁵ In our cohort, patients undergoing double incision had significantly less postoperative complications in comparison with the periareolar incision technique;

Table 5. Crude and Adjusted Odds Ratios

Outcome	Type of Surgery	N	Events	%	OR*	95% CI	OR†	95% CI	OR‡	95% CI
Any complication	Double incision with nipple graft	243	47	19.3	1.00	Ref.	1.00	Ref.	1.00	Ref.
	Periareolar incision	113	36	31.9	1.95	(1.17–3.24)	2.71	(1.37–5.39)	3.14	(1.44–6.84)
	Semicircular incision	67	13	19.4	1.00	(0.51–1.99)	1.46	(0.61–3.49)	0.58	(0.15–2.19)
	Other techniques	41	8	19.5	1.01	(0.44–2.33)	1.63	(0.54–4.92)	0.51	(0.06–4.38)
Clavien-Dindo III–IV§	Double incision with nipple graft	243	14	5.8	1.00	Ref.	1.00	Ref.	1.00	Ref.
	Periareolar incision	113	19	16.8	3.31	(1.59–6.87)	7.83	(2.61–23.4)	7.40	(2.40–22.9)
	Semicircular incision	67	6	9.0	1.61	(0.59–4.36)	3.99	(1.04–15.3)	1.77	(0.31–10.1)
	Other techniques	41	3	7.3	1.29	(0.35–4.71)	2.51	(0.43–14.8)	0.00	(0.00–)
Reoperation <30 days	Double incision with nipple graft	243	8	3.3	1.00	Ref.	1.00	Ref.	1.00	Ref.
	Periareolar incision	113	14	12.4	4.15	(1.69–10.2)	7.56	(2.13–26.9)	8.62	(2.38–31.2)
	Semicircular incision	67	8	11.9	3.98	(1.44–11.1)	6.49	(1.56–27.0)	2.41	(0.38–15.2)
	Other techniques	41	3	7.3	2.32	(0.59–9.13)	4.46	(0.71–28.0)	0.00	NA
Secondary correction	Double incision with nipple graft	243	69	28.4	1.00	Ref.	1.00	Ref.	1.00	Ref.
	Periareolar incision	113	74	65.5	4.78	(2.97–7.71)	2.87	(1.54–5.36)	3.19	(1.52–6.69)
	Semicircular incision	67	25	37.3	1.50	(0.85–2.65)	0.94	(0.44–1.98)	1.20	(0.45–3.20)
	Other techniques	41	13	31.7	1.17	(0.57–2.39)	0.94	(0.35–2.56)	0.28	(0.03–2.36)

*Crude odds ratio.

†Adjusted for age, ADHD, DM, overweight (BMI > 25), period, and smoking.

‡Restricted to last time period (2014–2018) and adjusted for age, ADHD, DM, overweight (BMI > 25), and smoking.

§A complication requiring surgical intervention or a life-threatening complication.

Double incision with nipple graft is superior to periareolar incision in all aspects of complications and also superior to semicircular incision with respect to acute reoperation within 30 days. None of the other pairwise comparison between surgery types were statistically significant.

Table 6. Comparing Two Time Periods

Variables	2009–2013	2014–2018	P
No. patients	107	356	
Age*	24.7 (15–64)	23.9 (14–59)	0.285
BMI ≥ 25	41 (38.3%)	96 (27.0%)	0.581
Current smoking	9 (8.4%)	24 (6.7%)	0.875
ADHD, ADD, ASD†	23 (21.5%)	89 (25.0%)	0.450
Semicircular	29 (27.1%)	38 (10.7%)	<0.0001
Periareolar	46 (43.0%)	66 (18.5%)	<0.0001
Double incision	19 (17.8%)	224 (62.9%)	<0.0001
Other techniques	13 (12.1%)	28 (7.9%)	0.177
Complications	28 (26.2%)	71 (19.9%)	0.180
Acute reoperation	6 (5.6%)	27 (7.6%)	0.668
<30 days			
Secondary correction	75 (70.1%)	105 (29.5%)	<0.0001
Detransition	2 (1.9%)	0 (0.0%)	0.231
Deceased	1 (0.9%)	3 (0.8%)	1.000

*Mean (range).

†ASD, autism spectrum disorder.

18.9% versus 28.3% ($P < 0.02$). The trend continued with less acute reoperations (3.3%) when double incision was used, in contrast to 12.4% in periareolar incision and finally, secondary revisions were performed in 28.4% and 65.5% respectively. Hematoma was the most commonly reported complication, followed by infection and wound dehiscence. The overall acute reoperation rate in our cohort was 7.2%, which is slightly higher than the rates observed in Monstrey's study¹⁸ (4.0%) and Cregten-Escobar's study¹⁹ (5.0%).

In a systematic review, Wess et al reviewed the most up-to-date literature and they too uncovered knowledge gaps.¹⁵ They noticed that there are many different techniques for incision placement and positioning of the nipple areola complex to achieve aesthetic goals, but there remains no consensus regarding which approach delivers optimal aesthetic results with the lowest complication rates. Monstrey and coworkers thoroughly described the most common surgical techniques used in GCM and proposed an algorithm to choose the correct incisional technique according to certain body and chest morphologies.¹⁸ This is a very good tool to use for most patients. However, the algorithm is mainly based on the aesthetic outcome. In their study, the highest patient satisfaction (rated 4.3 of 5) was found among those operated with periareolar technique. However, our study shows that the periareolar incision technique is used less today than it was when Monstrey et al published their study in 2006. We believe that most patients nowadays prefer a one-stage operation that will instantly give them a flat chest at the price of longer and more prominent scars rather than undergoing repeated surgeries to remove residual breast tissue and skin to get less visible scars. This is supported by Lo Russo et al,²⁰ calling this “the contrast to the modern short-scar concept,” which is popular in most other areas of plastic surgery, such as in breast reduction and mastopexy. The periareolar technique also has drawbacks in reducing the areolar size and achieving the correct anatomical male NAC position. Several corrective reoperations were due to widened periareolar scars and enlargement of the NAC over time due to tension. Furthermore, with increasing prevalence of transgender individuals comes increasing demands for gender confirmation surgeries, such as

mastectomies. Hence, a one-stage surgery is preferred over a technique that sometimes requires up to four revision surgeries before satisfaction has been achieved. Also, somewhat self-evident, the incidence of bleeding is significantly higher in GCM-techniques with small incisions compared with large incisions such as the double incision technique.^{19,21} This is mainly due to the small access and impaired vision field to establish adequate hemostasis. Other advantages with the double incision is the ability to alter two of the most feminizing characteristics of a female breast, namely to remove the inframammary fold, resize, and reposition the NAC in a correct male position.⁶ The disadvantage of the double incision technique is the risk of getting a complete necrosis of the grafted nipple/NAC. However, the risk of NAC-necrosis (partial and total) after the double incision technique was 3.3% in our study, which is less than (although not significant, $P = 0.37$) the periareolar incision technique with 5.3% risk of developing NAC-necrosis. Nevertheless, the risk for nipple necrosis is relatively small.

In this study, we have presented one of the largest series of gender confirmation mastectomies, consisting of 464 patients. The cohort is representative for this patient population, with demographic data, rates of complications, acute reoperations, and revision surgeries comparable to published data in the literature.¹⁵ The study was limited by a few factors. One of them is that the surgeries were performed by different plastic surgeons at Karolinska. However, a majority of them were performed by two of our surgeons. Another limitation is that the transition of surgical technique from mainly using periareolar incision to double incision happened successively over the 10 years which were studied and without any concrete consensus or introduction of new guidelines at our department, but rather as a result of feedback from patient follow-ups and acquired knowledge from conferences and literature. Finally, we cannot avoid mentioning the bias of the learning curve, which might partly explain the decrease in revision surgery during the later time period.

Future research is to follow the same cohort to evaluate the long-term results. Combining this with patient reported outcome measure questionnaires would further contribute to the study by adding the patients' assessment of the surgery.

CONCLUSIONS

The current study is one of few that have been able to describe a successful transition of surgical technique from periareolar incision to double incision with free nipple graft in gender confirmation mastectomy, leading to significant improvements in the overall outcome with fewer complications, less acute reoperations, and less secondary corrections. Thus, we consider the double incision with free nipple graft technique to be the safest surgical technique in female-to-male chest wall contouring and the favored technique in the vast majority of cases. The exception is patients with small volumes of breast tissue and minimal skin excess where semicircular or periareolar incision still might be favorable.

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