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7 **Female-to-Male Chest Surgery in Transgender Patients: A Comparison Between Two**
8 **Different Techniques and a Satisfaction Study in a Single-Center**

9

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24

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26

27 **Abstract**

28 **Background:** Gender dysphoria is a distress due to a mismatch between the gender identity and
29 the sex assigned at birth. 0,5% of the population suffer from gender dysphoria which represents

1 25 million people worldwide. Gender-affirming mastectomy is the most common procedure for
2 FtM (female-to-male) patients.

3 **Objectives:** The aim of this single-center retrospective study is to present the outcomes after
4 mastectomy and to evaluate patient satisfaction using the BODY-Q questionnaire.

5 **Methods:** Several data regarding patients' characteristics and surgery have been collected. A
6 satisfaction survey has been sent to patients. Two groups, "NAC grafts" and "semicircular", have
7 been compared for complications and satisfaction.

8 **Results:** 104 patients have had a transgender mastectomy performed by three surgeons
9 representing 208 mastectomies. There were five wound infections (4,8%), eight seromas (6,8%),
10 ten hematomas (6,8%) and 23 partial/total NAC necrosis (20,4%). The complications rate in this
11 study is similar to others in the literature. Few studies express interest in patient's satisfaction
12 after this type of surgery and even fewer use a suitable questionnaire.

13 **Conclusions:** Transgender mastectomy is a safe and often necessary procedure to improve
14 quality of life of patients suffering from gender dysphoria. Nevertheless, there is currently no
15 validated tool to assess post-operative satisfaction within this specific population group.

16
17 Gender dysphoria refers to a clinically significant distress or a functional impairment resulting
18 from a mismatch between gender identity and the sex assigned at birth¹. These patients
19 experience significant suffering and generally have a strong desire to undergo hormonal and/or
20 surgical procedures to match their gender-identity. It is estimated that 0,5% of the population
21 experiences some form of gender dysphoria representing approximately 25 million individuals
22 worldwide².

23 Gender confirmation mastectomy is the most frequently requested procedure and, in many cases,
24 the only one among FtM patients seeking to masculinize their body³. This surgery involves
25 resection of the mammary gland and, when deemed necessary, of excessive skin depending on
26 breast volume and ptosis, while minimizing scarring. Additionally, it is often necessary to resize
27 and reposition the nipple areolar complex (NAC)⁴. Various techniques exist, depending on the
28 patient's anatomy namely semicircular mastectomy, transareolar mastectomy, concentric circular
29 mastectomy and free nipple graft mastectomy⁵.

30 In recent years, our institution (Liège University Hospital) has become a reference center for
31 transgender surgeries where mastectomies, breast augmentations and facial feminizations are

1 performed ^{6,7}. Since 2019, medical consultations for transgender children have been developed.
2 Currently, there is limited data in the literature assessing satisfaction of patients who have
3 undergone transgender mastectomy. Moreover, there is no specific tool evaluating the post-
4 operative satisfaction of this population group ⁸. The primary objective of this monocentric
5 retrospective study is to highlight post-operative complications following gender-affirming
6 mastectomies and to assess patients' satisfaction using the BODY-Q satisfaction questionnaire ⁹.

8 **METHODS**

9 After approval from the Liège University ethic committee (EudraCT: B7072023000046), we
10 queried the hospital records at the Liège University Hospital between January 2019 and April
11 2023. Inclusion criteria were patients with no age restriction that underwent a FtM transgender
12 mastectomy, semicircular mastectomy or mastectomy with NAC grafts, with at least three months
13 of follow up. We found 103 patients matching the inclusion criteria. One patient was excluded
14 from the study as he was the only one to benefit from an inverted-T mastectomy which is not a
15 standard procedure.

16 The following data were collected from the patients' medical records: age, weight, height, BMI,
17 medical and surgical history, medication, smoking status, psychologist's approval, operative date,
18 type of procedure, surgeon, mastectomy weight, post-operative complications (infections,
19 seromas, hematomas, necrosis of NAC, revision surgery), and need for corrective surgery.

20 Patients were contacted by phone by two doctors in August 2023 to obtain their email addresses.
21 After informed consent, the BODY-Q (French version) including four modules of interests
22 (satisfaction regarding chest, nipples, scars and the surgeon), was sent to each patient as a Google
23 Forms. BODY-Q questionnaire was selected over the BREAST-Q due to the relevance of its
24 questions, which could not be adequately addressed by the BREAST-Q questionnaire. Patients
25 were asked to respond to 36 questions (e.g. "In the past few weeks, how much have you been
26 bothered by the location of your scars?") by assigning a value from 1 (extremely
27 bothered/definitely disagree) to 4 (very satisfied/definitely agree) to each of them. A satisfaction
28 score was then calculated. The minimum time between the surgery and the BODY-Q answers was
29 three months.

30

1 The results in terms of post-operative complications and satisfaction were then compared
2 between the two operative techniques: semicircular mastectomy and free nipple graft
3 mastectomy.

4 **Surgical Technique**

5 The choice of the technique (semicircular mastectomy or mastectomy with NAC grafts) was left
6 to the surgeon's discretions based on the breast volume and skin excess.

7 Semicircular mastectomy is proposed to patients with lower breast volume and skin excess. An
8 inferior hemi-areolar incision is made through which the mammary gland is excised. Mastectomy
9 with NAC grafts is proposed to patients with higher breast volume. The NAC is deepidermized
10 and harvested. An elliptic incision excising a skin paddle and the original NAC is made. The
11 mammary gland is excised with this skin paddle. The NAC is then grafted on the desired
12 location. All patients had a drain placed in each breast at the end of the surgical procedures and
13 were required to wear a chest compression garment for a month, day and night. Patients who
14 benefited from the NAC graft technique had a bolster dressing for five to seven days. They all
15 spent one night at the hospital (except in case of complication), were discharged the following
16 day after removal of the drain and were seen in the outpatient clinic at one and two weeks post-
17 operatively.

18 **Statistical Analysis**

19 Descriptive statistics were calculated as percentages, means and medians, based on the variable
20 type. The Mann-Whitney test (a non-parametric test) was used to compare variables with non-
21 normally distributed data. The Chi-Squared (X^2) test was used to compare smoking habits
22 between the "semicircular" and "NAC graft" groups.

23

24 **RESULTS**

25 A total of 103 patients underwent surgery by three different surgeons during this period
26 representing 206 mastectomies.

27 The median age was 22 years old (range 16-45), with a median BMI of 24,11 kg/m². Twenty-nine
28 patients were active smokers (28,2%). Eighty-eight patients were undergoing hormonal therapy at
29 the time of the surgery, which represents 85,4% of the cohort.

30 Seventy-four patients underwent free nipple graft mastectomy, totaling 148 mastectomies
31 (71,9%) while the remaining 29 patients underwent semicircular mastectomy, resulting in 58

1 mastectomies (28,1%). The average weight of the mastectomies from the “NAC grafts” group
2 was 496.9g (+/- 348,2), while the average weight of the “semicircular” group was 189.9g (+/-
3 123,2). Patients’ characteristics are summarized in Table 1.

4 A Mann-Whitney test was conducted to assess groups’ comparability. It was found that in the
5 “NAC grafts” group, the BMI was significantly higher (26,7kg/m² vs 20,6kg/m²; p<0,05), as
6 were the resection weights (p<0,05). The age was also higher in this group, but the difference was
7 not statistically significant (p=0,45). A X² test demonstrated that the proportion of smokers was
8 significantly higher in the “semicircular” group (p<0,05).

9 **Complications**

10 Among the 206 mastectomies, there were five wound infections (representing 5 patients out of
11 103, 4,8%) that were treated with oral antibiotics. There were eight seromas (representing 7
12 patients out of 103, 6,8%) managed by needle puncture. There were ten hematomas (representing
13 7 patients out of 103, 6,8%), three of which required surgical drainage while the other seven were
14 managed by needle aspiration in the following weeks. There were 28 cases of NAC necrosis
15 (partial or total) (representing 21 patients out of 103, 20,4%) and four patients underwent surgical
16 revision (3,8%), including the drainage of the three hematomas and one NAC excision. Any form
17 of complication occurred in 33 patients which represents 32% of the patients included in the
18 study. The above-mentioned post-operative complications are shown in Table 2.

19 A comparison of complications was carried out between the two groups and did not reveal any
20 significant differences in terms of infection (p=0.692), hematoma (p=0.693) and seroma
21 (p=0,402). There was also no significant difference in revision surgery between the two groups
22 (p=0.185).

23 However, a significant difference (p=0.028) was observed in the occurrence of NAC necrosis
24 (partial/total), which were more frequent in the “semicircular” group. An overall comparison of
25 post-operative complications was also conducted and showed no significant difference between
26 the two groups (p=0.175).

27 **Survey**

28 The French version of the BODY-Q questionnaire was used to evaluate post-operative
29 satisfaction, covering modules related to the chest, nipples, scars and surgeon satisfaction. These
30 modules are provided in the Appendix.

1 A total of 87 patients were contacted via email to complete the questionnaire. We received 48
2 responses, accounting for 46,6% of the 103 patients included in the study and 55,2% of the 87
3 patients contacted via email. Three of the 48 responses were incomplete and thus excluded. The
4 response rate for the “NAC grafts” group is 50% (37 responders out of 74 patients) and 27,6% (8
5 responders out of 29 patients) for the “semicircular” group. The median time between surgery
6 and questionnaire completion was ten months (32 months for the “semicircular” group and 8
7 months for the “NAC grafts” group, $p < 0.05$).

8 The average satisfaction scores for the chest, scars, NAC and surgeon were 72,7%, 71,5%, 64%,
9 and 84,5%, respectively. Tables 3 and 4 detail patients’ scores for the four modules of the BODY-
10 Q. Patients expressed the highest satisfaction score with their surgeon while the lowest
11 satisfaction score concerns their nipples appearances. Patients were least satisfied with the
12 amount of time the surgeon spent with them but were also less satisfied with the shape of the
13 NAC.

14 Satisfaction was also compared between the two groups. Overall, the satisfaction was similar but
15 was slightly lower for the “NAC grafts” group (73.7%) than for the “semicircular” group
16 (74.5%). Patients who underwent mastectomy with NAC grafts were less satisfied with their
17 scars and their NAC.

18

19 **DISCUSSION**

20 The most common post-operative complication following mastectomy is hematoma ¹⁰. In our
21 study, the hematoma rate was 4.9%, which is in line with the literature ^{11,12}. Agarwal et al.
22 reported a hematoma rate of 5% while Donato et al. observed 14% and Rifkin et al. reported
23 hematoma rate from 3.1% to 5.6% ¹⁰⁻¹². Gallagher et al.’s study showed a reduction in hematoma
24 rates in mastectomies with NAC grafts to 0.3% using progressive tension sutures ¹³.

25 Four patients required urgent revision surgery (3,8%), which is consistent with the literature
26 ranging from 3,2% to 8,8% ^{11,13-16}. Gallagher et al.’s study showed an advantage in the use of
27 progressive tension suture technique to reduce the need of urgent revision ¹³.

28 Partial or total NAC necrosis was observed in 21 patients (20,4%). Interestingly, necrosis was
29 more frequent ($p=0.028$) in the “semicircular” group which might seem inconsistent. This can be
30 explained by the heterogeneity of our two groups since active smoking was more prevalent in the
31 “semicircular” group with 13 patients actively smoking (44.8%) compared to only 16 patients in

1 the “NAC grafts” group (21.6%). The difference was statistically significant ($p < 0,05$). Numerous
2 studies have shown the negative impact of smoking on NAC survival ¹⁷.

3 A comparison of post-operative complications was also performed, showing no significant
4 difference between the two groups ($p = 0.175$). Kamali et al.’s study demonstrated the superiority
5 of the NAC grafts technique in terms of fewer complications compared to other techniques ¹⁴.
6 This trend was only observed in our study for NAC necrosis.

7 **Satisfaction**

8 Currently, there is no consensus on which questionnaire to use to assess post-operative
9 satisfaction in transgender patients. No specific questionnaire regarding this population group
10 exists. Some studies used the BREAST-Q ^{12,18} while others used the BODY-Q questionnaire or
11 even their own four to five points questionnaires ³. This makes comparing the results of the
12 different studies more challenging.

13 Argawal et al. study ¹² used the BREAST-Q, focusing on breast satisfaction, psychosocial well-
14 being, sexual well-being and physical well-being modules. This study shows a significant
15 difference in pre-operative and post-operative satisfaction for these four items. Nonetheless, none
16 of these modules address surgery and patient care. Furthermore, when analyzing the questions in
17 the “satisfaction with breasts” module, some questions may be irrelevant for transgender patients
18 such as “How satisfied or dissatisfied have you been with how comfortably your bras fit?”.

19 Another questionnaire, the TRANS-Q, that seemed promising, has also been developed and
20 validated by Wanta et al. ¹⁹. It shows an improvement in post-operative scores. However, some
21 questions are repeated multiple times in the post-operative questionnaire section. In addition,
22 there is no information on how to compare pre-operative and post-operative scores since there are
23 more questions in the post-operative form.

24 Our overall satisfaction stands at 73.2% indicating that patients are generally satisfied with the
25 surgery. However, this number does not clarify whether there is an improvement compared to
26 their pre-operative condition. Numerous studies tackled this subject and highlighted a positive
27 impact of mastectomy on patients’ body image ²⁰. Notably, a 2021 meta-analysis by Bustos et al.
28 reported an impressive overall satisfaction rate of 92% following chest surgery ²¹. This surpasses
29 our satisfaction rate, which could be attributed to our use of a validated questionnaire, while most
30 of the studies in this meta-analysis relied on non-validated and different questionnaires.

31 Another contributing factor could be that most patients in our survey had recently undergone

1 surgery. To obtain more reliable results, it would probably be necessary to administer the
2 questionnaire at key intervals for each patient, such as at six months and one year or more post-
3 surgery. Additionally, we observed that unsatisfied patients may not actively seek corrective
4 surgery, and those considering secondary procedures tend to be relatively satisfied before the
5 second intervention.

6 Satisfaction regarding nipple-related aspects received the lowest scores, aligning with the results
7 of Bertrand et al.'s research ⁹.

8 Furthermore, studies indicate varying satisfaction levels depending on the type of mastectomy,
9 with transverse mastectomy with NAC grafts showing lower satisfaction (90%) compared to
10 semicircular approach ²¹. Our study mirrors this trend with a 73.7% satisfaction rate for the
11 "NAC grafts" group and 74.5% for the "semicircular" group. However, this slight difference is
12 not statistically significant. Notably, most questionnaire respondents in our cohort had undergone
13 mastectomy with NAC grafts (37 patients in the "NAC grafts" group compared to eight patients
14 in the "semicircular" group), which may help explain the lower satisfaction score in our study
15 compared to the literature.

16 The questionnaires were completed at different times for each patient, with a median gap of 10
17 months between surgery and responses. There was a significant difference between the two
18 groups (32 months in the "semicircular" group and eight months in the "NAC grafts" group).
19 This difference could potentially influence satisfaction levels. Especially, if the patients operated
20 a long time ago, have since had other additional surgeries.

21 One of our study's limitations is that the form couldn't be completed before surgery and there is
22 no comparison between preoperative and postoperative results and thus we are unable to assess
23 the surgery's impact on patients' wellbeing. Another limitation is that patients completed the
24 survey at varying postoperative time. Thus some of them might have had additional surgeries that
25 can affect their satisfaction scores.

26 Giving the growing number of transgender surgeries worldwide ²², it is essential to develop a
27 specific questionnaire for this population group. As mentioned earlier, each study uses a different
28 questionnaire, making it impossible to compare results between different centers. Ideally, this
29 questionnaire should be administered before and after the surgery at key intervals. Questions such
30 as "Do you regret this surgery?" or "Would you recommend this procedure to someone in a
31 similar situation as you?" could be included into this new questionnaire.

1 The GENDER-Q is currently in phase 2 and has already been tested on over 4,000 candidates
2 since July 2023. It will focus on the chest and NAC grafts and will include questions related to
3 self-image, appearance, physical, sexual and psychosocial function ⁸.

5 **CONCLUSIONS**

6 Transgender mastectomy is a safe and often necessary procedure to improve quality of life of
7 patients suffering from gender dysphoria. Nevertheless, there is currently no validated tool
8 available to assess post-operative satisfaction within this specific population group.

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- 18

1 Table 1: Patients' characteristics within the 2 groups

	« NAC grafts » (n=74)	« Semicircular » (n=29)	p-value
Mean age in years (range)	24,8 (16-45)	22,8 (18-42)	p=0,45
Mean BMI in kg/m ² (range)	26,7 (19,3-43,9)	20,6 (17,8-16,9)	p<0,05
Smoking (%)	16 (21,6%)	13 (44,8%)	p<0,05
Weight of right mastectomy in g (range)	498,5 (79,6-1648)	165,4 (46,8-569,9)	p<0,05
Weight of left mastectomy in g (range)	490 (52,6-1800)	174,2 (43,8-607)	p<0,05

2

3 Table 2: Complications within the 2 groups

	« NAC grafts » (n=148)	« Semicircular » (n=58)	p-value
Hematoma	6 (4,1%)	4 (6,9%)	p=0,693
Seroma	7 (4,7%)	1 (1,7%)	p=0,402
Infection	4 (2,7%)	1 (1,7%)	p=0,692
NAC necrosis	23 (15,5%)	5 (8,6%)	p<0,05
Revision surgery	1 (0,7%)	3 (5,2%)	p=0,185

4

5 Table 3: BODY-Q scores (Equivalent Rasch Transformed Score) for the patients in the "NAC
6 grafts" group

Patient's number	BODY-Q scores "chest"	BODY-Q scores "scars"	BODY-Q scores "nipples"	BODY-Q scores "surgeon"
4	64	83	100	100
10	44	63	21	54
19	73	90	68	73
20	100	83	62	86
24	46	90	45	48
27	49	74	45	100
30	61	100	62	92
42	100	100	100	100
43	87	50	68	100
44	87	53	56	92
45	79	59	62	92
46	51	53	21	100
57	46	63	62	46
58	73	74	82	77
61	61	43	50	100

62	67	74	45	100
63	100	78	82	100
67	79	83	90	100
69	83	74	100	66
70	83	68	50	86
74	70	65	56	56
75	87	50	100	100
76	79	74	62	86
77	9	78	68	100
78	100	63	56	92
79	100	83	68	86
80	33	30	41	44
83	79	83	68	100
84	87	90	90	81
87	64	45	75	92
90	76	55	41	100
92	83	57	100	100
93	93	90	62	77
96	49	83	32	77
97	64	50	68	81
98	79	53	50	92
102	100	74	100	100

1

2 Table 4: BODY-Q scores (Equivalent Rasch Transformed Score) for the patients in the
3 “semicircular” group

Patient's number	BODY-Q scores “chest”	BODY-Q scores “scars”	BODY-Q scores “nipples”	BODY-Q scores “surgeon”
1	100	100	100	100
6	73	90	90	81
12	59	83	45	61
13	83	78	45	58
31	64	90	50	58
33	70	50	50	66
50	31	43	50	58
94	70	100	62	73

4