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ORIGINAL ARTICLE

Low Risk of Persistent Pain, Sensory Disturbances, and Complications Following Mastectomy After Gender-Affirming Surgery

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Abstract

Purpose: In recent years, there has been a significant increase in referrals for gender-affirming surgery to departments of plastic surgery in Denmark. There is currently no literature on postsurgical pain in trans men after mastectomy. We aimed at investigating the prevalence and severity of postsurgical persistent pain, sensory disturbances, and complications in trans men after mastectomy.

Methods: The 90 trans men who underwent bilateral mastectomy between September 1, 2013 and August 31, 2018 were included. Patients' files were evaluated for complications, and 84 (response rate 93.3%) patients answered a questionnaire (validated for women undergoing oncologic mastectomy) regarding persistent pain and sensory disturbances.

Results: Twenty-three patients (27.4%) reported either unilateral or bilateral persistent pain after mastectomy. Of these, 14 (60.9%) patients categorized the pain as mild. However, 77 (95.2%) of the patients did not use analgesics and nonopioid pain medication was sufficient for the remainder. Sensory disturbances were found in 44 (47.5%) of the patients, and 4 (4.8%) patients reported clear signs of neuropathic pain. Seven (7.8%) patients developed hematomas, and areola necrosis was seen in four (4.4%) patients. Due to infection, seven (7.8%) patients received antibiotics.

Conclusion: Mastectomy as a part of gender-affirming surgery is a safe procedure with a few, nonsevere, complications. Although a quarter of the patients experienced persistent pain, the majority of that pain is mild, intermittent and can be treated with nonopioid pain medication.

Keywords: complications; mastectomy; postsurgical pain, sensory disturbance, transgender

Introduction

Background

The awareness and social acceptance of transgender people combined with a more liberal access to gender-affirming surgery has led to an increase in referrals of transgender people to departments of plastic surgery in Denmark. In Denmark all people with gender dysphoria are evaluated by a multidisciplinary care team of psychologists, psychiatrists, gynecologists, and plastic surgeons. Treatment is covered by a full reimbursement program financed by the Danish Health Authority. Female gonadectomy and hormone therapy are handled by the Department of Gynecology. Top surgery (mastectomy and breast augmentation) is performed by plastic surgeons in several departments in Denmark (these procedures were only performed at Copenhagen University Hospital until 2018), whereas bottom surgery (vaginoplasty or phalloplasty and metoidioplasty) is only performed at a single center.

Between January 1994 and March 2015, a total of 184 people were referred to the Sexology Clinic, where all people with gender dysphoria, who request reimbursed treatment in Denmark are evaluated.[1] During the past 10 years, the number of referrals to the Department of Plastic Surgery and Burns, Copenhagen University Hospital, has increased from 10 to 20 per year to $\sim$350 new referrals of transgender people in 2018. This trend has led to an increase in demand for surgery. In trans men,

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the first step in gender-affirming surgery is often a mastectomy to masculinize the chest, which is also known as top surgery. Several studies have evaluated complications after mastectomy in the transgender population,[2–5] but to our knowledge none of these have evaluated persistent postsurgical pain and sensory disturbances. These are important aspects to consider before surgery, as pain is known to have a significant impact on the quality of life, as seen in breast cancer patients.[6] Among Danish women treated for early stage breast cancer >40% have reported persistent postsurgical pain and >50% have reported sensory disturbances in the area of surgery 1 to 3 years after surgery.[7,8] In a Danish study on patients treated for ductal carcinoma *in situ* (DCIS), only 26% reported persistent pain among those treated with a mastectomy and sentinel node biopsy.[9] We hypothesized that trans men would have less pain compared with women treated for DCIS. The surgical technique is similar, but in gender-affirming top surgery breast tissue is retained to ensure breast contour, the fascia of the pectoral muscle is not removed and no sentinal node biopsy is done. The aim of this study was to evaluate persistent pain, sensory disturbances, and surgical complications among trans men who underwent top surgery as a part of gender-affirming surgery.

Methods

Study design

The study was a single-center cross-sectional survey by questionnaire[8] to evaluate postsurgical pain and sensory disturbances in a retrospective cohort of transgender people who underwent female-to-male top surgery. The questionnaire has been validated in women undergoing oncologic mastectomy.

Registration

All approvals for this study have been registered according to the Danish health legislation. The study has been approved by the scientific board of the Capital Region: j.nr. 2012-58-0004, and by the local health data handling center: RH-2017-353.

Population

Trans men who underwent bilateral mastectomy as a part of gender-affirming surgery during a 5-year period between September 1, 2013 and August 31, 2018 at the Copenhagen University Hospital, Denmark were considered. The period was restricted to 5 years due to Danish health research legislation. Patients were identified by using the diagnostic code (International Classification of Diseases [ICD-10] [F64.0]) for transgender men and the surgical procedure code (Sundhedsstyrelsens Klassifikations System [SKS] [KHAD10]) for mastectomy.

Between November 1, 2018 and January 15, 2019 patients were contacted by phone and answered a structured interview by one of the five investigators/authors who filled out the questionnaire. Nonresponders were advised with a text message or a voice mail reminder and contacted again later to reduce selection bias.

Patients

All trans men between the age of 18 and 70 years at the time of surgery, who underwent a mastectomy during the study period, were included. Exclusion criteria included death, emigration, previous extensive surgery of the breast, and previous treatment for cancer or other major disease.

Questionnaire/data sources

In this study, we used a slightly modified version of a questionnaire, which has been validated in women undergoing oncological mastectomy. This questionnaire examines persistent pain, sensory disturbances, self-reported lymphedema, and functional impairment among women treated for primary breast cancer.[8] Neuropathic pain was assessed by using the NeuPPS scale, a simple 5-item scale, which has been developed and validated to measure neuropathic pain in postsurgical patients.[10]

To evaluate complications, we reviewed the patients' medical journals. We noted whether there had been any surgery done in the immediate period after mastectomy and whether scar correction surgery was performed. Further, we noted whether antibiotics were prescribed from our department, a general practitioner, or an emergency department. Seroma formation, necrosis of the areola, and subsequent tattooing of the areola were also noted. The need for tattooing of the areola was used as a marker for significant areola necrosis.

Treatment

All patients were evaluated by a plastic surgeon, who is a part of the transgender team, to decide whether they were eligible for surgery based on indication, co-morbidity, smoking status, and body mass index. Based on breast size, skin quality, and physical appearance, the surgeon decided whether to use a semicircular or a transverse incision with free nipple grafting techniques,[11] and whether or not to install drains perioperatively. Weak analgesics

were administered postoperatively (paracetamol, nonsteroidal anti-inflammatory drugs and tramadol). All patients received a compression vest postoperatively and were advised to use the vest for a total of 6 weeks. All had a follow-up visit in the outpatient clinic 3 months postsurgery.

Statistical methods

Data are presented descriptively with numbers and percentages. Differences in postsurgical persistent pain according to age groups, follow-up time, type of surgery, surgeon, postoperative infection, necrosis of the areola, and pain at other sites were evaluated with the chi-square test (or fisher's exact test if there were fewer than five in the compared group) and reported as a *p*-value. Alpha was set at 0.05. Data analysis was performed by using SAS 9.4 for Windows (SAS Institute, Cary, NC).

Results

Patients

A total of 92 patients treated with a mastectomy during a 5-year period as a part of gender-affirming surgery were identified. Two of the 92 patients were registered twice. The duplicates were removed, leaving 90 patients to be evaluated. Of the 90 patients identified, 84 (93.3%) completed the questionnaire. Patient demographics are shown in Table 1.

Mastectomy with a free areola transplant was performed on 67 (74.4%) of patients, and a periareolar or trans-areolar incisional technique was performed on 23 (25.6%) of patients.

The median age in the population was 23 years (range 18–53 years). Median follow-up time from the day of the surgery until the day of questionnaire completion was 23 months (range 5–62 months).

Pain

Persistent pain was reported in 23 (27.3%) of the 84 patients in the study. The pain did not seem to be related to age, time since surgery, surgical technique, postoperative infection, necrosis of the areola, or a pre-existing pain problem (Table 2). Persistent postoperative pain presented among a higher proportion of patients who were treated by "other surgeons" and by "surgeon number 4," but this was not statically significant. Other surgeons include senior residents or other senior plastic surgeons.

In patients who reported pain, the pain was located to the anterior chest or lateral chest wall. The majority

Table 1. Patient Demographics

	N	%
Age		
18–20	28	31.1
21–30	42	46.7
31–40	13	14.4
41–50	6	6.7
>50	1	1.1
Surgery		
Free	67	74.4
Periareolar	23	25.6
Year of surgery		
2013	3	3.3
2014	6	6.7
2015	20	22.2
2016	11	12.2
2017	40	44.4
2018	10	11.1
Reoperations and complications		
No complication	69	76.7
Hematoma	7[a]	7.8
Tattoo	4	4.4
Any sign of nipple necrosis	17	18.9
Antibiotics		
Yes	7	7.8
No	83	92.2

[a]Six patients were re-operated. One was treated conservatively.

Table 2. Pain Versus No Pain in Trans Men Who Underwent Bilateral Mastectomy

	Pain [*n* (%)]	No pain [*n* (%)]	*p*
Age, years			
≤20	6 (22.2)	21 (77.8)	0.44
21–30	14 (34.2)	27 (65.9)	
31–40	1 (10.0)	9 (90.0)	
>40	2 (33.3)	4 (66.7)	
Time since surgery			
≤12 months	4 (36.4)	7 (63.6)	0.79
13–24 months	9 (25.7)	26 (74.3)	
>24 months	10 (27.0)	27 (73.0)	
Surgery			
Mastectomy with free areola transplant	18 (28.6)	45 (71.4)	0.67
Periareolar access	5 (23.8)	16 (76.8)	
Surgeon			
"no 1"	5 (26.3)	14 (73.7)	0.09
"no 2"	5 (27.8)	13 (72.2)	
"no 3"	3 (11.5)	23 (88.5)	
"no 4"	6 (46.2)	7 (53.9)	
Other	4 (50.0)	4 (50.0)	
Postoperative infection			
Yes	1 (16.7)	5 (83.3)	1.00
No	22 (28.2)	56 (71.8)	
Necrosis of areola			
Yes	2 (66.7)	1 (33.3)	0.18
No	21 (25.9)	60 (74.1)	
Pain at other sites than the areas of surgery			
Yes	12 (29.3)	29 (70.7)	0.81
No	11 (26.8)	30 (73.2)	

of patients reported mild pain. No patients experienced constant pain, although five (21.7%) reported daily pain. Only four (4.9%) patients reported using analgesics due to persistent postoperative pain. Details of the reported pain are listed in Table 3.

Sensory disturbances

The sensibility of the nipple areolar complex was described as either satisfying or partly satisfying in 62 (74.7%) patients. About half of the population (52.4%) reported sensory disturbances, defined as an area with sensory loss. Four (4.8%) showed three or more signs of neuropathic pain. For further details see Table 3.

Table 3. Characterization of Pain and Management

	N (%)
Pain laterality	
Pain both sides	10 (11.9)
Pain left side	8 (9.5)
Pain right side	5 (6.0)
No pain	61 (72.6)
Pain location	
Breast area	17 (20.2)
Side of chest	7 (8.3)
Axilla	0 (0.0)
Arm	0 (0.0)
Pain intensity	
Mild pain	14 (60.9)
Moderate pain	7 (30.4)
Severe pain	2 (8.7)
Missing	0 (0.0)
Pain frequency	
Constantly	0
Daily	5 (21.7)
Weekly	5 (21.7)
Monthly	4 (17.4)
Rarely	8 (34.8)
Missing	1 (4.3)
Pain at movement	
Yes	4 (4.8)
No	80 (95.2)
NeuPPS score	
0–1 (no signs of neuropathic pain)	66 (78.6)
2 (signs of neuropathic pain)	13 (15.5)
3–5 (clear signs of neuropathic pain)	4 (4.8)
Sensory disturbances (area with sensory loss)	
Yes	44 (52.4)
No	40 (47.6)
Pain-relieving medicine against postsurgical pain	
Strong (e.g., morphine derivates)	0 (0.0)
Weak (e.g., paracetamol/acetaminophen)	3 (3.7)
Special pain-relieving medicine (gabapentin, TCA)	0 (0.0)
Other	1 (1.2)
No	77 (95.1)
Pain intensity of pain at other sites	
No	2 (4.9)
Mild	6 (14.6)
Moderate	18 (43.9)
Severe	11 (26.8)
Missing	4 (9.8)
Pain frequency, other sites	
Constantly	7 (17.1)
Daily	13 (31.7)
Weekly	11 (26.8)
Monthly	7 (17.1)
Rarely	3 (7.3)
Missing	0 (0.0)

TCA, tricyclic antidepressant.

Complications

The four senior surgeons operated on 81 (90%) of the patients. The remaining nine (10%) patients were operated on by other senior surgeons or senior residents. Antibiotics were used as markers of postoperative infection, and tattooing was used as a marker of significant areola necrosis. These results are shown in Table 1. Seven patients developed a unilateral hematoma: Six patients were reoperated acutely, and one patient was treated conservatively with compression. Scar correction due to "dog ears" was performed on nine (10%) of the patients, primarily in patients who underwent mastectomy with free areola grafting. Only two (2.2%) patients developed seroma formation that required transcutaneous needle aspiration. Overall, 17 (18.9%) of the patients experienced full or partial areola necrosis. Areola necrosis was primarily found in the free nipple transplant group, involving 14 out of 67 (20.8%) patients. In the periareolar incision group, only 3 out of 23 (13%) patients developed areola necrosis. No patients were admitted for treatment with intravenous antibiotics.

Discussion

This study set out to evaluate complications and persistent pain after bilateral mastectomy among trans men during a 5-year period. All patients' files were evaluated for complications, and all patients were contacted by phone to answer a structured questionnaire to evaluate pain. Overall, 93.3% of a total of 90 patients answered the questionnaire. Of the 90 trans men who underwent mastectomy, we discovered that 23 (27.4%) of the patients presented with persistent postsurgical pain.

Persistent postsurgical pain is a well-known problem and presents in 10–50% of patients undergoing various types of surgery such as breast surgery, groin hernia, leg amputations, and thoracic surgery.[11,12] Pain is a subjective experience, as it can be divided into nociceptive pain, inflammatory pain, and neuropathic pain, where the latter is believed to explain most cases of postsurgical persistent pain.[11] There are several risk factors associated with persistent postsurgical pain, such as: preceding pain, genetic susceptibility, age, gender, and psychological factors.[11] In our study, we did not find a significant association between the development of persistent postsurgical pain and age. This is in contrast to other studies

that have shown that young age is a predictive factor for postoperative pain in patients undergoing breast surgery.[13–16] The median age in our study was 23 years, which is very different from patients treated for breast cancer, where the median age is 64 years.[15] This difference could explain the lack of association found in our study.

There was also no significant association between persistent pain and time since surgery, even when we subdivided time since surgery into three categories: ≤ 12, 12–24, and >24 months. Previous studies in breast cancer patients have established only a small decline in persistent pain over time. However, studies have also demonstrated that the postoperative pain state is not static; some patients who are initially free of pain develop it later, whereas others report that they are free of pain several years later.[15]

Surprisingly we could not find any association between pain and the surgical technique used, which would be expected as free areola grafting leaves a larger scar.

In patients with persistent pain, the pain was primarily located to the anterior chest, although one third of patients reported pain at the lateral chest wall. No patients reported pain in the axilla or the arm, indicating that surgery was not performed in close proximity to the intercostobrachial nerves. Although approximately one quarter of the patients reported pain, the majority (90.1%) experienced only mild to moderate pain. None of the patients who reported pain had constant pain, and only half of the patients experienced pain monthly or less frequently. The majority of the patients who experienced pain had no need for analgesics and for the few who did, only paracetamol was used. Movement of the upper extremity was not a trigger of pain in the anterior chest or lateral chest wall in 95% of patients. These findings could indicate that even though a quarter of the patients develop pain, the pain is not severe and does not interfere with their daily living. We did not, however, investigate this specifically.

Sixty-two patients (74.7%) reported postsurgical sensibility of the nipple as satisfying or partly satisfying. This is counterintuitive to what one would expect after a mastectomy due to nerve damage during surgery. Half of the population did experience sensory loss, mainly to the breast, indicating that surgery does alter sensibility in our population. It is unclear whether the patient had regained sensibility or just did not consider sensibility important. Further investigations, including a clinical evaluation, are needed to investigate this further.

In our study, 21 out of 90 (23.3%) patients experienced complications. This complication rate is comparable to other studies, although in other studies the risk is typically evaluated per mastectomy and not per patient.[17–21] We consider the two mastectomy sides to be dependable and, therefore, have evaluated risk per side. Postsurgical hematoma was the only major complication that required immediate surgical intervention, which was performed in six patients (6.7%). We found no correlation between the surgical technique and the risk of hematoma. The most frequent complication was areola necrosis. Overall, 17 (18.9%) of the patients experienced full or partial areola necrosis. Only four (4.4%) patients required tattooing subsequently. This indicates that patients should be informed of this risk preoperatively and that surgeons should consider a conservative approach postoperatively, as most heal without the need for subsequent aesthetic correction. We found no correlation between the development of pain and the presence of infection, seroma, or areola necrosis.

Limitations

The study is retrospective and is based on a relatively small sample size of 90 patients, of whom 84 answered the questionnaire. With only a quarter of patients experiencing pain it is difficult to draw any conclusions on predisposing factors leading to persistent pain. To minimize recall bias, items in the questionnaire were exploring patients' experiences within the past week or during the present week. Interviewer bias was addressed by reading the questionnaire to the patients, although intonation, accent, and speech speed might have affected the responses. Further, the questionnaire was validated for women undergoing oncologic mastectomy and not trans men. The questionnaire did not contain any questions regarding presurgical pain, which is a known risk factor. The study is a single-center study including the majority of trans men treated with top surgery in Denmark during the period. The study setup with a single center improves homogeneity in the treatment and evaluation, but it reduces the generalizability of the results.

Conclusion

Mastectomy as a part of gender-affirming surgery is a safe procedure with a few, nonsevere, complications. Although a quarter of the patients experienced persistent pain the pain is mild, not constant, and can be treated with weak analgesics. Trans men undergoing

mastectomy should be thoroughly informed about this complication before surgery.

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Author Disclosure Statement

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Abbreviations Used

BMI = body mass index
DCIS = ductal carcinoma in situ
SKS = Sundhedsstyrelsens Klassifikations System