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A prospective evaluation of breast satisfaction and expectation in preoperative immediate breast reconstruction patients**

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ABSTRACT

Introduction: Breast reconstruction has an important positive contribution to the quality of life of breast cancer patients. However, a large proportion of breast cancer survivors have unmet expectations surrounding reconstruction. This study aimed to delineate factors affecting preoperative native breast satisfaction and expectations with surgery in immediate breast reconstruction (IBR) patients. **Methods:** This is a prospective cross-sectional trial with breast cancer patients undergoing oncology surgery following breast reconstruction enrolled from 2019 to 2021 at the Hospital Nossa Senhora das Graças in Curitiba, Brazil. Two groups were studied: patients who underwent mastectomy following IBR with implant; and those who underwent breast conservative therapy (BCT) following oncoplastic surgery (OP). All patients completed a patient-reported outcome, the BREAST-Q Breast Reconstruction Expectations Module, prior to surgery. **Results:** Seventy-nine patients with breast cancer were included: 49 OP and 30 mastectomy following IBR. The mastectomy with IBR implants group had a better satisfaction with their native breast than the OP group (p=0.001). Women in the OP group had higher expectations for breast appearance when clothed than the mastectomy with IBR implant group (p=0.030). Patients aged 50 years and older with a university education or higher level expected that their breast appearance would match almost the same after ten years (p=0.001). **Conclusions:** Our results highlight the importance of establishing realistic expectations prior to surgery. Understanding which factors affect patients' satisfaction with native breasts and their expectation toward surgery in the preoperative set could improve preoperative counseling and management of patients' expectations regarding breast reconstruction.

KEYWORDS: expectation; breast reconstruction; satisfaction; quality of life; breast cancer.

INTRODUCTION

Breast cancer care involves highly complex procedures such as surgery in conjunction with oncoplastic techniques and breast reconstruction[1,2]. Over the past 20 years, there have been many innovations and advancements that elevate the quality of breast reconstruction following a mastectomy or breast conservative surgery. Several methods and surgical techniques were developed such as tissue expanders; shaped, integrated valve; textured saline or silicone gel implants that have undergone significant improvements; a novel and innovative oncoplastic approach described based upon an oncoplastic algorithm; fluorescent laser angiography; acellular dermal matrices; and current techniques for fat grafting that have revolutionized breast reconstruction. These advancements focus on improving surgical and aesthetic outcomes as well as reducing adverse events[3].

There is general agreement that breast reconstruction makes a significant positive contribution to the quality of life of many women who have undergone mastectomy for breast cancer[4-6]. Patients' satisfaction is one of the most important endpoints whose overriding goal is to meet their expectations and improve their quality of life. However, a large proportion of breast cancer survivors have unmet expectations surrounding reconstruction after mastectomy, particularly in relation to appearance. Approximately 42% of women who underwent breast

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reconstruction after mastectomy reported their reconstruction to be worse than expected[7].

There is little consensus about what impact specific factors have on women`s satisfaction with the breast reconstruction process and outcomes. Concerning expectation and satisfaction issues, several instrumentals were validated but most of them are general questionnaires that do not specify body and psychological changes experienced by breast cancer patients[8,9] and compare different surgical approaches. Among the available patient-reported outcome measurement tools, the BREAST-Q has established itself as the gold standard, being most frequently used in the literature[10-12]. The BREAST-Q questionnaire was developed especially for breast cancer patients undergoing breast surgery. Independent modules are available for different surgical interventions (e.g., mastectomy, breast reconstruction, or conservative surgery). Each module consists of a preoperative and a postoperative questionnaire[13]. In 2012, a specific preoperative expectation for breast reconstruction module was added to the BREAST-Q set of questionnaires that cover a range of breast surgical procedures. The expectation module covers a thorough range of questions about how the patient expects to feel in the first week, first year, and ten years after breast reconstruction surgery[4].

A preoperative assessment of quality of life, satisfaction, and expectation can aid the surgeon in an accurate clinical evaluation and may allow for early identification of patients with a higher risk of regret[14,15]. Furthermore, these assessments improve patient education, shared medical decision-making, patient perception of outcomes[16], and provide a point of reference for assessing change after a procedure[15]. Besides, it is an important predictor of health outcomes and health-related quality of life[16,17]. Unrecognized or unfilled expectations have been shown to correlate with patients' low satisfaction and poor overall outcomes in any type of surgery[17-20]. Despite its importance, few studies to date have focused on measuring expectations and satisfaction prior to oncological breast surgery using systematically the validated BREAST-Q[21]. A systematic review of literature did not find consistent evidence to support a link between patients' expectations and degrees of satisfaction with breast reconstruction outcomes[4]. A recent study that evaluated patients' expectations using the preoperative BREAST-Q expectation score was a retrospective chart review that included mainly delayed reconstruction[17].

The present study aimed to delineate factors affecting preoperative native breast satisfaction and expectations toward surgery using the BREAST-Q in patients before oncological breast surgery following IBR.

METHODS

This is a prospective cross-sectional trial with breast cancer patients undergoing oncology surgery (mastectomy or breast conservative therapy) following breast reconstruction or oncoplastic surgery enrolled from November 2019 to October 2021 at the Hospital Nossa Senhora das Graças, Breast Unit, in Curitiba, Brazil. All patients had ***in situ*** or invasive carcinoma diagnosed by core biopsy or vaccum-assisted biopsy[9]. We excluded patients who refused participation in the study, who would undergo prophylactic mastectomy or preoperative radiotherapy, and those who had local recurrence or metastasis at the time of analysis[9].

Two independent groups of patients undergoing oncology surgery were studied. The first included patients who underwent mastectomy following IBR with definitive anatomical form-stable implant. Here, contralateral symmetrization was performed using different techniques according to the necessity in each individualized case and the possibility of obtaining better symmetry with the reconstructed breast: reduction mammaplasty, mastopexy, augmentation mammaplasty, or mastopexy associated with implant[9]. The second group underwent breast conservative therapy (BCT) following level 2 oncoplastic techniques (bilateral surgeries with mammaplasty techniques).

This study was approved by the Internal Review Board of Positivo University, Curitiba, Brazil, on September 19, 2019.

All patients were invited to complete the patient-reported outcome BREAST-Q Expectations Module and Preoperative Breast Reconstruction or Preoperative Reduction/Mastopexy Module already translated into Portuguese. They signed informed consent and answered the questionnaire in paper format prior to the surgical procedure.

The BREAST-Q Preoperative Breast Reconstruction Module comprises two domains: satisfaction (i.e., satisfaction with breasts) and quality of life (psychosocial, physical, and sexual well-being), consisting of five scales. The score from each scale is transferred into a 100-point scale. Thus, BREAST-Q question values were transformed and scored using the QScore, a statistical program developed specifically for the BREAST-Q that provides a total scale score, ranging from 0 to 100, in which a higher score suggests a better quality of life or satisfaction[8-10].

The BREAST-Q Preoperative Expectation short-form module is composed of five scales and assesses:

1. Pain;
2. Appearance when clothed after one year;
3. Appearance of breast symmetry after one year;
4. Sensation of breast after one year; and
5. Appearance of breast symmetry after ten years.

Response options for all scales are on a 3-point Likert-type scale, where 1 represents unlikely, 2 likely, and 3 very likely[17].

Item responses for each section of the modules are summed and transformed to give a score for each scale (0–100), using a standardized conversion template[17]. Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) program. For quantitative variables, expressed with mean ± standard deviation, the Mann-Whitney U test was applied. For

qualitative variables, expressed with numbers and percentages, Fisher`s exact test was used. Sociodemographic and clinical characteristics were compared between groups. A p<0.050 was considered statistically significant.

RESULTS

Overall, 79 breast cancer patients completed the preoperative BREAST-Q questionnaire. Patients were divided into two groups: BCT following oncoplastic surgery (n=49) and mastectomy following IBR with implant (n=30). Table 1 summarizes the sociodemographic characteristics of the cohort. The mean age was 52.6 standard deviation±12.3 years. Most patients were considered overweight or obese (64.5%) and 16 women had previously been submitted to breast aesthetic surgery (20.3%).

Table 2 shows BREAST-Q expectation and satisfaction rates for both groups. The mastectomy with IBR implants group had a better satisfaction with their native breasts than BCT oncoplastic group (p=0.001). There was no statistically significant difference between groups regarding the other parameters.

When we compared BREAST-Q reconstruction expectations rate, women in BCT following oncoplastic group had higher expectations for breast appearance when clothed than the mastectomy with IBR implant group (93.4±16,3 vs. 82.9±26.5; p=0.030).

Table 1. Sociodemographic characteristics of study cohort.

Characteristic	BCT+Oncoplastic n (%)	Mastectomy with IBR implants n (%)	p-value
Age, mean±SD (year)	52.3±12.8	53±11.6	0.82
BMI, mean±SD	27.4±4.7	25.5±4.1	0.07
Weight characteristics			
Normal	14 (28.6)	14 (46.7)	0.16
Overweight	26 (53.1)	14 (46.7)	
Obese	9 (18.4)	2 (6.7)	
Menopausal status			
Postmenopausal	25 (51.0)	17 (56.7)	0.65
Premenopausal	24 (49.0)	13 (43.3)	
HRT			
Yes	16 (32.7)	9 (30.0)	1.00
No	33 (67.3)	21 (70.0)	
Education level			
Unfinished primary school	5 (10.2)	1 (3.3)	0.81
Full primary school	1 (2.0)	2 (6.7)	
High school	9 (18.4)	7 (23.3)	
College degree	18 (36.7)	6 (20.0)	
Specialization, postgraduate degree	16 (32.7)	14 (46.7)	
Family history			
Yes	24 (49.0)	13 (43.3)	0.65
No	25 (51.0)	17 (56.7)	
Previous aesthetic breast surgery			
Yes	7 (14.3)	9 (30.0)	0.15
No	42 (85.7)	21 (70.0)	
Neoadjuvant chemotherapy			
Yes	17 (34.7)	9 (30.0)	0.81
No	32 (65.3)	21 (70.0)	
Smoking			
Yes	3 (6.1)	5 (16.7)	0.25
No	46 (93.9)	25 (83.3)	

BCT: breast conservative therapy; IBR: immediate breast reconstruction; SD: standard deviation; BMI: body mass index; HRT: hormonal reposition therapy.

Table 2. BREAST-Q satisfaction and expectation rates between the two groups.

BREAST-Q satisfaction			
	BCT+Oncoplastics (n=49)	Mastectomy with IBR implants (n=30)	p-value
	Mean±SD	Mean±SD	
Psychosocial well-being	55.5±16.7	71.9±23.0	0.920
Sexual well-being	61.3±23.0	61±21.6	0.950
Physical well-being	69.1±16.4	68.2±22.4	0.850
Satisfaction with breast	55.5±16.7	71.9±23	**0.001**
BREAST-Q expectations			
	BCT + Oncoplastics (n=49)	Mastectomy with IBR implants (n=30)	p-value
	Mean±SD	Mean±SD	
Expectations for pain	63.2±18.9	56.7±23.9	0.190
Expectations for breast appearance when clothed	93.4±16.3	82.9±6.5	**0.030**
	n (%)	n (%)	p-value
Expectation for breast appearance when unclothed after one year			
Will look very different	1 (2.0)	0 (0.0)	0.623
Will look similar	35 (71.4)	24 (80.0)	
Will look exactly the same	6 (12.2)	4 (13.3)	
Don't know	7 (14.3)	2 (6.7)	
Expectations for breast sensation after one year			
Almost no sensation	3 (6.1)	6 (20.0)	**0.001**
Will have some sensation	10 (20.4)	13 (43.3)	
Will have normal sensation	25 (51.0)	3 (10.0)	
Don't know	21 (42.9)	8 (26.7)	
Expectation for breast appearance after ten years			
Will not match	9 (18.4)	6 (20.0)	0.721
Will match almost	21 (42.9)	11 (36.7)	
Will match exactly	3 (6.1)	4 (13.3)	
Don't know	16 (32.7)	9 (30.0)	

BCT: breast conservative therapy; IBR: immediate breast reconstruction (implant based); SD: standard deviation.
Bold indicates statistically significant p-values.

Most patients in both groups expected that breast appearance (symmetry) when unclothed would look similar after one year (71.4% for BCT and 80.0% for mastectomy group) and after ten years would match almost the same as it did right after the reconstruction (42.9% for BCT and 36.7% for mastectomy group). In the BCT with oncoplastic group, 51.0% of patients expected that the breast would have normal sensation after one year, whereas 43.3% of women in the mastectomy with IBR group expected to have some sensation (p=0.001).

Table 3 shows logistic regression analysis and results. Previous aesthetic breast surgery and neoadjuvant chemotherapy were significant predictors of preoperative physical well-being. Patients 50 years or older and with a university degree or higher level of education expected that their breast appearance would match almost the same after ten years (p=0.001) (Table 4).

DISCUSSION

Patients' satisfaction with their breasts is an important metric for the evaluation of outcomes in breast surgery[15]. Many factors affect aesthetics and satisfaction with each native breast; it is difficult to capture in existing assessments. In our study, the mastectomy with IBR implant group had better satisfaction with their native breast than the BCT oncoplastic group (p=0.001). Despite all these variables and nonspecific factors, it is essential to have baseline scores representative of patients' self-perception (15) before treatment in order to assess whether quality of life will change postoperatively.

Patients in the oncoplastic group had worse preoperative psychosocial well-being (55.5±16.3) than the breast reconstruction group (71.9±23.0), and in both groups, we found low physical well-being scores. It is important to consider that preoperative

Table 3. BREAST-Q satisfaction and reconstruction expectations according to different factors.

	Psychosocial well-being	Sexual well-being	Physical well-being	Satisfaction with breast	Expectations for pain	Expectations for breast appearance when clothed
Age (years)						
<39	73.8±18.3	67.6±17.2	70.1±23.2	65.0±18.9	70.0±14.7	87.5±21.6
40–49	66.7±19.9	55.2±22.4	64.1±17.3	55.7±19.2	64.4±19.7	91.6±15.5
50–59	66.9±19.4	64.4±19.7	69.0±17.7	66.0±20.6	63.4±18.0	84.4±29.6
>60	76.0±20.2	61.3±27.6	72.6±19.1	61.6±23.3	49.5±24.7	93.3±15.6
p-value	0.31	0.40	0.51	0.37	0.26	0.53
Educational level						
High school or less	68.7±23.4	57.4±27.8	69.3±20.1	60.6±21.8	54.1±20.6	92.5±16.0
University or more	71.1±18.0	62.9±19.7	68.6±18.3	62.1±20.5	63.4±21.0	88.2±23.0
p-value	0.62	0.33	0.89	0.78	0.90	0.42
Previous aesthetic breast surgery						
Yes	73.7±18.6	70.9±18.1	77.2±15.1	68.4±22.8	53.4±27.7	82.9±29.1
No	69.5±20.1	58.8±22.9	66.6±19.1	59.9±20.1	62.8±18.7	91.1±18.6
p-value	0.45	0.06	0.044*	0.14	0.11	0.17
Weight characteristic						
Normal	75.5±20.5	65.9±22	74.3±18.0	65.7±20.4	62.9±19.7	90.0±18.4
Overweight	65.9±18.6	57.9±24.6	64.9±17.7	59.7±21.9	59.7±21.9	90.7±21.8
Obese	73.6±19.4	60.1±12.1	69.6±21.8	60.6±12.8	58.5±23.5	84.2±25.8
p-value	0.12	0.37	0.12	0.43	0.78	0.66
Neoadjuvant chemotherapy						
Yes	65.3±19.9	55.6±24.9	62.7±14.7	60.5±21.2	65.0±18.4	92.4±15.1
No	72.9±19.3	64.1±20.6	71.7±19.8	62.3±20.7	58.5±22.2	88.0±23.6
p-value	0.11	0.12	0.04*	0.67	0.21	0.40

*Statistically significant (p<0.050).

patients are not "normal", as they have undergone the physical and psychological trauma associated with being diagnosed with breast cancer[22] — a unique entity and a life-changing moment for each patient. The low physical well-being score may be explained by pain secondary to the tumor itself or pain after biopsy before cancer resection[22]. A study by Roth et al.[23] showed that women who reported higher preoperative levels of distress and anxiety were significantly less satisfied with the outcomes of breast reconstruction[23,24]. Clearly, many clinical and non-clinical factors influence a woman's satisfaction with psychosocial and physical breast reconstruction outcomes, making a single measurement of satisfaction challenging[4]. Differently, Builes Ramírez et al. identified no anthropometric and clinical variables related to satisfaction and quality of life in breast cancer women before their surgical procedure[25]. In our study, we found that variations in expectations such as previous aesthetic breast surgery and neoadjuvant chemotherapy were significant predictors of preoperative physical well-being.

The assessment and management of patients' expectations may improve their perception of outcomes[16]. When we compare the two different types of surgery, in the BCT with oncoplastic group, 51.0% of patients expected that the breast would have normal sensation after one year, whereas 43.3% of women in mastectomy with IBR group expected to have some sensation (p=0.001). A review by Sisco et al.[26] reported that sensory outcomes in nipple-sparing mastectomy varied, with normal sensation self-reported in the range 10.0–43.0%[26,27]. However, it has now become clear that nipple sensation is largely or completely lost in most cases. A Swedish prospective study that quantitatively examined tactile, thermal, and nociceptive cutaneous sensitivity before and after nipple-sparing mastectomy found total loss of touch sensation in the nipple in 62.0% of patients, while touch sensation was impaired in the remaining 38.0%[27,28]. These findings highlight the importance of managing patients' expectations about breast and nipple sensations after mastectomy to reduce the risk of dissatisfaction with the surgery.

Interestingly, we identified that most women in both groups expected that breast appearance (symmetry) when unclothed would look similar after one year (71.4% for BCT and 80.0% for

Table 4. Analysis of BREAST-Q reconstruction expectation for breast appearance after ten years according to different factors.

	Expectation for breast appearance after ten years				
	Will not match	Will match almost	Will match exactly	Don't know	p-value
Age (years)					
<39	4	6	0	1	0.03*
40–49	5	7	0	12	
50–59	5	9	2	6	
>60	1	10	5	6	
Educational level					
High school or less	2	9	1	13	0.04*
University or more	13	23	6	12	
Previous aesthetic breast surgery					
Yes	6	6	2	2	0.09
No	9	26	5	23	
Weight characteristic					
Normal	8	13	2	5	0.18
Overweight	6	17	3	14	
Obese	1	2	2	6	
Neoadjuvant chemotherapy					
Yes	6	11	0	9	0.27
No	9	21	7	16	

*Statistically significant (p<0.050).

mastectomy group) and after ten years would match almost the same as it did right after reconstruction (42.9% for BCT and 36.7% for mastectomy group). Overall, the aesthetic outcomes decline over time, especially if chemotherapy and radiotherapy are required. Furthermore, breast cancer patients using adjuvant endocrine therapy can vary their weight resulting in asymmetry, impacting patient-reported outcomes. In breast-conserving therapy, a prospective study by Hennigs et al.[29] showed that the change in the aesthetic outcome is still measurable over four years after the surgical procedure with a subjective evaluation[29,30]. In breast reconstruction with implant, several authors have described a trend of deterioration over time, with a decline in aesthetic outcomes, an increase in capsular contracture, and an overall decrease in patient satisfaction[10,31,32]. Seth and Cordeiro contradict these results demonstrating that prosthetic breast reconstruction outcomes do not deteriorate over time. This stability is apparent in both long-term surgeon and patient report outcomes data measured in the same patients[10]. Despite the differences in the literature, we delineated factors such as patients aged 50 years and older with university education or higher who expect their breast appearance to match almost the same after ten years (p=0.001). These findings emphasize the importance of managing patient expectations about breast and nipple sensation after mastectomy and aesthetic outcomes over time to reduce the risk of dissatisfaction with the surgery.

It is important to consider that most data were collected during the coronavirus disease (COVID-19) that was first reported in Wuhan (China), in December 2019. The COVID-19 pandemic became one of the main international concerns regarding its impact on mental health[33]. A study that included 3,000 Brazilian population from 25 states showed that almost half of participants expressed symptoms of depression (46.4%), anxiety (30.7%), and stress (42.2%) in this period[33]. Mental illness during the pandemic associated with the diagnosis of breast cancer may have adversely affected the satisfaction and quality of life scores found in our study.

A strength of this work is that it is the first prospective study that provides a useful perspective on the patients' feelings prior to breast cancer surgery, using the objective, validated, and reliable BREAST-Q questionnaire. The recruitment of this population included all breast cancer patients who underwent oncological surgery with IBR or oncoplastic surgery. We excluded those who underwent a prophylactic mastectomy and delayed breast reconstruction to get a homogenous cohort. This comparison enables surgeons to adopt an individualized approach according to the technique to be employed.

In contrast, this study also has several limitations. Our population was restricted to a single center, limiting the generalizability of data. As a cross-sectional study, there is an important element of selection bias to consider. We only included patients

who agreed to participate in the study; they probably had a better quality of life and satisfaction score than those who refused do take part.

Further studies are needed to evaluate the effect of preoperative patient expectations on patient-reported outcomes following breast reconstruction to determine whether preoperative expectations can be modified to produce long-term satisfaction after surgery. It is well documented that patients' satisfaction with their breasts correlates more strongly with their satisfaction with the information they received prior to surgery and with their plastic surgeon[24,34,35]. Failure to recognize and understand what patients expect from their surgical procedure often leads to dissatisfaction and poor overall outcome for them[24].

CONCLUSIONS

This study's results highlight the need to improve education and informed decision-making about breast reconstruction. Patients demonstrated high expectations for breast appearance after reconstruction and expected it not to change over time. Multiple factors influence preoperative breast satisfaction and expectation prior to surgery. Understanding which factors affect patients' satisfaction with native breasts and their expectations with the surgery in the preoperative set could improve preoperative counseling and the management of patients' expectations of subsequent breast reconstruction and reduce the risk of dissatisfaction with the surgery.

AUTHORS' CONTRIBUTIONS

FK: Conceptualization, Investigation, Methodology, Project administration, Resources, Validation, Visualization, Writing – original draft, Writing – review and editing, Manuscript review. CAU: Conceptualization, Methodology, Project administration, Resources, Supervision, Manuscript review. MTD: Investigation, Validation, Visualization, Writing – original draft, Writing – review and editing. IR: Investigation, Validation, Visualization, Writing – original draft, Writing – review and editing. MRL: Data curation, Formal analysis, Software. BS: Data curation, Formal analysis, Software. ML: Conceptualization, Methodology, Project administration, Resources, Supervision, Manuscript review.

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