Quality of Life and Patient Satisfaction After Breast Cancer Surgery: BREAST-Q analysis

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Research Article

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Abstract

Purpose Conceptions of quality of life (QoL) and patient satisfaction are important to improve quality of care in breast cancer patients. The purpose of this study was to compare QoL and patient satisfaction using the BREAST-Q among patients who underwent breast-conserving surgery (BCS) or nipple-sparing mastectomy (NSM) for breast cancer treatment.

Methods We performed a cross-sectional study using a database of patients who underwent BCS (n=75) or NSM (n=70), operated by the same surgeon, between January 2017 and December 2017. Clinical-pathological data were assessed from the medical record. All patients filled out the BREAST-Q questionary. A difference of 0.5 standard deviation between groups was considered clinically relevant. Effect size was estimated for each domain of BREAST-Q in both groups.

Results Patients in the NSM group were younger at the time of surgery than those in the BCS group, 45.4 vs. 55.7 years, respectively (p<0,05). There was no global difference in QoL and Patient Satisfaction among the groups. Patients in BCS group presented significantly higher scores related to 'physical well-being' compared to the NSM group, 83.2 vs. 70.5 (p<0.05), as well as the 'satisfaction with their breasts', scoring 81.2 vs. 73.1 (p<0.05). Satisfaction with care was high and not statistically different between groups.

Conclusion Our study shows no difference in global QoL and patients' satisfaction among women who underwent BCS and NSM for breast cancer treatment. Satisfaction with care was extremely high, reassuring the importance of the support offered by the team, and patient's involvement in decision-making process.

Introduction

Breast cancer remains the most common female malignancy worldwide. According to GLOBOCAN 2020, female breast cancer has now surpassed lung cancer as the leading cause of global cancer incidence in 2020, with an estimated 2.3 million new cases [1]. The treatment is based on three main strategies: surgery, radiation therapy and systemic treatment. Surgical options can be categorized in two overall groups: breast-conserving surgery (BCS) and mastectomy with or without breast reconstruction [2]. Randomized trials have established BCS as an equivalent alternative to mastectomy in selected early-stage breast cancer patients [3]. In the same way, the oncological safety of the Nipple-sparing mastectomy (NSM), a conservative mastectomy approach for early breast cancer, has already been proved, with good aesthetic satisfaction [4].

Despite the improvement in surgical techniques, the oncologic breast surgery can have a profound impact on woman's global health. The advances in overall breast cancer treatment results in longer survival, highlighting the importance of assessment quality of life (QoL) in this group of patients [5]. Patient reported outcome measures (PROMs) are now recognized as valuable tools for collecting outcomes data from the patient's perspective and are being widely used. The assessment of QoL

outcomes in breast cancer patients, such as satisfaction, functionality and well-being, provides essential information required to improve the shared decision-making process [6]. A study by Lagendijk et al, showed that 89% of breast cancer participants agreed that PROMs had the potential to improve quality of care, and over 80% believed that PROMs could have been used as a 'guidance tool for themselves' during their treatment journey [7].

The BREAST-Q is one of the most widely used PROM to assess the impact and effectiveness of breast surgery. Relevant to breast cancer, there are BREAST-Q modules specific to mastectomy, BCS and breast reconstruction. The conceptual framework of the modules is comprised of two domains: Health-Related Quality of Life and Patient Satisfaction [8]. Literature focusing on the satisfaction with surgical outcomes and QoL of breast cancer patients are available, however data is heterogeneous. Several studies have demonstrated no difference in global QoL between different breast surgical techniques, while other authors support the superiority of mastectomy with reconstruction regarding breast satisfaction, physical and sexual wellbeing. In contrast, an american study evidenced higher patient satisfaction and QoL with BCS [9–11]. The purpose of this study was to compare QoL and patient satisfaction using the BREAST-Q among patients who underwent BCS or NSM for breast cancer treatment.

Methods

Design and participants

We performed a cross-sectional study using a database of women who underwent BCS or NSM for breast cancer treatment between 1 January 2017 and 31 December 2017. The indication of the procedure was based in clinical-pathological characteristics of the tumor, locoregional staging, previous surgery for breast cancer treatment and genetic testing, with patient's agreement. Intraoperative frozen sections of the margins and retroareolar tissue, in case of NSM, was performed to confirm free margins. In the NSM group, immediate breast reconstruction was performed using subpectoral direct-to implants.

Women were eligible if they have in situ carcinoma or invasive breast cancer clinical stage I-III, undergoing or not neoadjuvant systemic therapy. The procedure was performed by the same senior breast surgeon. Patients with less than 6 months follow-up, stage IV breast cancer, with breast cancer recurrence or without complete data were excluded. The clinical-pathological data was retrospectively evaluated by the medical chart and the patient`s follow-up was updated during the appointments. All patients filled out an electronic version of the BREAST-Q questionary if they agreed to participate signing the informed consent. This study was performed according to The Code of Ethics of the World Medical Association (Declaration of Helsinki) and received approval from the ethics committee of the Pontifical Catholic University of Rio Grande do Sul (#38449020.0.0000.5336).

BREAST-Q

The BREAST-Q is a validated PROM designed to evaluate outcomes among women undergoing different types of breast surgery. The Breast Cancer Modules includes Mastectomy, Reconstruction, Breast

Reconstruction Expectations and Breast Conserving Therapy. Each module is composed by two domains - QoL and Patient Satisfaction - divided into multiple scales that can be used independently and contains preoperative and postoperative scales, however it may also be administered at a single time point. Under each of these domains, there are six subthemes; QoL: 1) Psychosocial, 2) Physical and 3) Sexual well-being; and Patient Satisfaction: 4) Satisfaction with Breasts, 5) Satisfaction with Outcome and 6) Satisfaction with Care. BI is an important concept for breast surgery patients. This concept is measured by several of BREAST-Q scales within each module [8]. The BREAST-Q is a self-administered questionnaire. Each scale takes 1-4 minutes to complete, and an entire module can be completed in about 10-15 minutes. There is no overall or total BREAST-Q score, only scores for each independent scale. Domain scores were obtained by transforming scaled responses into a range from 0 to 100, with higher scores indicating greater satisfaction or QoL [12].

The primary outcome of this study was to compare the QoL and patient satisfaction using the BREAST-Q among the BCS and NSM groups. The secondary outcomes were to specify QoL and patient satisfaction subthemes and correlate with clinical-pathological features, type of axillary surgery, genetic testing, locoregional and systemic treatment.

Statistical Analysis

Prior to commencement of the study, a sample size calculation was performed based on previously published data using the BREAST-Q. A difference of 20 standard deviation (SD) between the means of the groups (70 and 80) was considered clinically relevant. It was determined that a total of 126 participants (63 per group) would be needed to detect this difference. We considered Type 1 error rate of alpha = 0.05, Type 2 error of beta = 0.10 and a power of 80%. Quantitative variables were described using mean ± SD or median and range, while categorical variables were described by absolute and relative frequencies. The significance level for claim statistical difference between groups was set at 0.05. All analyses were performed using the Statistical Package for Social Sciences v21.0 software for Windows (IBM Corp. Released 2013. IBM Statistics for Windows. Armonk, NY, USA). Comparisons across groups were made using Mann Whithney or Student t test for quantitative variables, and Fisher’s exact test or the Chi-squared for categorical variables. One-way ANOVA was used to compare groups for baseline characteristics and mean BREAST-Q scores. Tukey’s post hoc test was then used to assess the differences between groups. Effect size, measured by Cohen’s d, was estimated for each domain of BREAST-Q in both groups.

Results

The BCS and NSM groups were attended by 88 and 73 women, respectively. Sixteen patients (BCS: n=13; NSM: n=3) were excluded due to no identification in the questionnaire, making it impossible to correlate the clinic and pathologic variables. Thus, the total number of participants was 75 in BCS and 70 in NSM group.

Clinical-pathological Characteristics

Patients in NSM group were younger at surgery time compared to BCS group, with a median age of 45.4 years and 55.7 years, respectively ($p<0.05$). Median follow-up time since surgery was similar in both groups, 29.2 months for BCS and 28.1 months for NSM group ($p=0.876$). The NSM patients referred more familial history of breast and ovarian cancer ($p=0.012$ and 0.015, respectively), and genetic testing was negative in 80% and 55.3% of BCS and NSM patients, respectively. There was a tendency for statistical significance related to BRCA1 mutation in the NSM group, as well as related to negative genetic testing in BCS group ($p=0.059$) (Table 1). Regarding tumor characteristics, the majority of patients presented with invasive cancer, luminal subtype being the most frequent among the groups. Patients who underwent NSM presented more LuminalHER tumors compared to patients in BCS group ($p=0.015$). There was no difference in endocrine therapy administration, neither in chemotherapy prescription for all patients. Radiation therapy was administered for almost all BCS patients, except for two women (1.4%). Patient's tumor and treatment characteristics are presented in Table 2.

Table 1
Factors related to breast cancer risk.

Variable n (%)		Group		p
		BCS (n=75)	NSM (n=70)	
Family history of breast cancer	Yes	35.6	56.5	0.012
	No	64.4	42.0	
	Not informed	0	1.5	
Family history of ovarian cancer	Yes	1.4	10.1	0.015
	No	98.6	88.4	
	Not informed	0	1.5	
Previous cancer	Yes (breast or ovarian)	9.3	4.3	0.911
	Yes (other)	4.0	4.3	
	No	86.7	91.4	
Genetic mutation	BRCA1	0	17.0	0.059
	BRCA2	5.0	6.4	
	TP53	0	2.1	
	ATM	5.0	0	
	Other	5.0	0	
	Negative	80.0	55.3	
	VUS	5.0	19.2	

BCS: Breast-conserving surgery; NSM: Nipple-sparing mastectomy; VUS: Variants of uncertain significance.

Table 2
Clinical-pathological characteristics.

Variable n (%)		Group		p
		BCS (n=75)	NSM (n=70)	
Breast tumor	Invasive carcinoma*	68 (90.7)	57 (81.4)	0.148
	DCIS	7 (9.3)	13 (18.6)	
Axillary surgery	SLNB	66 (88.0)	64 (91.4)	0.591
	AD	9 (12.0)	6 (8.6)	
Molecular subtype	Luminal	57 (76.0)[a]	37 (52.9)	0.015
	LuminalHER	3 (4.0)	10 (14.3)[b]	
	Triple negative	9 (12.0)	9 (12.9)	
	HER2 positive	0 (0)	1 (1.4)	
	DCIS	6 (8.0)	13 (18.6)	
Endocrine therapy	Yes	52 (81.3)	41 (70.7)	0.204
	No	12 (18.8)	17 (29.3)	
Chemotherapy	Yes	24 (32.9)	33 (47.8)	0.087
	No	49 (67.1)	36 (52.2)	
Radiotherapy	Yes	73 (98.6)	38 (55.1)	<0.001
	No	1 (1.4)	31 (44.9)	

*n=2 patients in NSM group had bilateral invasive cancer; BCS: Breast-conserving surgery; NSM: Nipple-sparing mastectomy; DCIS: Ductal carcinoma in situ; SLNB: Sentinel node biopsy; AD: Axillary dissection; Index letters: difference detected by Fisher's Exact Test.

Breast-q Questionnaire

Results from the BREAST-Q questionnaires - Breast aConserving Therapy and Reconstruction Modules - are shown in Figure 1. There was no global difference in the two overarching domains, QoL and Patient Satisfactions, between the groups. However, the magnitude of effect estimated for all domains showed, in increasing order, greater impact for ‘satisfaction with their breasts’ and ‘physical well-being’ domains.

Despite the high scores, 79.6 and 80.8 of the BCS and NSM groups, respectively, the comparison of the "psychosocial well-being" domain showed no significant difference between patients (p=0.617). Similarly, for ‘sexual well-being’ and ‘effects of radiation’ domains, no difference was detected among the groups (p=0.144 and 0.251, respectively); only two patients did not receive radiotherapy in the BCS group.

Patients who had undergone BCS presented significantly higher scores related to ‘physical well-being’ compared to the NSM patients ($p<0.05$), 83.2 versus 70.5, respectively, as well as the ‘satisfaction with their breasts’, scoring 81.2 versus 73.1, respectively ($p<0.05$). These results are shown in Figure 2 (a and b).

The ‘satisfaction with care’ was not significantly different between BCS patients and NSM patients, presenting high levels of satisfaction related to the surgeon, medical team and office staff, as well as the satisfaction with surgeon’s information.

On multivariable analysis, after adjusting for age at surgery, invasive tumors detected on pathology, axillary lymphadenectomy, endocrine therapy and chemotherapy’s use, we found no difference in the BREAST-Q scores compared to the non-adjusted analysis. The ‘satisfaction with the breasts’ and the ‘physical well-being’ were significantly higher in BCS patients, compared to NSM ones.

Discussion

The equivalence and safety of BCS was proved in several studies by the 1990’s and established the procedure as an alternative to mastectomy for early-stage breast cancer. Since then, BCS rates have increased considerably [13]. However, there is evidence that this trend is reversing with an increase in mastectomy rates in the last years, especially due to the enhanced number of contralateral prophylactic mastectomy. Some possible explanations for this trend are the greater awareness of breast cancer risk, the availability of genetic testing and the possibility of satisfactory aesthetic outcomes and oncological safety since the widespread of NSM [14]. A recent study from Galimberti et al including 1989 women who had a NSM, with a median follow-up of 94 months, indicate that NSM is oncologically safe for selected patients, with acceptable local recurrence and low complication rates [15].

The overall safety of BCS and reconstruction surgery, as well as improvements in long term outcomes of breast cancer treatment, have enhanced concerns about quality of life and aesthetic results [16]. QoL comprises aspects including body image, cosmetic results, breast satisfaction, attractiveness, sexual problems, post-surgical complications and worrying about the future. These aspects are influenced by type of surgery as well by additional treatments, like chemotherapy, endocrinotherapy and radiotherapy [17]. Despite the importance of this concept, most of the studies on QoL originate only from the last 2 decades and we still have lack of information [18].

In our study, there was no statistical difference in global QoL and patient satisfaction among women who underwent BCS and NSM for breast cancer treatment. A study by Kim et al administered QoL questionnaires to 485 patients who underwent BCS and 46 patients who underwent mastectomy with immediate reconstruction at least 1 year after surgery and adjuvant therapy, showed no difference in global QoL and cosmetic results for both surgery groups. Similar results were described in a Polish study that included 82 breast reconstructions in 79 patients and 226 BCS, with high levels of global QoL between the two groups, not differing significantly from one another. Jagsi et al conducted a SEER population-based survey with 1450 respondents, 9 months and 4 years after diagnosis, to evaluate QoL

and patterns and correlates of satisfaction with overall cosmetic outcomes. Among 963 patients receiving BCS and 222 receiving mastectomies with reconstruction, there was no difference related to the cosmetic satisfaction. The authors suggest that in patients undergoing post-mastectomy radiation, the use of autologous reconstruction may mitigate radiation's deleterious impact on cosmetic outcomes. A metanalysis from Sadaf Zehra et al published in 2020 compared QoL outcomes among breast cancer surgery groups and suggest that QoL outcomes in breast reconstruction and BCS groups are better than the mastectomy group. All these studies, except for the metanalysis, however, applied other questionnaires than the BREAST-Q [3, 16, 19].

Regarding the specific domains of QoL and patient satisfaction analyzed in the present study, we found significantly higher physical wellbeing scores in BCS group compared to NSM. Howes et al performed a case-controlled study to evaluate QoL following breast cancer surgery to compare outcomes following BCS versus total mastectomy with or without reconstruction. The BREAST-Q were completed by 400 women (123 controls, 97 breast conservations, 93 mastectomies without reconstruction, 87 mastectomies with reconstruction) and the results showed that women who underwent BCS scored the lowest in the physical well-being chest domain and the majority reported breast asymmetry. In the study, higher scores of satisfaction and sexual well-being was found among women who underwent mastectomy with reconstruction, compared to women who had BCS [9].

Satisfaction with the breasts in our analysis were significantly higher for patients who had undergone BCS, and this difference remained significant after adjusting for variables. Flanagan et al published the results of a study including 3233 women (2026 patients had BCS, 123 had NSM, and 1084 had skin-sparing or total mastectomy) to compare patient satisfaction following BCS and mastectomy with implant reconstruction (M-iR), utilizing the BREAST-Q. Breast satisfaction, psychosocial well-being and sexual well-being were higher for BCS compared with M-iR in early-stage invasive breast cancer. The satisfaction with the breasts decreased over time in all women of the study, highlighting the need for further evaluation with longer follow-up [11].

A study including 7619 patients recruited from the Army of Women with a history of breast cancer surgery, administered surgery-specific questionnaires, including the BREAST-Q, to evaluate the effect of procedure type on breast satisfaction scores. The authors reported that women who underwent implant-based reconstruction were less satisfied with their breasts compared to women that underwent BCS. These findings emphasize the value of PROMs as an important guide to decision making in breast surgery and underscore the importance of multidisciplinarity in the decision-making process [20].

The satisfaction with care in our study, related to the Surgeon, Medical Team and Office Staff, was extremely high in both groups. This domain addresses issues related to the professionalism, knowledge, respect and empathy of the team, as well as the patient's involvement in decision making and understanding of the process. Of our knowledge, this is the first study comparing patients operated on by the same surgeon, which considerably reduces the bias of different techniques of operation and practice, which we know has a profound influence on QoL and patient satisfaction. We correlated the high levels

of satisfaction in both groups with the fact that patients were operated on by the same senior surgeon and, mainly, with the patient's involvement in decision-making regarding surgical treatment. Studies about satisfaction with breast cancer procedures have shown that women who report active roles in their decision-making process were twice as likely to be satisfied with their decision compared with those who reported more passive roles [20]. Additionally, literature suggests that other aspects of care during consultation are more important than the type of surgery alone, including patient involvement in the decision for surgery, surgeon specialization in breast surgery, and access to informational materials. Patient satisfaction is highly dependent on the extent to which postoperative outcomes match preoperative expectations, which is deeply influenced by the support offered by the surgeon and his medical and office staff [21, 22].

One of the limitations of the study was the inclusion of the patients that made themselves available to answer, what could be a selection bias. Additionally, the median follow-up was short, less than 30 months, and we were unable to adjust for preoperative BREAST-Q scores, since the preoperative version of the questionary was not applied. Based on previous studies, we know that time from surgery is an important factor associated with satisfaction with breasts and QoL [11].

Conclusion

Our study demonstrates that there is no statistically significant difference in global QoL and patients' satisfaction among women who underwent BCS and NSM for breast cancer treatment. Regarding physical well-being and breast satisfaction, BCS patients scored higher compared to NSM ones. Furthermore, the satisfaction with care was extremely high in both groups, reassuring the importance of the support offered by the surgeon and his medical and office staff, and the importance of the patient's involvement in decision-making process.

Declarations

Compliance with ethical standards

Ethical approval: All procedures performed in the study were in accordance with the ethical standards by the Institutional Ethics Committee of Pontifical Catholic University of Rio Grande do Sul (PUCRS) (#38449020.0.0000.5336) and according to The Code of Ethics of the World Medical Association (Declaration of Helsinki) and its later amendments or comparable ethical standards.

Informed consent: All participants of the study signed the informed consent.

Conflict of interest: The authors declare no conflict of interest.

Data availability: All data analyzed during this study are included in this published article.

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Authors contributions: Study conception and design were performed by IM and ALF. Material preparation and writing the manuscript were performed by IM, ML, BPC, BV, FB, ABF and CM; data collection and analysis were performed by IM, BPC, ALF, BV, FB, ABF and CM The first draft of the manuscript was written by IM and all authors commented on previous versions of the manuscript. Supervision was performed by BPC.

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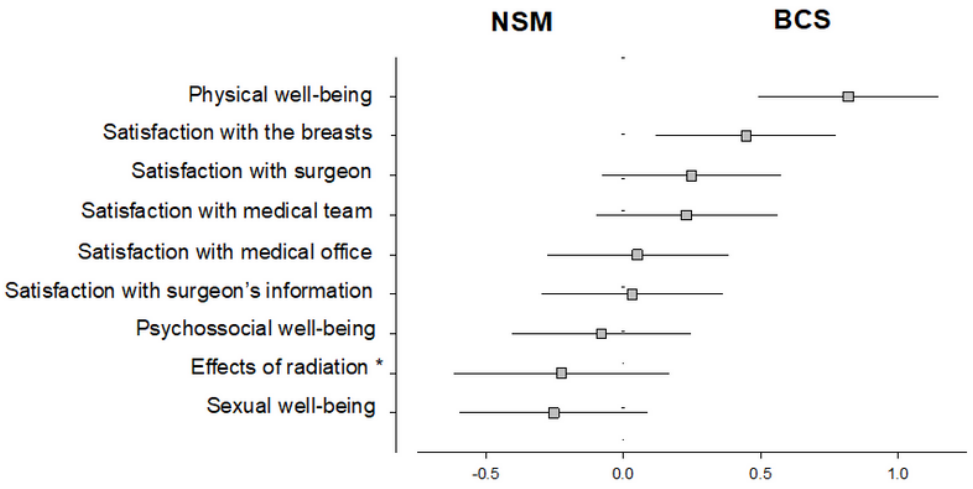
Figures

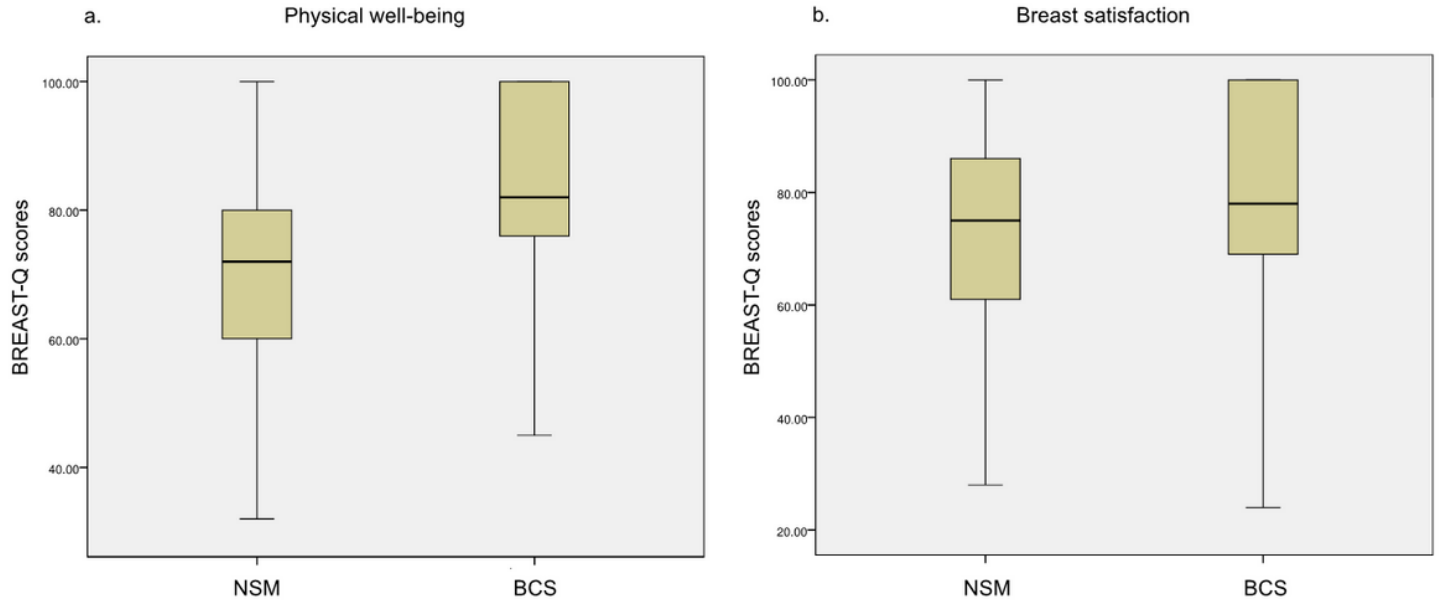


	NSM n=70	BCS n=75	d (95% CI)	*p value*
Physical well-being	70.5±17.2	83.2±13.7	0.82 (0.49 – 1.15)	<0.001
Satisfaction with the breasts	73.1±17.8	81.2±18.6	0.45 (0.12 – 0.77)	0.008
Satisfaction with surgeon	96.3±8.8	98.1±5.4	0.25 (0.08 – 0.58)	0.142
Satisfaction with medical team	94.8±16.8	97.7±7.2	0.23 (0.10 – 0.56)	0.171
Satisfaction with medical office	96.9±8.2	97.4±11.2	0.05 (0.28 – 0.38)	0.779
Satisfaction with surgeon's information	80.1±19.2	80.8±23.8	0.03 (0.30 – 0.36)	0.836
Psychossocial well-being	80.8±14.9	79.6±15.1	0.08 (0.41 – 0.25)	0.617
Effects of radiation *	7.4±2.1	7.0±1.4	0.23 (0.62 – 0.17)	0.251
Sexual well-being	68.0±17.6	63.5±17.9	0.25 (0.60 – 0.09)	0.144

NSM: Nipple-sparing mastectomy
BCS: Breast-conserving surgery
CI: Confidence interval
d: Cohen's d
*Raw sum scale score, not converted in rash scores (0-100).

Figure 1

Caption not included with this version.



NSM: Nipple-sparing mastectomy
BCS: Breast-conserving surgery

Figure 2

Caption not included with this version.