Original Article Open Access

Archives Of Breast Cancer

DOI: 10.32768/abc.201854173-182

Patient Satisfaction and Body Image Following Mastectomy, Breast-Conserving Therapy, and Mastectomy With Reconstruction: A Study in Iran

Asiie Olfatbakhsh[a], Shahpar Haghighat[b], Mohammadreza Tabari[c], Esmat Hashemi[a], Fateme Sari[a], Ahmad Kaviani[c,d]

[a] *Breast Disease Department, Motamed Cancer Institute, Breast Cancer Research Center, ACECR, Tehran, Iran*
[b] *Quality of Life Department, Motamed Cancer Institute, Breast Cancer Research Center, ACECR, Tehran, Iran*
[c] *Department of Surgery, Tehran University of Medical Sciences, Tehran, Iran*
[d] *Department of Research, Kaviani Breast Diseases Institute, Tehran, Iran*

ARTICLE INFO

Received:
20 September 2018
Revised:
12 October 2018
Accepted:
19 October 2018

Key words:
Breast cancer,
satisfaction,
body image,
breast- conserving surgery,
reconstruction

ABSTRACT

Background: Breast cancer is considered a chronic disease owing to the increases in survival rate. Thus, better body image and patient satisfaction with the surgery have become more important factors to be considered when choosing the surgical approach. The aim of this study was to compare body image and patient satisfaction following three different approaches.

Methods: We evaluated 183 consecutive patients who had undergone three different surgeries including breast-conserving surgery (BCS), mastectomy, or mastectomy followed by reconstruction (M-R). Body image was evaluated using the BICI questionnaire, and patient satisfaction was rated using a multiple-choice question and a scale ranging from 1 to 10.

Results: A significantly better body image was observed in the M-R and BCS groups compared with mastectomy (P = 0.02). In body image subscale analysis, social functioning scores were higher in the M-R and BCS groups than in the mastectomy group (P = 0.01), but no differences were obtained between surgery groups in appearance dissatisfaction subscale. Patients were more satisfied with BCS than the other two surgeries (P = 0.008).

Conclusion: Based on the results of this study, it could be proposed that both oncoplastic BCS and implant reconstruction could provide patients with acceptable body image, while BCS could bring about better satisfaction with the surgery. Reconstruction may be an alternative for the patients to improve body image and satisfaction when BCS is not applicable.

Introduction

Breast cancer is diagnosed at a more advanced stage in developing countries,[1, 2] and the incidence is also increasing.[1, 3] More and more patients will need breast surgery in the near future in low- and middle-income countries including I.R. Iran.[4] Nowadays, the most frequent surgery for breast cancer patients, especially at early stages, is breast-conserving surgery (BCS).[5] Although surgical approach toward breast cancer favors more conserving procedures, mastectomy is sometimes inevitable and is performed in 20%-30% of cases.[6] It was shown that survival rates were not different between mastectomy and other less invasive approaches.[7, 8] In spite of these findings, some studies demonstrated increasing rates of mastectomy,[9-12] mostly chosen by the patients.[13] This may be due to the fear of recurrence or perception of

Address for correspondence:
Asiie *Olfatbakhsh, MD*
Address: Motamed Cancer Institute,Breast Cancer Research Center, No. 146, South Gandi St., Vanak Square, Tehran, Iran
Tel: +98 21 88796592
Fax: +98 21 88679402
Email: folfatbakhsh@yahoo.com

improved survival.[14] Breast reconstruction, a proper alternative for patients who are candidates for mastectomy, was first described in the 1970s, and multiple surgical techniques are now available,[15] making interactive decision making for reconstruction essential for patients and doctors.[16]

Why perform breast reconstruction? Improved appearance satisfaction,[17] positive effects on body image,[18] better sexual function,[19] and better long-term health[20] may be among the reasons to opt for breast reconstruction. With improved breast cancer survival rates, breast cancer is classified as a chronic disease. Thus, other factors such as quality of life, satisfaction, body image, and sexuality become important besides the treatment of the disease itself.[21,22]

Body image, which is defined as a multidimensional construct that extends beyond the evaluation of an individual's appearance[23] and entails an individual's perception of his or her body, may be altered postoperatively and affect patients' psychosocial functioning.[24]

Patient satisfaction is influenced by different factors such as overall outcome and specific breast features (size, shape, and symmetry).[25] Also, factors other than the procedure itself, including personality traits,[26] appearance investment,[27,28] pain,[29] scars, missing a nipple,[30,31] and recovery time,[32] may cause dissatisfaction.

Breast reconstruction is thought to be a coping strategy to prevail over body image changes after mastectomy.[15, 33-35] Whether patient satisfaction is higher with reconstruction or breast conservation is still a question.[36-49] The goal of this study was to compare patient satisfaction and body image of patients undergoing mastectomy, BCS, or mastectomy followed by reconstruction. To our knowledge, this is the first study to compare satisfaction and body image among these techniques in I.R. Iran.

Methods

Subjects

A series of 183 consecutive patients who had undergone breast cancer surgery between August 2016 and September 2017 at Breast Cancer Research Center (BCRC; Motamed Cancer Institute, Tehran, Iran) or Imam Khomeini Hospital Complex (IKHC; Tehran, Iran) were enrolled . The decision to choose the type of surgery had been taken through an interactive process involving a multidisciplinary team of physicians and the patients, with the final decision remaining with the patient. Patients were eligible to enter the study if they had undergone mastectomy, oncoplastic BCS, or mastectomy followed by implant reconstruction (M-R, either immediate or delayed) and had finished the treatment at least 3 months before enrollment in the study. The end of the treatment was marked by the last session of radiotherapy if applicable. Otherwise, the time of completing the treatment and the start of follow-up was considered the treatment completion time. Written informed consent was obtained from each patient, and the data were collected anonymously. This was an observational study and researchers made no controlled or randomized intervention. Patients completed the Persian version of Body Image Concern Inventory (BICI) during a follow-up visit. Demographic and clinical data were extracted from patients' records in BCRC and IKHC. The local ethics committee approved all the study protocols (IR.ACECR.IBCRC.REC.1394.7).

Questionnaire

The BICI questionnaire is a 19-item multiple-choice, self-report instrument to evaluate the patient's body image. Patients were asked to rate each item about how often they had the described behavior or feeling on a 5-point Likert scale from 1 (never) to 5 (always). The total score ranged from 19 to 95, with higher scores corresponding to greater concern regarding body image (12 of 86). During answering the questionnaire, the patient was supervised by a research assistant to provide any additional information and make sure that no item was left unrated or rated twice. Six patients were illiterate, so a research assistant read the questions and marked the answers for them. This questionnaire consists of two subscales, namely, appearance dissatisfaction (items 1,3,5,8,9,14-19) and social functioning interference (items 2,4,6,7,10-13). The mean Spearman-Brown coefficient was calculated 0.62 and Cronbach's alpha was 0.93.[50] Sajadinejad *et al.* reported an overall Cronbach's alpha coefficient of 0.84, and alpha coefficients of 0.84 and 0.74 for appearance dissatisfaction and social functioning interference, respectively, in the Persian version of BICI.[51]

Patient Satisfaction With the surgery

We used a multiple-choice question to evaluate patients' satisfaction with the surgery: how satisfied are you with the cosmetic result of your operation? The patients could choose from among very satisfied, moderately, slightly, and not satisfied at all. This was used in a similar study.[33] We also asked the participants to rate their satisfaction with the surgery on a scale of 0 (least satisfaction) to 10 (most satisfaction).

Data Analysis

Distributions of body image and satisfaction score were not normal based on the Kolmogorov-Smirnov test. Quantitative data were presented as mean and standard deviation. The one-way ANOVA test was used to show differences in scale variable between groups. The Fisher exact test was used to represent differences in categorical variables between the three surgery groups. Statistical comparisons for body image score and satisfaction (scale score) were made using Kruskal-Wallis one-way

Table 1. Comparison of patients' characteristic between surgery groups

		BCS[a] N (%)	Mastectomy N (%)	M-R[b] N (%)	P[1]
Marital status	Married	62 (88.6)	56 (83.6)	37 (88.1)	0.669
	Single[2]	8 (11.4)	11 (16.4)	5 (11.9)	
Educational level	University	21 (30.0)	15 (23.1)	16 (41.0)	0.158
	≤ Diploma	49 (70.0)	50 (76.9)	23 (59.0)	
Economic status[3]	Low	6 (9.5)	8 (11.8)	21 (48.8)	< 0.001
	Moderate	57 (90.5)	60 (88.2)	22 (51.2)	
Employment status	Clerk	17 (24.3)	26 (37.1)	11 (25.6)	0.218
	Housewife[4]	53 (75.7)	44 (62.9)	32 (74.4)	
Age	Mean	43.8	46.5	41.5	0.006
	(SD)	(7.7)	(8.5)	(7.2)	
Time after treatment[5]	Mean	41.3	50.2	35.3	0.146
	(SD)	(39.0)	(44.3)	(29.3)	

Abbreviations: a, breast-conserving surgery; b, mastectomy *followed by reconstruction*

ANOVA, and differences between each pair of groups were shown using the Dunn's post hoc test. We then used a multiple linear regression model to predict satisfaction score (scale score) and body image score based on surgery groups and adjusted the model for age, time after treatment, education, and socioeconomic status. Breast-conserving surgery was assumed as the reference group. We used binary logistic regression to predict satisfaction (categorical score) based on the type of surgery ("very satisfied" and "moderately" were grouped as satisfied and "slightly" and "not satisfied at all" were grouped as unsatisfied). Tests were two-tailed and P values ≤ 0.05 was considered significant. All analyses were performed on SPSS v.16.

Results

We enrolled 183 consecutive females with breast cancer who had undergone mastectomy, breast-conserving surgery (BCS), or mastectomy followed by reconstruction (M-R) and were seen post operative as their routine follow-up. Seventy patients (38.3%) had undergone mastectomy, 70 (38.3%) BCS, and 43 (23.5%) reconstruction. The mean (SD) age of the participants at the time of surgery was 44.31 ± 8.12 years (range: 25-62 y). The mastectomy group was significantly older than the M-R group (46.5 vs 41.5 y, P = 0.005). The mean follow-up was 43.52 (Range: 3-288) months. The characteristics of the three groups are presented in Table 1.

Description: 1, P value is calculated using the Fisher exact test for parametrical variable and ANOVA for age and time after treatment; 2, includes both single and widowed patients; 3, classified according to income; 4, includes housewives and retired patients; 5, time after treatment is the time after the last treatment in month

Body image

Body image (BI) was evaluated with the BICI questionnaire. We report three scores for body image: total body image, appearance dissatisfaction, and

Table 2. Comparison of body image score and satisfaction in surgery groups

		BCS[a]	Mastectomy	M-R[b]	P[1]
Body image	Median (1^{st}, 3^{rd} Q^3)	32 (23-41.25)	36.5 (29-45.25)	30 (26-42)	0.027
	Mean (SD)	33.80 (11.93)	38.57 (12.78)	33.30 (11.25)	
	Mean rank	84.66	105.30	82.30	
Social function	Median (1^{st}, 3^{rd} Q)	16 (11-20.25)	17 (14-22)	15 (11-19)	0.013
	Mean (SD)	15.87 (6.09)	18.21 (5.71)	15.30 (5.54)	
	Mean rank	84.36	106.51	80.81	
Appearance dissatisfaction	Median (1^{st}, 3^{rd} Q)	17 (11.75-22)	18 (14-25)	17 (13-23)	0.098
	Mean (SD)	17.93 (6.82)	20.36 (7.89)	18.00 (6.44)	
	Mean rank	84.41	102.61	87.08	
Satisfaction with surgery	Median (1^{st}, 3^{rd} Q)	10 (10-10)	10 (8.75-10)	10 (7.5-10)	0.008
	Mean (SD)	9.49 (1.34)	9.08 (1.65)	8.89 (1.63)	
	Mean rank	104.19	87.38	79.69	

Abbreviations: a, breast-conserving surgery; b, mastectomy *followed by reconstruction*

social functioning score. The mean total BI score of patients was 33.61 (18-70). The mean body image score in the BCS was 33.80 (11.93), in the mastectomy group was 38.57 (12.78), and in the M-R group was 33.30 (11.25). A significant difference was seen among the three groups in BI (P = 0.027), with the lowest BI score being seen in the mastectomy group. The difference in social functioning was also significant, with the mastectomy group scoring lower than the other two groups (P = 0.013). No statistical difference, however, was observed in appearance dissatisfaction among the three groups (P = 0.098). The information regarding body image scores is shown in Table 2. Pairwise differences are presented in Figures 2 and 3.

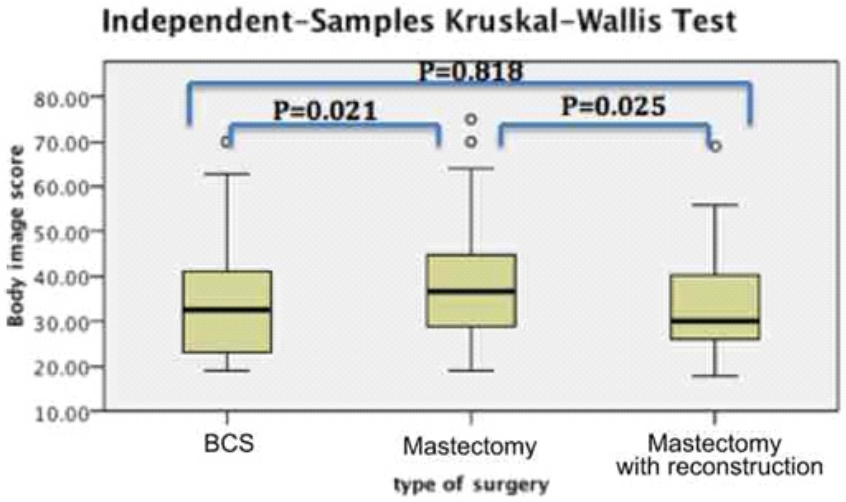

Figure1. Comparison of body image scores between surgery groups

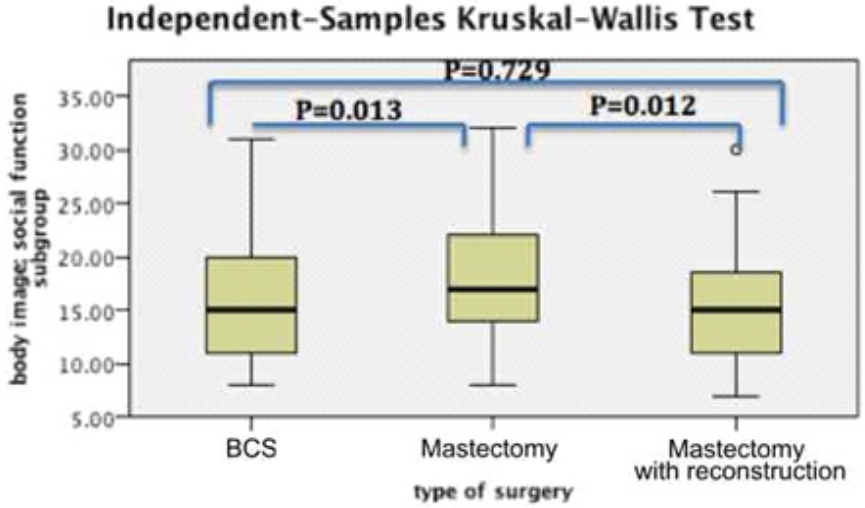

Figure 2. Comparison of social function score between surgery groups

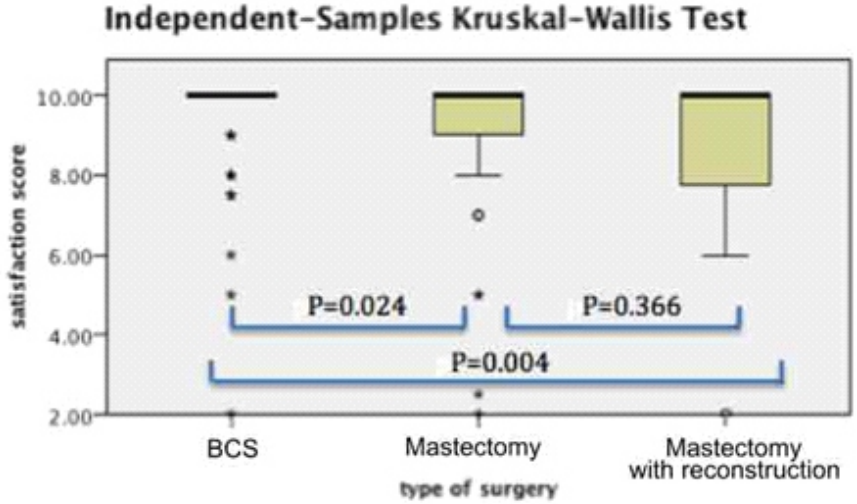

Figure 3. Comparison of satisfaction score between surgery groups

Table 3. Information regarding linear regression for predicting body image and satisfaction

Type of surgery	Body image	Appearance dissatisfaction	Social function
Mastectomy			
B	4.684	2.425	2.259
βeta	0.189	0.164	0.189
Significance	0.036	0.069	0.034
M-R			
B	-1.806	-0.502	-1.303
βeta	-0.064	-0.030	-0.096
Significance	0.514	0.762	0.324
R^2	0.045	0.029	0.58

Breast-conserving surgery is assumed as the reference group. The regression models are adjusted for age, marital status, education, economic status, and employment status. M-R, mastectomy followed by reconstruction.

We then performed a multivariable linear regression and adjusted the regression for age, marital status, education, employment, and economic status. Breast-conserving surgery was assumed as the reference group. The results are shown in Table 3. The mastectomy group had significantly lower scores on body image and social function. However, scores on BI and its subscales showed no significant difference between the BCS and M-R groups.

As a supplementary analysis, we divided the patients into two groups; the first was patients who were surveyed within 6 months after the last treatment, and the second included those who were surveyed after 6 months. There was no significant difference in the mean body image score between the two groups (P = 0.30).

Patient satisfaction

We evaluated patient satisfaction with the surgery in two ways. First on a scale of 1-10, and second using a multiple-choice question. The satisfaction score was significantly different between the three groups (P = 0.008). That was the highest in the BCS group (9.49 ± 1.34) and the lowest in the M-R group (8.89 ± 1.63). There was no significant difference in satisfaction score between the mastectomy and M-R groups (P = 0.36). However, the difference was significant between the BCS and the other two groups (P = 0.024 for the mastectomy and P = 0.004 for the M-R group). These results are illustrated in Figure 3. In the multiple-choice question on satisfaction, there was a significant difference between the groups (P = 0.049). The BCS group had the highest number of "very satisfied" answers (91.4%), and in pairwise comparisons, there was a significant difference just between the BCS and M-R groups (91.4% vs 74.4%, P = 0.015). However, when considering "very satisfied" and "moderately" answers as satisfied and the other ones as dissatisfied, there was no significant difference in the percentage of satisfied patients between the surgery groups (BCS: 97.2%; mastectomy: 94.2%; and M-R: 95.3%). In the binary logistic model, none of the surgical techniques could increase the risk of dissatisfaction (BCS assumed reference; OR: 0.413 and 0.620; 95% CI: 0.08-2.74 and 0.08-4.46 for Mastectomy and M-R, respectively). In the supplementary analysis, there was no statistical difference in satisfaction score between patients who were surveyed within 6 months after the last treatment and those surveyed after 6 months (P = 0.32).

Discussion

The results of this study showed that among the three frequent surgeries for breast cancer, mastectomy was associated with the highest dysmorphic appearance concern, while BCS and mastectomy followed by reconstruction led to the same BI score. Mastectomy patients scored significantly lower on the social functioning subscale of the BICI compared with the other two groups; however, appearance dissatisfaction was not significantly different among the three groups. At the same time, BCS was associated with a greater satisfaction with surgery in comparison with mastectomy or M-R.

Breast cancer surgery approach has changed during recent years. As the number of breast cancer survivors increases, we should consider breast cancer a chronic disease. Chronic disease may potentially worsen the overall health of patients by limiting their functional status, productivity, and quality of life.[52] Thus, factors besides treatment options will bear importance for these patients, including body image and satisfaction after surgery.

The findings of our study indicated that the mastectomy group had a lower body image score compared with the BCS or M-R group. The latter groups were identical regarding BI. This finding is contrary to that of Fang *et al.*, who found that women receiving BCS had a significantly better overall body image. They declared that losing a breast could cause loss of body integrity. Thus, patients with reconstruction perceive themselves as deficient despite satisfaction with shape and appearance. Moreover, it was shown that reconstruction would contribute to a better body image than mastectomy alone, which is consistent with our finding.[15] Another study, by Al-Ghazal *et al.*, showed a significantly better body image and less psychosocial problems after BCS compared with breast reconstruction. The

rationale behind this finding was that BCS is less extensive and disfiguring, and as the most important factor in determining the type of treatment is the concern about adverse effects such as disfigurement,[53] BCS brought better body image.[33]

Previous studies comparing reconstruction and mastectomy have reported different results. Some studies found no significant differences between reconstruction and mastectomy in body image,[54-56] while others, in line with our findings, reported better body image after reconstruction.[33, 57, 58] There are several possible explanations for this inconsistency. The scale to measure body image differs widely in these studies. Some studies measure satisfaction with body image,[59,60] while others designed their own scale.[58, 61] Another explanation is that different women choose different surgery types, i.e. patients choosing reconstruction might differ from others in terms of preoperative body image and perception of their appearance.[22] Preoperative body image was a predictor of a better general body image in the long term.[62] Another important factor in body image is the conservation of nipple-areola complex, which was shown to improve body image score.[63]

Another variable that has been suggested to influence BI is the time after treatment. It was shown that if BI was evaluated during the first 6 months after treatment, the problems with body image would increase,[62, 64] although there are studies that point to the contrary. The mean follow-up time in our study was 43 months and we found no difference in body image of patients with less than <6 months versus >6 months of follow-up.

In addition, we should consider radiotherapy after BCS and the complications such as fibrosis, infection, and skin edema[65,66] as factors which may be associated with body image. The effects of age, marital status, and socioeconomic status on body image were investigated in previous studies, with conflicting results.[67] Nevertheless, we controlled for them in the linear regression model and matched the three groups based on these variables.

Our study showed that mastectomy patients had significantly low scores on overall BICI scale and social functioning subscale. However, no significant difference was observed between the surgery groups in appearance dissatisfaction. We should be aware of a particular domain of body image called body stigma, which emphasizes the loss of body integrity. Although breast appearance may be acceptable to a woman, the integrity may be considered lost. Therefore, none of these surgeries may solve this perception of integrity loss, and we saw that the reconstruction group had a better body image in the domain of body concern but not in body stigma than the mastectomy group,[15] which means losing a part of the body may be considered suffering to the patients even though they regain that lost part of the body in another shape and also with good appearance.

We found that the BCS group had the highest satisfaction with surgery. Satisfaction evaluation is believed to be completely different from the point of view of patients and physicians.[68] In our study, we just evaluated satisfaction from the patients' point of view. Although radiotherapy was reported to have the greatest impact on the cosmetic outcome, the BCS group had the highest satisfaction in our study. Our findings are consistent with a study by Al-Ghazal *et al.*[33] who performed oncoplastic BCS, which uses the reconstructive technique simultaneously. This may increase satisfaction and should be considered. A study by Kaviani *et al.* showed no differences in QoL between BCS and oncoplastic breast surgery (OBS).[69] However, OBS was considered cosmetically more acceptable in one study with acceptable oncologic outcomes.[70] Nicholson *et al.* showed higher satisfaction in patients receiving reconstruction versus BCS. They inferred that it is because the reconstruction patients are highly motivated individuals for whom cosmetic outcome is important and also the level of choice they had in the nature of their treatment.[71,72]

We didn't evaluate patients' preoperative satisfaction with their breast appearance. However, it has been shown that patients with higher satisfaction prior to surgery were more likely to be satisfied with reconstructed breast.[73]

Although the reconstruction group had the lowest satisfaction score among the three groups in our study, there was no statistically significant difference. A study by Ng *et al.* reported a significant difference in satisfaction between mastectomy and reconstruction groups.[74] A majority (64%) of their reconstructions were autologous, while all of our participants had received implant reconstruction. The type of reconstruction may account for this difference. In the binary logistic model, there were no differences between the surgery groups when dichotomizing the satisfaction outcome as satisfied or unsatisfied. The difference between this dichotomous result and the multiple-choice satisfaction measure may show that a yes/no question may not be a good scale to measure satisfaction and that further scales should be designed to measure satisfaction.

A limitation of the present study is that we did not perform a preoperative evaluation of body image and satisfaction, and preoperative status may have altered postoperative results. As we know, the grouping of patients is not randomized in such studies, and a multidisciplinary team decides the surgery approach. Thus, the use of propensity score may help to group the patients by demographic and clinical factors without randomization.[77] However, we were unable to use this score in our analysis. There are other factors apart from those we considered in our study that can influence body image. These factors, including self-esteem,[62] may be confounding, and we were unable to control them.

We cannot generalize these conclusions to all breast cancer patients. Another limitation was the lower number of reconstruction patients because of limitations for this type of surgery, such as lack of insurance coverage and higher costs.

As Conclusion, based on the results of this study, it could be proposed that BCS and mastectomy with reconstruction are associated with better body image and social functioning compared with simple mastectomy. Breast-conserving surgery could bring about better patient satisfaction with the surgery. Time is an important factor in determining satisfaction; however, evaluation of satisfaction should be made in different time points during follow-up.

Conflict of Interest

The authors have none to declare.

References

1. Harirchi I, Karbakhsh M, Montazeri A, Ebrahimi M, Jarvandi S, Zamani N, *et al.* Decreasing trend of tumor size and downstaging in breast cancer in Iran: results of a 15-year study. Eur J Cancer Prev. 2010;19(2):126-30.
2. Harirchi I, Kolahdoozan S, Karbakhsh M, Chegini N, Mohseni SM, Montazeri A, *et al.* Twenty years of breast cancer in Iran: downstaging without a formal screening program. Ann Oncol. 2011; 22(1):93-7.
3. Asadzadeh Vostakolaei F, Broeders MJ, Mousavi SM, Kiemeney LA, Verbeek AL. The effect of demographic and lifestyle changes on the burden of breast cancer in Iranian women: a projection to 2030. Breast. 2013;22(3):277-81.
4. Sinaei F, Zendehdel K, Adili M, Ardestani A, Montazeri A, Mohagheghi MA. Association Between Breast Reconstruction Surgery and Quality of Life in Iranian Breast Cancer Patients. Acta Med Iran. 2017;55(1):35-41.
5. Olfatbakhsh A, Mehrdad N, Ebrahimi M, Alavi N, Hashemi E, Kaviani A, *et al.* Evaluation of factors impacting cosmetic outcome of breast conservative surgery--a study in Iran. Asian Pac J Cancer Prev. 2015;16(6):2203-7.
6. Schmauss D, Machens HG, Harder Y. Breast Reconstruction after Mastectomy. Front Surg. 2015;2:71.
7. Veronesi U, Saccozzi R, Del Vecchio M, Banfi A, Clemente C, De Lena M, *et al.* Comparing radical mastectomy with quadrantectomy, axillary dissection, and radiotherapy in patients with small cancers of the breast. N Engl J Med. 1981;305(1):6-11.
8. Fisher B, Fisher ER, Redmond C. Ten-year results from the National Surgical Adjuvant Breast and Bowel Project (NSABP) clinical trial evaluating the use of L-phenylalanine mustard (L-PAM) in the management of primary breast cancer. J Clin Oncol. 1986;4(6):929-41.
9. Gomez SL, Lichtensztajn D, Kurian AW, Telli ML, Chang ET, Keegan TH, *et al.* Increasing mastectomy rates for early-stage breast cancer? Population-based trends from California. J Clin Oncol. 2010;28(10):e155-7; author reply e8.
10. Mahmood U, Hanlon AL, Koshy M, Buras R, Chumsri S, Tkaczuk KH, *et al.* Increasing national mastectomy rates for the treatment of early stage breast cancer. Ann Surg Oncol. 2013;20(5):1436-43.
11. Katipamula R, Degnim AC, Hoskin T, Boughey JC, Loprinzi C, Grant CS, *et al.* Trends in mastectomy rates at the Mayo Clinic Rochester: effect of surgical year and preoperative magnetic resonance imaging. J Clin Oncol. 2009;27(25):4082-8.
12. Tuttle TM, Habermann EB, Grund EH, Morris TJ, Virnig BA. Increasing use of contralateral prophylactic mastectomy for breast cancer patients: a trend toward more aggressive surgical treatment. J Clin Oncol. 2007;25(33):5203-9.
13. Morrow M, Jagsi R, Alderman AK, Griggs JJ, Hawley ST, Hamilton AS, *et al.* Surgeon recommendations and receipt of mastectomy for treatment of breast cancer. JAMA. 2009;302 (14):1551-6.
14. Huang J, Chagpar AB. Quality of Life and Body Image as a Function of Time from Mastectomy. Ann Surg Oncol. 2018;25(10):3044-51.
15. Fang SY, Shu BC, Chang YJ. The effect of breast reconstruction surgery on body image among women after mastectomy: a meta-analysis. Breast Cancer Res Treat. 2013;137(1):13-21.
16. Mayor S. NICE updates guidance on early and advanced breast cancer. BMJ. 2009;338:b815.
17. Oiz B. [Breast reconstruction and psychological benefit]. An Sist Sanit Navar. 2005;28 Suppl 2:19-26.
18. Wilkins EG, Cederna PS, Lowery JC, Davis JA, Kim HM, Roth RS, *et al.* Prospective analysis of psychosocial outcomes in breast reconstruction: one-year postoperative results from the Michigan Breast Reconstruction Outcome Study. Plast Reconstr Surg. 2000;106(5):1014-25; discussion 26-7.
19. Filiberti A, Tamburini M, Murru L, Lovo GF, Ventafridda V, Arioli N, *et al.* Psychologic effects and esthetic results of breast reconstruction after mastectomy. Tumori. 1986;72(6):585-8.
20. Atisha D, Alderman AK, Lowery JC, Kuhn LE, Davis J, Wilkins EG. Prospective analysis of long-term psychosocial outcomes in breast reconstruction: two-year postoperative results from the Michigan Breast Reconstruction Outcome Study. Ann Surg. 2008;247(6):1019-28.
21. Golshan M, Cirrincione CT, Sikov WM, Berry DA, Jasinski S, Weisberg TF, *et al.* Impact of neoadjuvant chemotherapy in stage II-III triple negative breast cancer on eligibility for breast-conserving surgery and breast conservation.

rates: surgical results from CALGB 40603 (Alliance). Ann Surg. 2015;262(3):434-9; discussion 8-9.Outcomes Study. Ann Surg2008;247(6):1019-28.
22. Lee C, Sunu C, Pignone M. Patient-reported outcomes of breast reconstruction after mastectomy: a systematic review. J Am Coll Surg. 2009;209(1):123-33.
23. Pruzinsky T. Enhancing quality of life in medical populations: a vision for body image assessment and rehabilitation as standards of care. Body Image. 2004;1(1):71-81.
24. Fingeret MC, Nipomnick SW, Crosby MA, Reece GP. Developing a theoretical framework to illustrate associations among patient satisfaction, body image and quality of life for women undergoing breast reconstruction. Cancer Treat Rev. 2013;39(6):673-81.
25. Klassen AF, Pusic AL, Scott A, Klok J, Cano SJ. Satisfaction and quality of life in women who undergo breast surgery: a qualitative study. BMC Womens Health. 2009;9:11.
26. Urcuyo KR, Boyers AE, Carver CS, Antoni MH. Finding benefit in breast cancer: relations with personality, coping, and concurrent well-being. Psychol Health. Psychol Health. 2005;2(20):175-92.
27. Carver CS, Pozo-Kaderman C, Price AA, Noriega V, Harris SD, Derhagopian RP, *et al.* Concern about aspects of body image and adjustment to early stage breast cancer. Pschycosom Med.1998; 60(2):168-74.
28. Moreira H, Silva S, Canavarro MC. The role of appearance investment in the adjustment of women with breast cancer. Psychooncology. 2010;19(9):959-66.
29. Kulkarni AR, Pusic AL, Hamill JB, Kim HM, Qi J, Wilkins EG, *et al.* Factors Associated with Acute Postoperative Pain Following Breast Reconstruction. JPRAS Open. 2017;11:1-13.
30. Gopie JP, Timman R, Hilhorst MT, Hofer SO, Mureau MA, Tibben A. The short-term psychological impact of complications after breast reconstruction. Psychooncology. 2013;22(2):290-8.
31. Andrade WN, Baxter N, Semple JL. Clinical determinants of patient satisfaction with breast reconstruction. Plast Reconstr Surg. 2001; 107(1):46-54.
32. Murray CD, Turner A, Rehan C, Kovacs T. Satisfaction following immediate breast reconstruction: Experiences in the early post-operative stage. Br J Health Psychol. 2015; 20(3):579-93.
33. Al-Ghazal SK, Fallowfield L, Blamey RW. Comparison of psychological aspects and patient satisfaction following breast conserving surgery, simple mastectomy and breast reconstruction. Eur J Cancer. 2000;36(15):1938-43.
34. Gopie JP, ter Kuile MM, Timman R, Mureau MA, Tibben A. Impact of delayed implant and DIEP flap breast reconstruction on body image and sexual satisfaction: a prospective follow-up study. Psychooncology. 2014;23(1):100-7.
35. Zhong T, Hu J, Bagher S, Vo A, O'Neill AC, Butler K, *et al.* A Comparison of Psychological Response, Body Image, Sexuality, and Quality of Life between Immediate and Delayed Autologous Tissue Breast Reconstruction: A Prospective Long-Term Outcome Study. Plast Reconstr Surg. 2016;138(4):772-80.
36. Beckmann J, Johansen L, Richardt C, Blichert-Toft M. Psychological reactions in younger women operated on for breast cancer. Amputation versus resection of the breast with special reference to body-image, sexual identity and sexual function. Dan Med Bull. 1983;30 Suppl 2:10-3.
37. Steinberg MD, Juliano MA, Wise L. Psychological outcome of lumpectomy versus mastectomy in the treatment of breast cancer. Am J Psychiatry. 1985;142(1):34-9.
38. Ganz PA, Lee JJ, Sim MS, Polinsky ML, Schag CA. Exploring the influence of multiple variables on the relationship of age to quality of life in women with breast cancer. J Clin Epidemiol. 1992;45(5):473-85.
39. Yurek D, Farrar W, Andersen BL. Breast cancer surgery: comparing surgical groups and determining individual differences in postoperative sexuality and body change stress. J Consult Clin Psychol. 2000;68(4):697-709.
40. Schain WS, d'Angelo TM, Dunn ME, Lichter AS, Pierce LJ. Mastectomy versus conservative surgery and radiation therapy. Psychosocial consequences. Cancer. 1994;73(4):1221-8.
41. Taylor KL, Lamdan RM, Siegel JE, Shelby R, Hrywna M, Moran-Klimi K. Treatment regimen, sexual attractiveness concerns and psychological adjustment among African American breast cancer patients. Psychooncology. 2002;11(6):505-17.
42. Arora NK, Gustafson DH, Hawkins RP, McTavish F, Cella DF, Pingree S, *et al.* Impact of surgery and chemotherapy on the quality of life of younger women with breast carcinoma: a prospective study. Cancer. 2001;92(5):1288-98.
43. Polivy J. Psychological effects of mastectomy on a woman's feminine self-concept. J Nerv Ment Dis. 1977;164(2):77-87.
44. Wolberg WH, Romsaas EP, Tanner MA, Malec JF. Psychosexual adaptation to breast cancer surgery. Cancer. 1989;63(8):1645-55.
45. Ashcroft JJ, Leinster SJ, Slade PD. Breast cancer--patient choice of treatment: preliminary communication. J R Soc Med. 1985;78(1):43-6.
46. Penman DT, Bloom JR, Fotopoulos S, Cook MR, Holland JC, Gates C, *et al.* The impact of mastectomy on self-concept and social function: a combined cross-sectional and longitudinal study with comparison groups. Women Health. 1986;11(3-4):101-30.

47. Goldberg JA, Scott RN, Davidson PM, Murray GD, Stallard S, George WD, *et al.* Psychological morbidity in the first year after breast surgery. Eur J Surg Oncol. 1992;18(4):327-31.
48. Holmberg L, Omne-Ponten M, Burns T, Adami HO, Bergstrom R. Psychosocial adjustment after mastectomy and breast-conserving treatment. Cancer. 1989;64(4):969-74.
49. Lee MS, Love SB, Mitchell JB, Parker EM, Rubens RD, Watson JP, *et al.* Mastectomy or conservation for early breast cancer: psychological morbidity. Eur J Cancer. 1992; 28A(8-9):1340-4.
50. Littleton HL, Axsom D, Pury CL. Development of the body image concern inventory. Behav Res Ther. 2005;43(2):229-41.
51. Mohammadi N, Sajadinejad MS. The evaluation of psychometric properties of Body Image Concern Inventory and examination of a model about the relationship between body mass index, body image dissatisfaction and self-esteem in adolescent girls. Psychological Studies. 2007; 3:85-101.
52. Devins GM, Binik YM, Hutchinson TA, Hollomby DJ, Barre PE, Guttmann RD. The emotional impact of end-stage renal disease: importance of patients' perception of intrusiveness and control. Int J Psychiatry Med. 1983;13(4):327-43.
53. Margolis GJ, Goodman RL, Rubin A, Pajac TF. Psychological factors in the choice of treatment for breast cancer. Psychosomatics. 1989;30(2):192-7.
54. Noyan MA, Sertoz OO, Elbi H, Kayar R, Yilmaz R. Variables affecting patient satisfaction in breast surgery: a cross-sectional sample of Turkish women with breast cancer. Int J Psychiatry Med. 2006;36(3):299-313.
55. Rowland JH, Desmond KA, Meyerowitz BE, Belin TR, Wyatt GE, Ganz PA. Role of breast reconstructive surgery in physical and emotional outcomes among breast cancer survivors. J Natl Cancer Inst. 2000;92(17):1422-9.
56. Harcourt DM, Rumsey NJ, Ambler NR, Cawthorn SJ, Reid CD, Maddox PR, *et al.* The psychological effect of mastectomy with or without breast reconstruction: a prospective, multicenter study. Plast Reconstr Surg. 2003; 111(3):1060-8.
57. Janz NK, Mujahid M, Lantz PM, Fagerlin A, Salem B, Morrow M, *et al.* Population-based study of the relationship of treatment and sociodemographics on quality of life for early stage breast cancer. Qual Life Res. 2005; 14(6):1467-79.
58. Pusic A, Thompson TA, Kerrigan CL, Sargeant R, Slezak S, Chang BW, *et al.* Surgical options for the early-stage breast cancer: factors associated with patient choice and postoperative quality of life. Plast Reconstr Surg. 1999;104(5): 1325-33.
59. Mock V. Body image in women treated for breast cancer. Nurs Res. 1993;42(3):153-7.
60. Reaby LL, Hort LK, Vandervord J. Body image, self-concept, and self-esteem in women who had a mastectomy and either wore an external breast prosthesis or had breast reconstruction andwomen who had not experienced mastectomy. Health Care Women Int. 1994;15(5):361-75.
61. Cocquyt VF, Blondeel PN, Depypere HT, Van De Sijpe KA, Daems KK, Monstrey SJ, *et al.* Better cosmetic results and comparable quality of life after skin-sparing mastectomy and immediate autologous breast reconstruction compared to breast conservative treatment. Br J Plast Surg. 2003;56(5):462-70.
62. den Heijer M, Seynaeve C, Timman R, Duivenvoorden HJ, Vanheusden K, Tilanus-Linthorst M, *et al.* Body image and psychological distress after prophylactic mastectomy and breast reconstruction in genetically predisposed women: a prospective long-term follow-up study. Eur J Cancer. 2012;48(9):1263-8.
63. Levy J, Bosc R, Warren N, Rebecca S, Dao TH, Hersant B, *et al.* Nipple-Sparing Mastectomy and Immediate Breast Reconstruction With a Deep Inferior Epigastric Perforator Flap: A Study of Patient Satisfaction. Ann Plast Surg. 2018;80(6):639-43.
64. Brandberg Y, Sandelin K, Erikson S, Jurell G, Liljegren A, Lindblom A, *et al.* Psychological reactions, quality of life, and body image after bilateral prophylactic mastectomy in women at high risk for breast cancer: a prospective 1-year follow-up study. J Clin Oncol. 2008;26(24):3943-9.
65. Gross E, Hannoun-Levi JM, Rouanet P, Houvenaeghel G, Teissier E, Ellis S, *et al.* [Evaluation of immediate breast reconstruction and radiotherapy: factors associated with complications]. Cancer Radiother. 2010;14(8): 704-10.
66. Carnevale A, Scaringi C, Scalabrino G, Campanella B, Osti MF, De Sanctis V, *et al.* Radiation therapy after breast reconstruction: outcomes, complications, and patient satisfaction. Radiol Med. 2013;118(7):1240-50.
67. Hopwood P. The assessment of body image in cancer patients. Eur J Cancer. 1993;29A(2):276-81.
68. Juhl AA, Christensen S, Zachariae R, Damsgaard TE. Unilateral breast reconstruction after mastectomy - patient satisfaction, aesthetic outcome and quality of life. Acta Oncol. 2017;56(2):225-31.
69. Kaviani A, Mir M, Daryani A, Bonyadi M, Ebrahimi M, Neishaboury M, *et al.* Quality of Life after Breast Conservation versus Oncoplastic Surgery. Archives of Breast Cancer. 2015;2(2).
70. Kaviani A, Safavi A, Mohammadzadeh N, Jamei K, Ansari-Damavandi M, Salmon RJ.

Oncoplastic surgery in breast conservation: a prospective evaluation of the patients, techniques, and oncologic outcomes. Am J Surg. 2014;208(5):727-34.
71. Deadman JM, Leinster SJ, Owens RG, Dewey ME, Slade PD. Taking responsibility for cancer treatment. So6c Sci Med. 2001;53(5):669-77.
72. Nicholson RM, Leinster S, Sassoon EM. A comparison of the cosmetic and psychological outcome of breast reconstruction, breast conserving surgery and mastectomy without reconstruction. Breast. 2007;16(4):396-410.
73. Schmidt JL, Wetzel CM, Lange KW, Heine N, Ortmann O. Patients' experience of breast reconstruction after mastectomy and its influence on postoperative satisfaction. Arch Gynecol Obstet. 2017;296(4):827-34.
74. Ng SK, Hare RM, Kuang RJ, Smith KM, Brown BJ, Hunter-Smith DJ. Breast Reconstruction Post Mastectomy: Patient Satisfaction and Decision Making. Ann Plast Surg. 2016;76(6): 640-4.
76. Gopie JP, Mureau MA, Seynaeve C, Ter Kuile MM, Menke-Pluymers MB, Timman R, *et al.* Body image issues after bilateral prophylactic mastectomy with breast reconstruction in healthy women at risk for hereditary breast cancer. Fam Cancer. 2013;12(3):479-87.
77. Dauplat J, Kwiatkowski F, Rouanet P, Delay E, Clough K, Verhaeghe JL, *et al.* Quality of life after mastectomy with or without immediate breast reconstruction. Br J Surg. 2017;104(9): 1197-206.