Association Between Breast Reconstruction Surgery and Quality of Life in Iranian Breast Cancer Patients

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Abstract- Breast reconstruction (BR) surgery is not common for the treatment of breast cancer in low- and middle-income countries, including Iran. We evaluated the quality of life (QoL) in Iranian breast cancer patients who underwent BR at the Cancer Institute of Iran. We compared patients who had BR with breast cancer patients who had a radical mastectomy as the control group, matched for age, and time since surgery. We interviewed the cases and controls and collected data about QoL using EORTC-Q30 and EORTC-Q23 questionnaires. We also obtained personal and clinical data for the patients and controls. We compared 61 BR and 45 radical mastectomy patients. The BR patients had a higher level of education (73.8%) than the mastectomy patients (27.3%). In addition, the BR patients had a higher employment rate (58%) than the mastectomy patients (4.4%). QoL was significantly better among BR patients compared to the control group (P<0.05). In the multivariable analyses, the BR patients had significantly lower scores of pain, fatigue, and diarrhoea than the controls. Breast cancer patients who underwent BR surgery had a higher quality of life scores in some domains compared to the radical mastectomy. Socioeconomic factors and awareness of the patients about BR was crucial for choosing BR among Iranian patients.

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Introduction

The incidence rate of breast cancer is increasing in developing countries, including Iran (1,2). Furthermore, breast cancer patients are usually diagnosed with a considerable delay and present a more advanced stage in these countries (2,3). Accordingly, Islamic Republic (I.R.) of Iran and most of low- and middle-income countries will experience a significant increase in the number of potential candidates for breast cancer surgery, including breast reconstruction (BR) in the near future.

BR has evolved to a great extent since its development in the mid-1900s (4). Starting from mammary implants (5,6), different flaps have been performed for this purpose, including old random pattern flaps, pedicle flaps, and recently perforator flaps (4). During this relatively long path, some countries have well kept up with the technology, while others are still in the early stages. Some countries like the US have passed acts to cover BR surgery through insurance as a part of the routine management of breast cancer patients (7), while others offer BR surgery among a few patients (8). The main objective of BR is improving the quality of life of breast cancer patients (9). Due to the extreme multifactorial construct of the quality of life issue, including ethnicity, culture, and socioeconomic factors, it is hard to generalize the results of quality of life studies between countries. Therefore, studies in different countries are required to determine the role of BR in the quality of life of breast cancer survivors.

Most breast cancer patients cannot afford the enhanced or maximal level of treatments in low- and middle-income countries (LMCs) (10). BR surgery is, therefore, an opportunistic operation and it is provided to patients who are aware of this treatment option and can afford it. In addition, only a few centers perform BR. However, data about the quality of life, patient

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satisfaction, and cost-effectiveness of BR is scarce in LMCs. Such data may provide an opportunity for more widespread use of this technique in these countries and enter into the national guidelines in these countries (11).

In this study, we evaluated the quality of life and satisfaction of patients who underwent BR compared to routine radical mastectomy at the Cancer Institute of I.R of Iran, the largest cancer center and pioneer center for BR techniques in the country.

Materials and Methods

Patients

We selected breast cancer patients who had Transverse Rectus Abdominis Myocutaneous Flap (TRAM-Flap) breast reconstruction after a total mastectomy between April 2001 and March 2009 at the Cancer Institute of Iran. We excluded a few patients who had mammary implants or mammoplasty.

We randomly selected a control group who had modified radical mastectomy with or without lymph node dissection at the cancer institute. The controls were individually matched by age (+/- five years) and time since surgery (+/- one year). We excluded patients with metastatic cancer. We collected personal and clinical information of the patients including age, occupation, the number of children, education, place of residence, dates of the first diagnosis of breast cancer, and, the dates of mastectomy and reconstruction. If the patients had more than one reconstruction surgery, the date of the last operation was used as the time for reconstruction.

After obtaining verbal informed consent, those who agreed to participate in the study were interviewed on the phone and a quality of life (QoL) questionnaire was completed for them by an interviewer. We completed the EORTC-Q30 and EORTC-Q23 questionnaires and also a group specific questionnaire for each patient.

Questionnaires

EORTC-Q30 and EORTC-Q23

We used the Iranian version of EORTC-Q30 and EORTC-Q23 questionnaires, which have been formerly translated and validated (12,13).

The EORTC-Q30 is a general 30-item questionnaire for health-related quality of life assessment in cancer patients. The questions were categorized in three domains including global health status, functional scales, and symptom scales. Functional scales assess physical functioning, role functioning, cognitive functioning, emotional functioning, and social functioning. Symptom scale incorporated pain, fatigue, nausea/vomiting, dyspnea, insomnia, loss of appetite, constipation, diarrhea, and financial difficulties. Global health status had a seven-point scale, while other domains were rated in a four-level response system, being transformed to standardized scores from 0 to 100. For the functional scales, the score 100 was assumed as the best score, while for the symptom scales, score 0 represented the best score (13).

The EORTC-Q23 was the breast cancer specific questionnaire consisting of functional scales and symptom scales. Body image, sexual functioning, future perspective, and sexual enjoyment constituted the functional scales, and the domains of the symptom scale included arm symptoms, breast symptoms, side effects of systematic therapy, and being upset by hair loss. Similar to the EORTC-Q30, in this questionnaire a score of 100 was assumed as the highest score for functional scales and 0 was assumed the best score for symptom scales (12).

Patient satisfaction

In addition to the QoL questionnaire, we used additional questionnaires to evaluate patient satisfaction about BR surgery and also about the overall status of patients' knowledge and attitudes about BR (Box 1 and Box 2). The satisfaction assessment tool was based on questionnaires used in previous studies with minor modifications according to our local situation in I.R of Iran. The first six questions of the reconstruction specific questionnaire assessed patient satisfaction in a four-level response category as “Not at All,” “A Little,” “Quite a Bit,” and “Very Much.” A question evaluated if the patients knew about BR surgery and a question explored if they experienced any complications related to BR surgery.

Statistical analysis

We performed descriptive analysis to study patient satisfaction and awareness about breast reconstruction. We used the EORTC QLQ scoring manual to score quality of life items of two groups. To evaluate the difference between two study groups about the quality of life scores, we did linear regression analysis and compared clinical and socioeconomic characteristics of the mastectomy and reconstruction groups using linear regression model. We adjusted for the matching variables, i.e. age and time since surgery in the crude regression model. In the multiple regression models, we included additional personal and clinical variables,

including marital status, the number of children, education, occupation, place of residence, and adjuvant chemotherapy. We used STATA statistical software (Stata Corp, College Station, Texas, 77845 USA, Version 12.1) for statistical analyses. A *P*.value of less than 0.05 was considered as a significant level.

Box 1. Questionnaire about patient satisfaction and their viewpoint about breast reconstruction: Specific for reconstruction group

1. How much do you regard your reconstructed breast as a natural part of your body(Nano, Gill *et al.*, 2005, Han, Grothuesmann, *et al*., 2010)?
2. How much are you satisfied with the shape of your reconstructed breast(Andrade and Semple 2006, Han, Grothuesmann *et al.*, 2010)?
3. How much are you satisfied with the size of your reconstructed breast(Andrade and Semple 2006, Han, Grothuesmann, *et al.* 2010)?
4. How much are you satisfied with the symmetry of your reconstructed breast(Andrade and Semple 2006, Han, Grothuesmann *et al*., 2010)?
5. Overall, how much are you satisfied with your reconstructed breast(Andrade and Semple 2006)?
6. How much would you recommend this surgery to other patients(Nano, Gill et al., 2005)?
7. How much do you regret having this surgery(Nano, Gill *et al.*, 2005)?
8. How did you know you could reconstruct your breast?
9. Did you experience any complications from the surgery? If yes, please describe

Box 2. Mastectomy specific questionnaire about their awareness and willingness to have breast reconstruction

1. If there was a way to reconstruct your breast would you wish to do that?
2. Do you know anything about breast reconstructive surgery?
3. How did you know about that?
4. Why have you not tried it yet?

Results

We found 146 patients who underwent BR at the Cancer Institute of Iran during the study period. Because of limitation in the patient files, changes in the address and telephone contact information and non-response, we could only access and telephone interview 61 patients who underwent BR surgery at the Cancer Institute of Iran. We selected 100 patients who underwent a radical mastectomy at the same time period, from which we could only interview 45 patients. Patients with BR had a higher level of education, i.e. high school diploma or higher education. The percentage of high education was higher in the breast reconstruction group (73.8%) compared to the mastectomy group (27.3%). In addition, the employment rate was higher in the breast reconstruction group (58%) compared to the mastectomy group (4.4%) (Table 1).

We found that patients with BR had significantly higher scores in global health status, physical functioning, role functioning, and emotional functioning. However, after adjustment for marital status, a number of children, education, occupation, place of residence, and chemo-radiation, none of them remained statistically significant (Figure1).

Regarding items of the symptom scale, pain, fatigue, dyspnea, loss of appetite, diarrhea, and financial difficulties were significantly predominant in mastectomy patients compared to BR patients. However, in the multivariable analysis, the only prevalence of pain, fatigue, and diarrhea remained statistically higher among BR patients compared to the control group (Figure 2).

We found that among the mastectomy patients 37.8% were not aware of the possibility of reconstructive surgery. 31% were afraid of further surgery, 29% had financial difficulties in undergoing reconstruction, and rest of them reported other reasons for not doing the surgery yet (Table 2). Among the patients who knew, the surgeons were the most important source of information for BR (44.4%).

Most of the patients who had BR were satisfied with the shape, size, and symmetry of the reconstructed breast and considered it as a natural part of their body (Table 3).

They strongly recommended BR surgery to other patients and a majority of them (84.7%) were not disappointed with BR surgery. 63.6% of the patients experienced no complications after the BR surgery, and the most common complications were a pain (14.8%), infection (6.6%), abdominal hernia (5%), and 10% had other complications including deformity in their breast, DVT, pruritus, scar, fibrosis, and necrosis.

Table 1. Personal and clinical information of breast cancer patients who had radical mastectomy and breast reconstruction surgery at the Cancer Institute of Iran in 2001-2009

Variable		Reconstruction	Mastectomy	*P*-value
No. of children mean (±SD)		2.16(1.07)	3.11(2.15)	0.0070
Age, mean (±SD)		46.75(8.13)	50.21(8.50)	0.039
Education, No. (%)	**Under diploma**	16(26.2)	32(72.7)	
	Diploma	18(29.5)	11(25)	
	Higher education	27(44.3)	1(2.3)	0.000
Place of residence, No. (%)	**Tehran**	29 (47.5)	14(31.1)	
	Other cities	32 (52.5)	31(68.9)	0.09
	Time since surgery(month), mean (±sd)	36.75 (29.13)	46.16(29.97)	0.108
Occupation number (%)	**Employed**	31(50.8)	2(4.4)	
	Unemployed	30(49.2)	43(95.6)	0.00
Marital status, (%) No	**Single**	11(18)	4(8.9)	
	Married	50(82)	41(91.1)	0.19
Chemoradiation, (%) No	**Yes**	55(90)	39 (86.7)	
	No	3(10)	6 (13.3)	0.15

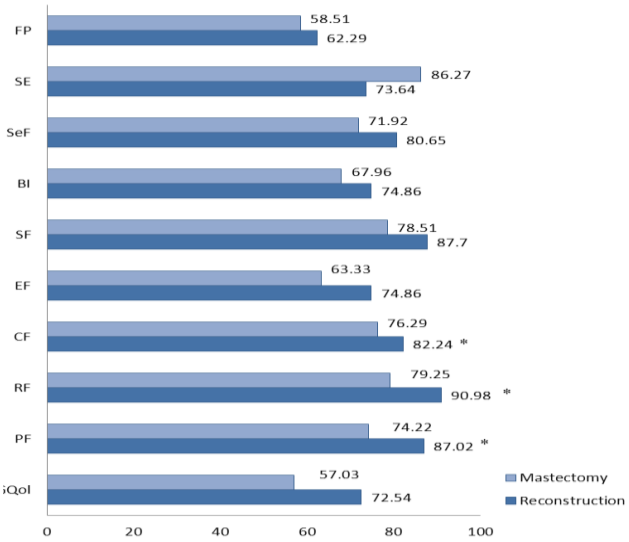

Figure 1. Comparison of the EORTC Questionnaire scores among breast cancer patients who had radical mastectomy alone or underwent breast reconstruction after mastectomy at the Cancer Institute of Iran in 2001-2009.

The asterisk shows significant differences (*P*.value less than 0.05), which was according to the multivariable regression model and adjustment for personal and clinical characteristics. GQol: global health status, PF: physical functioning, RF: role functioning, CF: cognitive functioning, EF: emotional functioning, SF: social functioning, BI: body image, SeF: sexual functioning, FP: future perspective, SE: sexual enjoyment

Table 2. Reasons reported by breast cancer patients who did not undergo breast reconstruction (BR) surgery

Reason	Percent
Unaware of the possibility of the surgery	37.8%
Afraid of additional operation	31%
Financial difficulties	29%
Other reasons*	3.2%

*Other reasons included "Not interested in undergoing BR," "not interested in BR surgery," "no trust in doctors to benefit from BR," "familial issues," "lack of sufficient time," and "being too old."

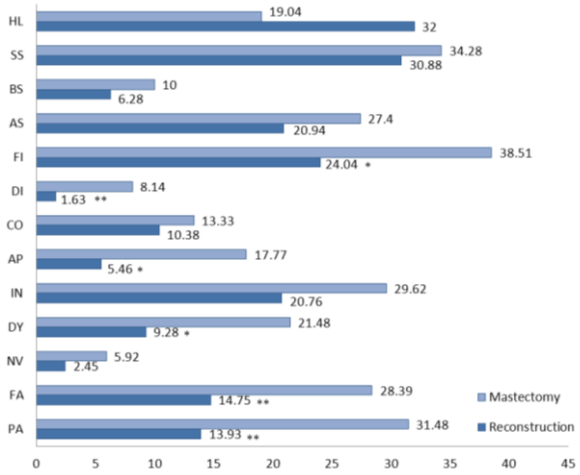

Figure 2. Comparison of the symptom scale of the EORTC scores among breast cancer patients who had radical mastectomy alone or underwent breast reconstruction after mastectomy at the Cancer Institute of Iran in 2001-2009.

The asterisk shows significant differences (*P*.value less than 0.05), which was according to the multivariable regression model and adjustment for personal and clinical characteristics.PA: pain, FA: fatigue, NV: nausea/vomiting, DY: dyspnea, IN: insomnia, AP: loss of appetite, CO: constipation, DI: diarrhea, FI: financial difficulties, AS: arm symptoms, BS: breast symptoms, SS: systematic therapy side effects, HL: upset by hair loss. (∗indicates statistically significant and *P*.values less than 0.05;∗∗indicates statistically significant and *P*.values less than 0.05 based on the multivariable model)

Table 3. Patient satisfaction with breast reconstruction among patients who underwent reconstruction after mastectomy at the Cancer Institute of Iran in 2001-2009

Satisfaction area	Satisfaction (%)			
	Not at all	A little bit	Quite a bit	Very much
Feeling that the reconstructed breast is a natural part of the body	5.1	15.3	35.6	44.1
Satisfaction with the shape of the reconstructed breast	6.8	20.3	37.3	35.6
Satisfaction with the size of the reconstructed breast	6.8	20.3	40.7	32.2
Satisfaction with the symmetry of the breast	6.8	30.5	39	23.7
Overall satisfaction from breast reconstruction	6.8	5.1	42.4	45.8

Discussion

We found that patients who were employed and those with a higher level of education were more likely to perform BR surgery after mastectomy in the I.R of Iran. Breast cancer patients who had BR surgery had significantly higher scores in health-related global quality of life, physical functioning, role functioning, and emotional functioning. However, after adjustment for different personal and clinical characteristics, the association between quality of life measures and performing BR was not statistically significant. This might be due to the fact that the patients who performed BR had a better quality of life compared to the mastectomy group already before the occurrence of breast cancer. In addition, we reported that pain, fatigue, and diarrhea from the symptom scales were significantly lower in BR patients compared to the control group even in the multivariable model. This might be because of psychosomatic disturbances in mastectomy patients as reported in previous studies (17).

Previous studies showed different results about the association between quality of life measures and performing BR. Some studies supported BR surgery, while some others found no significant benefit from BR (14,18-23). Such controversies might be due to the analysis method and selection forces in the BR group, as reported in the current study. Yet, BR is not common in many low- and middle-income countries and larger studies with appropriate study design from these countries are still needed to clarify whether the observed association is due to socioeconomic determinants or BR

itself improves the quality of life of breast cancer patients.

In both reconstruction and mastectomy patients, the surgeons were the main source of information, which was consistent with other studies (11). Although surgeons with their expertise can be the best source to help patients make a rational decision, still the point is that patients may not be offered BR surgery because it is not included in the national guideline and hospital protocols. Therefore, improving patient education and increasing the general knowledge of the community and breast cancer patients may help in propagating this kind of surgery in the country. The rate of BR may also increase if the surgeons receive adequate training about this technique during their training.

Besides the lack of reliable and unrestricted sources of information, the most important reason for avoiding BR surgery was that patients were afraid of further surgeries, which has been found to be important in previous studies as well (17). A more comprehensive preoperational evaluation and patient education may help the selected patients to follow-up their treatment and perform immediate BR after their initial surgery (24). Financial problems were the second reason to avoid BR among Iranian patients. A more widespread use of BR technique in other non-private institutions may decrease the cost of this surgery and help more patients take advantage of BR surgery. Further evidence of the efficacy and cost-effectiveness of BR may convince insurance companies to compensate the cost of BR and extend the use of this type of surgery in LMCs.

We used a case-control approach and matched our control group by age and time since surgery and performed multivariable statistical analyses. The main limitation of this study was the small sample size and low response rate. Early reports of BR in Iran go back to the 1990s (25) and it is still considered a new technique. Still, a limited number of BR surgeries are performed in Iran and many other LMCs. To the best of our knowledge, this is the largest study in the I.R. of Iran to date. We managed to interview 42% or the BR cases and 45% of the selected controls. The low response rate was random, and most of the patients could not be reached because their contact information was not available or patients had changed their address. Therefore, the low response rate was non-differential and did not affect the validity of our findings. In this study, we used the EORTC questionnaire, which is cancer specific and has a breast cancer specific supplement but is not specific for BR. The results of this study must be confirmed in larger multi-centre studies using reconstruction specific questionnaires like the Breast-Q questionnaire (26). Offering the BR surgery by the surgeon and the uptake of this surgery by the patients could be associated with baseline quality of life and socioeconomic status. Therefore, the reverse causation is another concern in this study that needs to be taken into consideration in the interpretation of the results and also in the future studies.

In conclusion, breast cancer patients who underwent BR surgery were highly satisfied with this surgery and had a higher quality of life scores in some domains compared to the radical mastectomy patients. Socioeconomic factors and awareness of the patients about BR was important factors for choosing BR among Iranian patients. A larger study with reconstruction specific questionnaires may provide clear evidence about the benefit of BR in our country.

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