RESEARCH ARTICLE

Evaluation of Factors Impacting Cosmetic Outcome of Breast Conservative Surgery - a Study in Iran

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Abstract

Background: Breast conservative surgery (BCS) followed by radiotherapy is the standard approach in management of stage I-II breast cancer. Several factors can affect cosmetic outcomes. The aim of this study was to evaluate the cosmetic results of BCS and influencing factors in the Iranian Breast Cancer Research Center.

Materials and Methods: Patients who had undergone BCS were included. Photographs were taken of both breasts of the patients in three aspects and were evaluated by three specialists. The cosmetic scores were calculated based on a standard questionnaire. The data were analyzed using univariate and multivariate regression for relationships between cosmetic scores and clinical data.

Results: A total number of 103 patients were included in the study. Mean age and BMI of the patients were 46.8±8.9 and 28.1±3.9, respectively. Breast cup sizes C and D accounted for 74.7% of the study group. The mean cosmetic score obtained from three referees was 5.72±2.06, consisting of 35.9% excellent-good, 35% moderate, and 29.1% unsatisfactory results. Patient BMI, volume of the resected tissue and breast cup size (D) showed significant correlation with the cosmetic score. On multivariate regression analysis, cosmetic score and BMI (p=0.022,) as well as breast cup size (p=0.040), remained significant.

Conclusions: Immediate or delayed symmetrization of the breasts is suggested during breast conservative surgery, meanwhile performing oncoplastic techniques to improve the results significantly. Also it is suggested to discuss anticipation of less satisfactory results with patients having higher BMI and large breast cup size.

Keywords: Breast cancer - breast conservative surgery - cosmetic outcome

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Introduction

Breast conservative surgery (BCS) followed by radiotherapy is the current standard treatment for most breast cancer cases especially in stage I-II. Although some studies have suggested that breast-conserving therapy is associated with higher local recurrence (Sun et al., 2013), several studies have shown that disease free survival as well as overall survival dose not differ significantly between the BCS and Modified Radical Mastectomy (MRM) (Fisher et al., 2002; Veronesi et al., 2002; Abdullah et al., 2013). Even, a recent study suggests that BCT may be associated with a higher breast cancer specific survival rate than mastectomy or mastectomy with radiation (Agarwal et al., 2014). In this point of view, one could consider BCT as the preferred modality of surgical treatment for breast cancer when eligibility criteria are fulfilled. Traditional contraindication to perform BCT includes large tumor size (>5 cm), skin or chest wall involvement, multiceentric tumors, or anticipated poor cosmetic outcome, and whenever radiation therapy is contraindicated (Kaviani et al; 2013).

The main goal of BCS is to remove tumor with clear margin along with conserving the most possible breast tissue to achieve the best possible cosmetic outcome. Cosmetic aspects of breast surgeries has always been one of the critical concerns influencing the patient’s post-operative quality of life.

Cosmetic outcome is the end result of a range of factors which come together under a broad head of surgery, radiotherapy, chemotherapy, and hormonal treatment (Munshi et al., 2009). As an instance the breast tissue would be replaced with fibrotic and fat tissue in older ages which can result poor outcomes compared to patients with younger ages. Factors most frequently reported to be important in final results are patient BMI, breast size, tumor localization, tumor size, specimen weight or volume, type of incision, chemotherapy, and irradiation (Cardoso et al., 2007). Recognizing these factors helps the surgeon to identify patients at higher risk for poor cosmetic
results, discuss the probability of worse cosmetic outcome with the patient and to improve modifiable risk factors.

Most series of surgical treatment of breast cancer in Asian countries report BCT rates lower than 55%. It is encouraging that active measures are being made in certain countries to increase BCT rates (Omranipour et al., 2014). Despite increasing numbers of breast cancer detection in early stages as well as Breast Conserving Surgeries in Iran, no evaluation of cosmetic outcomes has been reported. This cross-sectional study aimed to evaluate cosmetic results and the influencing factors of BCS procedures performed in Breast Cancer Research Center (BCRC) which works as multidisciplinary breast clinic from 1997 in Iran.

Materials and Methods

In a cross-sectional study, patients who had undergone BCS and radiotherapy at the BCRC and were followed in this center were included in the study. Inclusion criteria consisted of 1/ having unilateral BCS with breast cancer diagnosis of stages I, II, or IIIA, 2/ minimum interval time of 6 months since the last radiotherapy session, 3/ compliance to regular routine follow-up for evaluation, and 4/ acceptance to obtain breast photography. Patients with metastasis or tumor recurrence were excluded from the study.

Photographs were taken by a single expert nurse from clavicle to the hypogastric region in three views: Anterior, right oblique and left oblique. All persons gave their informed consent prior to their inclusion in the study. All the photographs were evaluated by three experienced breast surgeons separately (one male and two female). The scoring system suggested by Al-Ghazal was used in this study (Amanda et al., 2006). Five factors including breast volume, breast shape, change in the nipple position, surgical scar, and radiotherapy adverse effects were considered in this assessment and each factor scored between 0 to 2 with the overall score ranging from 0 to 10. Patients with 0-4 score were categorized in fair result group, 5-6 score in moderate group, 7-8 in good result group and 9-10 in excellent group. Cup size of the patients was estimated based on the photography of the contralateral breast. Conventionally, investigators considered cup size A as breasts size ≤65, B as 70-75, C as 80 - 85, and D as ≥85. To evaluate the resected tissue, we used the volume as it was the available data from pathologic records of the patients.

The intra-class correlation coefficient (ICC) analysis was performed after evaluation of thirty patients by referees to confirm the consistency between them. The consistency of the assessment was considered acceptable with ICC ≥0.7. Demographic, clinical, and therapeutic data of the patients were obtained from their clinical records.

The data were analyzed using SPSS-16 software. The mean and standard deviation were used for reporting data with Gaussian distribution, while median and range were used for the non-Gaussian data. The Pearson and Spearman correlation coefficient were used to describe the quantitative relationship of the studied factors. For the mean comparison of two or several factors student t test and ANOVA were used, respectively. The P-value of 0.05 was considered as the statistical significance cut point.

Results

Total number of 350 patients had undergone BCS during 2001-2009 at BCRC of which 103 patients who were compliant to the follow up schedule were included. The mean age of the participants was 46.8±8.9 (26-70) years old. Married women consisted 93% of the study group and 87% of them were gravid. About 74% of the patients were in the C and D breast cup size category.

Mean tumor size was 2.24 cm ±1.14. One percent of the permanent pathologies reported positive margin and required reoperation. The mean volume of resected tissue was 271±234.4 cc. Fifty one percent of the patients were treated with Taxane-containing chemotherapy regimen and Tamoxifen was the most common used hormone therapy (66.7%). Mean time of follow-up for the patients was 28.94±15.9 months ranging from 6 to 95 months.

Three experienced breast surgeons evaluated breast photographs based on the five-item scoring system. The lowest score was for breast asymmetry. The mean total cosmetic score of the patients was 5.27±2.06. Overall, 35.9% of the patients were in the good-excellent category, 35% in moderate and 29.1% in the fair group (Table 1). The male surgeon reported the least scores among three referees. To evaluate the consistency of the scoring between the surgeons, the intra-class correlation coefficient test was performed and the consistency level was 0.719 (0.637-0.790) with 95%CI which was in the acceptable range.

As presented in Table 2, analysis of variables did not show any statistically significant correlation between different clinicopathologic and therapeutic characteristics with cosmetic outcome except for patients’ BMI (p=0.002), Breast cup size (p=0.001) and volume of the resected tissue (p=0.027). The association between patient’s age, tumor size, time of follow-up and number of involved lymph nodes with cosmetic outcome score were not statistically significant, although the correlation coefficient was negative implying the reverse correlation of these factors with cosmetic outcome (Not showed in Tables). Breast cup size was reversely correlated to the cosmetic outcome score implying that patients with higher cup size had lower cosmetic score. To further evaluate the relationship between cup size and cosmetic outcome, the results were analyzed by Post Hoc-Tukey test which revealed that the correlation is in fact between the breast D cup size and cosmetic score.

Variables showed significant correlation in univariate analysis were tested by multivariate linear regression test. Based on the multivariate analysis results, patients’ BMI

<table>
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<tr>
<th>Table 1. Final Results Based on the Mean Score</th>
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<td>Cosmetic result</td>
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<tr>
<td>Poor</td>
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<tr>
<td>Fair</td>
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<td>Good</td>
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<td>Excellent</td>
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The objective of the present study was to evaluate the cosmetic results of breast conserving surgeries and to characterize factors influencing them. The incidence of patients with good or excellent cosmetic result in this series was lower than similar studies and the most important risk factors were large breast cup size and higher BMI.

In this study, the cosmetic results were evaluated by panel. Care should be used in interpreting results where cosmetic outcomes have been obtained from a single evaluator.

Different methods have been suggested to evaluate cosmetic outcome of breast surgery with controversy for deciding the most comprehensive one. The most popular used criteria are suggested by Harris et al (Harris et al., 1979): i) Excellent: the treated breast almost identical to the untreated one. ii) Good: the treated breast slightly

and breast D cup size were the factors that influence the cosmetic outcome of BCS independently (Table 3).

**Discussion**

The objective of the present study was to evaluate the cosmetic results of breast conserving surgeries and to characterize factors influencing them. The incidence of patients with good or excellent cosmetic result in this series was lower than similar studies and the most important risk factors were large breast cup size and higher BMI.

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Different methods have been suggested to evaluate cosmetic outcome of breast surgery with controversy for deciding the most comprehensive one. The most popular used criteria are suggested by Harris et al (Harris et al., 1979): i) Excellent: the treated breast almost identical to the untreated one. ii) Good: the treated breast slightly
different from the untreated breast. iii) Fair: obvious
difference between the two sides without major distortion.
iv) Poor: the treated breast is seriously distorted.

However in more detailed assessment systems like Al-
Ghazal multi-item scoring system which is used in
this study, cosmetic features could be scored which
include: shape and volume symmetry, scar quality and
skin changes. The multi-item scales can provide more
information with regards to what specifically is wrong
with the cosmetic appearance of the breast and should be
corrected. (Amanda et al., 2006)

Overall Cosmetic scores in this study compared to the
other similar study in Iran are lower (Kaviani et al., 2010)
(5.72 of 10 compared to 9 of 14). The difference in the
used scoring system can be considered as one of the main
reasons. Another important reason for higher cosmetic
score in Kaviani’s report would be that the investigators
merely included data of oncoplastic breast surgeries which
uses simultaneous breast tissue reconstructive techniques
compared to our study that covers BCS overall without
summarization. Also our data reported lower score
compared to some similar published international studies
with a rate of excellent and good proportion ranging from
52.9% to 89.8% (Deutsch et al., 2003; Arenas et al., 2006;
Schultz et al., 2008). Meanwhile it should be considered
that in some of them such as Deutsch et al, high cosmetic
score was the result of a single referee evaluation (Deutsch
et al., 2003).

Our study showed that the lowest scores belonged
to the asymmetric breast volume compared to the
contralateral breast followed by breast shape. The high
proportion of patients with C and D breast cup sizes might
be the most reason of breast asymmetry.

In this study three referees scored the breast
photographs with the male oncoplastic surgeon having
the lowest reported scores, a result similar to Fortin et al
study (2006). The mean age of the patients in the present
study was 46.8±8.9 with 63.6% less than 50 years which
was consistent with the similar national study, however
it was lower compared to the international studies. In a
study performed by Johansen et al the mean of patients’
age was 50 (Deutsch et al., 2003), while this value in the
study published by Deutsch et al was 61 years old with
25.3% being younger than 50 (Johansen et al., 2002).

About three forth (74.7% ) of the patients in our
study had breast C and D cup sizes implying their high
breast volumes which resulted in the lower score for their
asymmetry after the surgery compared to the contralateral
breast. High breast size is a commonly mentioned factor
with negative effect on the surgery (Harris et al., 1979; Al-
Ghazal et al., 1999; Cardoso et al., 2007). Tumor location
did not show a significant correlation with cosmetic
results, similar to the results reported by Clarke and Rose
(Clarke et al., 1983; Rose et al., 1989), but Sacchini et al
mentioned that tumors located in the lateral breast region
have better results (Sacchini et al., 1991). Despite the
controversy regarding the correlation of patient age and
cosmetic outcome, most of the studies have reported better
results with lower patient age, a correlation that could
not reach statistical significance in our study. (p=0.48)
(Taylor et al., 1995).

The univariate analysis of this study showed that BMI,
breast size, and resected tissue volume were significantly
effective on the cosmetic results. Clarke et al noted a
 correlation between body weight and cosmetic results,
with patients less than 55 kg having excellent cosmesis
in 90%, whereas a group weighing more than 73 kg had
only 46% excellent outcomes (Clarke et al., 1983). This
latter finding may also be related to breast size because
heavier women have usually larger breasts with more fat.

As we noted, the lowest cosmetic score between five
items of scoring system in this study was for asymmetry
and in large breasts difference in breasts’ size would be
more distinguishable. The worst outcome was for patients
with cup size D after multivariate analysis which approve
other studies (Harris et al., 1979).

Volume of the resected breast tissue had a direct impact
on cosmesis. Only isolated small studies have not shown
any correlation between extent of surgical excision and
cosmesis (Touboul et al., 1995). Olivotto et al suggested
that tumors greater than 70 cm3 result in a significant
increase in the number of cosmetic failures (Amanda
et al., 2006). Garofalo et al overcome this problem by
performing a contralateral quadrantectomy to achieve
symmetry of both sides (Garofalo et al., 1992).

Beside the common studied factors, correlation of
other probable factors such as marital status, pregnancy
history, side of the operated breast, hormone therapy
regimen, chemotherapy regimen, as well as axillary
incision type with cosmetic score were evaluated in the
study, but no significant correlation was found. In spite
of our results, in a study with 6.6 years follow up of 266
patients, Johansen et al found performing chemotherapy
with CMF regimen and radiotherapy as two more effective
factors on cosmetic results (Johansen et al., 2002).

In conclusion, the results of this study showed that
volume of the resected tissue, BMI, and breast cup
size have correlation with lower cosmetic outcome in
breast conservative surgery. Within these factors BMI
and breast size are impossible or hard to change, but
it should be mentioned to patients that their chance of
getting satisfactory results may be not as good as usual
and consider symmetrization for the contralateral breast.

Volume of the resected tissue is the single modifiable
factor. Attending balance between this factor and
oncologically safe margin is the main challenge for
surgeons during BCS. Applying Oncoplastic breast surgery
(OBS) that provide both of these aspects is an answer to
this problem. Different techniques of OBS have been
introduced in recent years, the investigations on aesthetic
outcomes after OBS are very few. According to these few
studies it seems that there are some important advantages
for OBS in comparison with the other traditional surgeries.

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