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Quality of life in breast cancer patients after immediate two-stage reconstruction

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ABSTRACT

Objective. To assess the quality of life and satisfaction with postoperative outcomes in patients with breast cancer after immediate two-stage breast reconstruction.

Material and methods. We analyzed aesthetic results and satisfaction with postoperative outcomes in 176 women aged 23-63 years (mean 42.9±8.1) with various stages of breast cancer. All patients underwent total mastectomy and immediate two-stage breast reconstruction with tissue expander/implant.

Results. According to the Assessment of Cosmetic Results after Organ-Preserving Operations, Oncoplastic Resections, Reconstructive Plastic Surgery in Patients with Breast Cancer questionnaire, mastectomy with immediate two-stage breast reconstruction was followed by excellent results in 21.9% (16/73) of cases, good results — 64.4% (47/73), satisfactory results — 13.7% (10/73). According to the BREAST-Q questionnaire, all women were satisfied with post-reconstruction outcomes: reconstructed mammary gland — 64 scores, postoperative result — 70 scores, psychosocial well-being — 68 scores, sexual well-being — 64 scores, physical well-being — 80 scores.

Conclusion. Immediate two-stage breast reconstruction has a beneficial effect on psycho-emotional state of women. A two-stage breast reconstruction technique with tissue expanders and implants usually provides good and excellent cosmetic results.

Keywords: *breast cancer, immediate single-stage and two-stage reconstruction, radiotherapy, silicone implant, tissue expander, BREAST-Q.*

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Introduction

Surgical treatment is necessary in most patients with breast cancer despite modern possibilities of therapy. To date, 72.5% of breast cancer cases are detected at stages I-II in Russia that usually provides organ-sparing, favorable aesthetic results and high patient satisfaction. However, organ-sparing treatment is not always possible. Therefore, mastectomy is often preferable (20–30% of cases) [1, 2].

The main goal of treatment of cancer is oncological control of disease. Currently, improvement of cosmetic results is important in breast cancer surgery to reduce physical and psychological trauma. Breast surgery has undergone various changes since the 19th century. In 1882, Dr. William Stewart Halsted presented total mastectomy at the Roosevelt Hospital in New York. In 1932, Patey D.H. performed the first mastectomy with preservation of the pectoralis major muscle at the Middlesex Hospital in London. In 1972, John Madden et al. described a modified total mastectomy with preservation of the pectoralis major and minor muscles. Skin-sparing and subcutaneous mastectomy with simultaneous reconstruction has been performed since 1991. This approach provides favorable aesthetic results and high patient satisfaction [3, 4, 20–25].

Moreover, higher survival of breast cancer patients actualized the problem of quality of life. That is why breast reconstruction with implants is currently an important part of combined / complex treatment in appropriate patients. Breast reconstruction does not affect survival. However, reconstruction restores breast anatomy and relieve psycho-emotional stress associated with mastectomy [5–7].

Siotos C. et al. [8] analyzed risk of recurrence and 5-year survival in 1517 women who underwent surgical treatment of breast cancer with (1013/66.8%) and without (504/33.2%) reconstruction between 2003 and 2015. Mean follow-up period was 5.1 years. Recurrence rate was similar in both groups (hazard ratio 1.08; 95% CI 0.69–

1.69). There was no significant difference in overall survival (HR 0.78; 95% CI 0.53–1.13). According to the authors, breast reconstruction does not adversely affect either overall survival or recurrence rate in patients with breast cancer.

There are various options for breast reconstruction: immediate and delayed procedures, tissue expanders/silicone implants, autologous flaps or their combination. The choice of approach depends on individual parameters and provides the most personalized treatment [9].

However, the choice of optimal method of breast reconstruction must be justified, and excellent/good postoperative aesthetic results are still a challenge for oncologist.

Lei C. et al. [10] identified the absence of radiotherapy ($p<0.001$) and preservation of the nipple-areolar complex ($p<0.001$) as positive predictors of higher patient satisfaction after breast reconstruction. Overall satisfaction and satisfaction with aesthetic results throughout 4-year follow-up period were similar after breast reconstruction with implants and autologous tissues.

Schmidt J.L. et al. [11] reported that patients who paid attention to breast size and shape prior to surgery were more likely to agree to breast reconstruction. According to these authors, patients who emphasized the role of the breast before surgery demonstrate lower satisfaction with breast reconstruction.

Thus, it is necessary to consider the impact of reconstructive surgeries on the quality of life and patient satisfaction in addition to excellent/good aesthetic results. These variables have become a fundamental part of successful breast surgery [12].

Various questionnaires have been proposed to assess satisfaction of patients undergoing surgical treatment for breast cancer. Ten years ago, only a few of these questionnaires had sufficient evidence base in patients after breast reconstruction [13].

In 2009, the BREAST-Q questionnaire was developed for this purpose. To date, it is a professional tool specific for breast surgery. This questionnaire improved analysis of results of breast reconstruction regarding patient satisfaction [14, 26].

Pusic A., Klassen A. and Cano S. developed the BREAST-Q questionnaire. The rights to this questionnaire belong to the Memorial Sloan-Kettering Cancer Center and Columbia University (USA). Version 2.0 has been presented since 2017. It was tested on the larger sample. The BREAST-Q questionnaire consists of 6 modules (2 modules related to satisfaction with aesthetic result after augmentation and reduction mammoplasty and 4 modules related to satisfaction with surgical treatment of breast cancer (mastectomy, reconstructive surgery and organ-sparing surgery) and preoperative expectations from reconstructive surgery). All modules consists of 6 items divided into 2 groups. The first group is related to the quality of life and includes physical, psychological and sexual well-being. The second group is related to patient satisfaction and includes satisfaction with mammary gland, result and medical care. Each module (except for preoperative expectation of reconstructive surgery) contains preoperative and postoperative scales that can be used in a separate or combined format to measure satisfaction with postoperative outcomes [15–17].

The questionnaire "Evaluation of cosmetic results after organ-sparing surgeries, oncoplastic resections, reconstructive plastic surgeries in patients with breast cancer" was approved at the VIII All-Russian Congress of the Russian Society of Mammary Oncologists (ROOM) in Krasnodar on September 9, 2021. This questionnaire was updated on June 13, 2022. This questionnaire allows both the patient and the doctor to assess aesthetic results of surgery, satisfaction with quality of life, psycho-emotional state, advantages and disadvantages of surgical intervention [18, 19].

Material and methods

We analyzed postoperative outcomes in 176 women with breast cancer between 2014 and 2020. Patients underwent simultaneous breast reconstruction with tissue expander and its subsequent replacement by silicone implant.

The follow-up period was 42.12±2.68 months (max 105, min 6). Age of patients ranged from 23 to 63 years (mean 42.9±8.1 years). There were 80 (45.5%) patients aged 41-50 years. Stages of breast cancer are presented in **Table 1**. The majority of patients had early stages of disease (IA-IIA).

According to histological data, breast cancer without signs of specificity was the most common (116 (65.9%) patients). Molecular biological types of tumors are presented in **Table 2**.

At the first stage of simultaneous breast reconstruction, 55 (31.25%) patients underwent subcutaneous mastectomy with simultaneous reconstruction by the pectoralis major muscle and tissue expander; 121 (68.75%) patients underwent skin-sparing mastectomy with simultaneous reconstruction by the pectoralis major muscle and tissue expander. Five (2.84%) patients with BRCA1 mutation underwent preventive mastectomy. Other 10 patients

Table 1. **Stages of breast cancer**

Breast cancer stage pTNM	Number of patients	
	n	%
Stage 0 (pTis(DCIS)N0M0)	4	2.3
Stage I (pT1N0M0)	43	24.4
Stage IIA (pT1-2N0-1M0)	53	30.1
Stage IIB (pT2-3N0-1M0)	35	19.8
Stage IIIA (pT1-3N1-2M0)	25	14.2
Stage IIIB (pT4N0-2M0)	10	5.6
Stage IIIC (pT1-4N3M0)	6	3.6
Total	176	100

Table 2. **Molecular biological types of tumors**

Molecular biological type of tumor	Number of patients	
	n	%
Luminal type A	60	34.09
Luminal type B, Her2/neu positive	35	19.89
Triple negative type	32	18.18
Luminal type B, Her2/neu negative	25	14.20
Non-luminal type, Her2/neu positive	16	9.09
In situ (ER+, PR+/ER–, PR–)	8	4.55
Total	176	100

with gene polymorphism refused preventive mastectomy of contralateral mammary glands.

Tissue expander was implanted in all patients at the first stage of simultaneous two-stage breast reconstruction. Tissue expander with a built-in port was the most common (151 (85.8%) cases). Mean volume of expander was 388.7±8.42 ml (min 215 ml, max 650 ml).

The second stage of simultaneous two-stage breast reconstruction implied replacement of tissue expander by silicone implant (135 (75.9%) out of 176 patients after primary treatment). The second stage of replacing the tissue expander by silicone implant was not performed in 42 women. There were complications in 15 (8.4%) cases including infection in 8 (4.4%) patients, protrusion in 3 (1.7%) patients, disrupted expander in 2 (1.1%) patients, persistent seroma in 1 (0.6%) patient, inframammary fold displacement in delayed period with migration of tissue expander to anterior abdominal wall in 1 (0.6%) patient. Twenty-one (11.9%) patients underwent treatment in another hospital. Three (1.7%) patients died from progression of the underlying disease before the second stage of reconstruction. Two (1.1%) patients died from pulmonary embolism.

Mean period between both stages of breast reconstruction was 343.5±3.25 days.

At the second stage of breast reconstruction, tissue expander was replaced by silicone implant (textured coating — 51.5% (70/135) of cases, polyurethane coating — 48.5% (65/135) of cases). Mean volume of implant was 395.7±5.7 ml (range 175-665).

To achieve the best aesthetic result after the second stage, we performed symmetrizing and prophylactic procedures on the contralateral mammary gland (contralateral augmentation mammoplasty — 16 (11.9%) out of 135 patients, reduction mammoplasty — 15 (11.1%) patients, periareolar augmentation mastopexy — 13 (9.6%) patients).

All women received comprehensive treatment in accordance with the stage and morphological type of cancer. Neoadjuvant therapy was performed in 25.6% (45/176) of patients, adjuvant therapy — in 51.1% (69/176) of patients, radiotherapy — in 55.5% (75/135) of patients, targeted therapy — in 21.5% (29/176) of patients, hormonal therapy — in 64.4% (87/176) of patients.

To study satisfaction with postoperative results, we surveyed our patients using the BREAST-Q questionnaire and the questionnaire "Evaluation of cosmetic results after organ-sparing surgeries, oncoplastic resections, reconstructive plastic surgeries in patients with breast cancer".

Results and discussion

Seventy-three (54%) patients filled both questionnaires before and after treatment. The BREAST-Q survey data are presented in **Fig. 1**.

In half of the cases, scores decreased by 16 points or more after treatment in the module "Satisfaction with the breast before and after surgery". In the module "Satisfaction with the result of reconstruction", scores decreased by 17 points in half of the cases after treatment. Scores of psycho-emotional state decreased by 22 points after reconstruction, sexual well-being — by 16 points, physical well-being — by 10 points ($p<0.05$).

Postoperative cosmetic results are important not only for patients, but also for doctors. Importantly, physician's score was lower in all cases. **Table 3** presents the results of patient survey according to the questionnaire "Evalua-

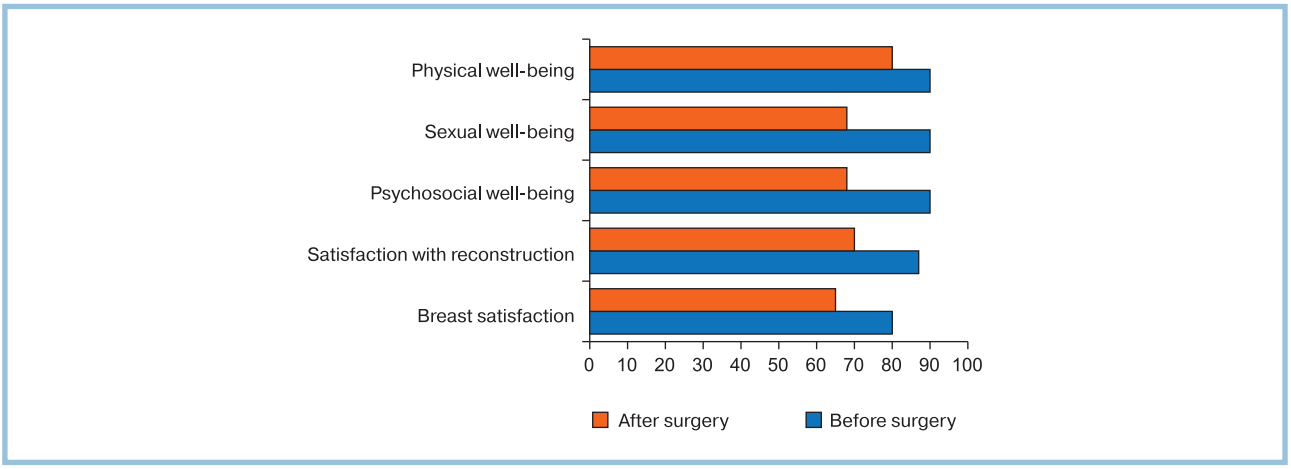


Fig. 1. **BREAST-Q survey data.**

Table 3. **Evaluation of cosmetic results after organ-sparing surgeries, oncoplastic resections, reconstructive plastic surgeries in patients with breast cancer**

Result	Simultaneous breast reconstruction		
	Patient's score	Mean score	Physician's score
Excellent result	16 (21.9%)	12 (16.4%)	3 (4.1%)
Good result	47 (64.4%)	49 (67.2%)	39 (53.4%)
Satisfactory result	10 (13.7%)	12 (16.4%)	31 (42.5%)
Total	73 (100%)	73 (100%)	73 (100%)

tion of cosmetic results after organ-sparing surgeries, oncoplastic resections, reconstructive plastic surgeries in patients with breast cancer".

We found good, excellent and satisfactory results in 49 (67.2%), 12 (16.4%) and 12 (16.4%) patients, respectively. There were no unsatisfactory outcomes.

We also analyzed the results depending on surgical treatment (subcutaneous and skin-sparing total mastectomy). Mean physician's score was 3.1 for subcutaneous mastectomy and 3.3 for skin-sparing mastectomy, patient's scores — 3.78 and 3.7, respectively. Mean overall score for subcutaneous mastectomy was 3.55 points, for skin-sparing mastectomy — 3.52 points. The questionnaire "Evaluation of cosmetic results after organ-sparing surgeries, oncoplastic resections, reconstructive plastic surgeries in patients with breast cancer" revealed no significant differences between subcutaneous and skin-sparing mastectomy ($p > 0.05$).

Radiotherapy has the greatest effect on aesthetic results of reconstruction. Therefore, we compared the results depending on radiotherapy. Mean physician's score was 3.45 points without radiotherapy and 3.2 points with radiotherapy ($p > 0.05$), patient's scores — 3.85 and 3.50 points, respectively ($p < 0.05$). Mean scores of patient satisfaction with postoperative outcomes according to the questionnaire "Evaluation of cosmetic results after organ-sparing surgeries, oncoplastic resections, reconstructive plastic surgeries in patients with breast cancer" in groups with and without radiotherapy are presented in **Fig. 2.**

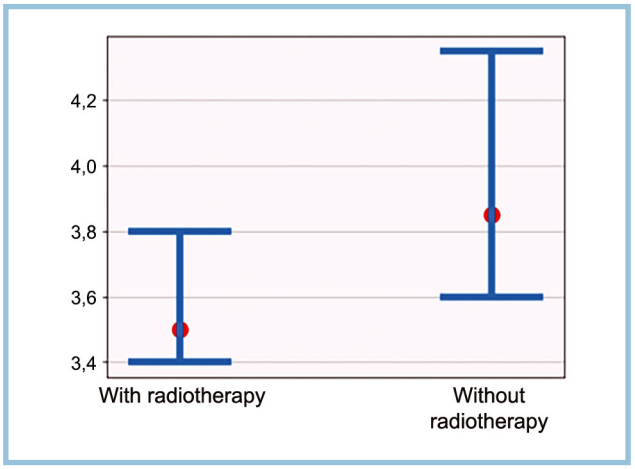


Fig. 2. **Satisfaction with postoperative results in patients with and without radiotherapy according to the questionnaire "Evaluation of cosmetic results after organ-sparing surgeries, oncoplastic resections, reconstructive plastic surgeries in patients with breast cancer".**

Conclusion

According to the questionnaire "Evaluation of cosmetic results after organ-sparing surgeries, oncoplastic resections, reconstructive plastic surgeries in patients with breast cancer", simultaneous two-stage breast reconstruction as one of the surgical methods for breast cancer provides good and excellent aesthetic results. Both the patient and physician can evaluate postoperative results using this questionnaire. According to the BREAST-Q questionnaire, this intervention has a beneficial effect on psycho-emotional state of patients and contributes to sexual and physical well-being. Thus, the above-mentioned questionnaires can be recommended for oncologists and plastic surgeons to assess the results of breast reconstruction. Moreover, simultaneous two-stage breast reconstruction can be recommended in appropriate patients when planning radiotherapy.

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