

Original Article

Effect of modified radical mastectomy combined with latissimus dorsi musculocutaneous flap breast reconstruction on patients' psychology and quality of life

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Abstract: Background: Breast carcinoma (BC) is a commonly seen malignancy in women. Although traditional radical mastectomy can improve the survival of patients, it can cause breast loss and chest wall deformities, which seriously affects the daily life of patients and causes anxiety and depression. The purpose of this research project is to investigate the effect of breast reconstruction with latissimus dorsi myocutaneous flap (LDMF) after nipple- and areola-sparing modified radical mastectomy (MRM) on the psychological mood and quality of life (QoL) of patients with stage I BC. Methods: A total of 102 patients with BC (research group, RG) treated in the Shanghai Fifth People's Hospital, Fudan University from January 2018 to December 2020 were selected for phase I breast reconstruction with LDMF after nipple- and areola-sparing MRM. Concurrently, 50 BC patients (control group, CG) who underwent traditional total mastectomy in our hospital were collected. The activities of daily living (ADL), self-rating anxiety scale (SAS) and self-rating depression scale (SDS) scores were observed before and 1 month after treatment. The intraoperative indicators, postoperative complications, postoperative satisfaction rate and overall survival rate were compared. Results: The Functional Assessment of Cancer Therapy-Breast Cancer (FACT-B) score was higher after treatment, while SAS and SDS scores were lower in RG than in CG ($P < 0.05$). No statistical difference was observed in intraoperative blood loss, wound drainage time, operation time, postoperative complications and overall survival rate between the two cohorts ($P > 0.05$). RG showed higher satisfaction degree and overall satisfaction rate, as well as better QoL than CG ($P < 0.05$). Conclusions: Breast reconstruction with LDMF after nipple- and areola-sparing MRM can alleviate adverse emotions of patients with stage I BC and improve their QoL.

Keywords: Nipple- and areola-sparing modified radical mastectomy, breast reconstruction with latissimus dorsi myocutaneous flap, stage I breast carcinoma, quality of life

Introduction

Breast carcinoma (BC) is the most common cancer among women, accounting for 25.1% of all cancers. Global statistics in 2018 showed 1.4 million new cases and 460,000 deaths per year [1]. According to research data, there are some geographical differences in the incidence and mortality of BC. In developed countries, the incidence and mortality rates of BC are gradually decreasing, while the opposite is true in less developed countries [2]. We speculated that the main reason may be related to the popularization of early screening and the difference in treatment methods [3, 4]. Des-

pite the great strides in treating BC in China, BC is still one of the major malignancies threatening women's lives. Therefore, finding an effective treatment is an urgent need.

As the first choice for early clinical treatment of BC, surgery can effectively reduce the possibility of recurrence by excising lesions and dissecting lymph nodes [5]. Whereas, following traditional radical mastectomy, patients are prone to complications such as edema caused by extensive trauma [6]; Moreover, breast loss, chest wall deformities, armpit depression and posture deformation will change the female physiological characteristics and unique curvi-

linear beauty of patients, which will cause serious psychological impact and pressure on patients and even affect their interpersonal relationship, social adaptability and family stability [7, 8]. Breast-conserving surgery, as a commonly used clinical treatment for patients with early BC, can satisfy patients' desire to preserve breasts, maintain image, and meet their psychological needs [9]. Stage I breast reconstruction after modified radical mastectomy (MRM) is a common clinical treatment in recent years [10]. A study found that patients undergoing breast-conserving surgery combined with radiotherapy and chemotherapy showed equivalent efficacy but higher satisfaction compared with patients undergoing total mastectomy [11].

Herein, we compared the effects of latissimus dorsi myocutaneous flap (LDMF) breast reconstruction after nipple- and areola-sparing MRM and traditional radical mastectomy on the psychological mood and quality of life (QoL) of patients with stage I BC, aiming to provide reference for clinical treatment.

Methods and materials

Clinical data

From January 2018 to December 2020, 102 patients with stage I BC all receiving LDMF breast reconstruction after nipple- and areola-sparing MRM in the Shanghai Fifth People's Hospital, Fudan University were selected as the research group (RG). Concurrently, 50 BC patients who underwent traditional total mastectomy were collected as the control group (CG). This study, which is a retrospective analysis, was approved by the internal Medical Ethics Committee, with the Ethical Approval No. of (2020) Ethics Review (124 for the record).

Inclusion and exclusion criteria

Inclusion criteria: All the enrolled patients were diagnosed as BC by pathological biopsy, with complete general information, clinical stage I-II, and unilateral lesion.

Exclusion criteria: Dropouts, patients with prior targeted treatment before enrollment, other malignant tumors, poor treatment compliance or those who were lost to followed up were excluded.

Treatment methods

Patients in RG underwent three procedures, namely surgical resection of the lesion, free and selection of the donor LDMF, and breast reconstruction. **Surgical excision of the lesion:** The patients were placed in lateral decubitus position on the healthy side under general anesthesia. The upper limb of the affected side was lifted, abducted, and fixed on the anesthesia frame with a bandage. Then, a round or elliptical incision was made with the primary tumor as the center, with the surgical margin >5 cm from the tumor and the distance of the tumor from the areola >3 cm. The reserved nipple and areola were collected for routine inspection, and the intraoperative serial sections obtained intraoperatively were quickly frozen for pathological examination to eliminate the possibility of residual tumors. **Free and selection of the donor LDMF:** The free flap was injected with adrenaline saline under the dermis, and the thickness of the separated flap was kept within 0.5-0.8 cm (the flap near the tumor was thinner, and that far from the tumor was thicker). The scope of excision was the breast tissue, as well as part of the breast skin including the tumor and pectoralis major and minor muscles. Then axillary lymph node dissection was performed. Thereafter, an oblique spindle incision with a width of 6-8 cm was made 3-5 cm from the subscapular angle of the latissimus dorsi. The adrenaline saline was injected under the skin flap, which was then freed, and the subcutaneous adipose tissue with a thickness of 0.5 cm was retained. The capillary network under the dermis was protected during the LDMF-free process to avoid extensive necrosis. The scope of skin extraction included completely severed latissimus dorsi insertion, LDMF, adipose tissue on the latissimus dorsi surface, island skin on the flap surface, adipose tissue in scapula area, breast adipose tissue on the front side of latissimus dorsi and adipose tissue above iliac crest. The length and thickness were determined during skin removal, and the volume was depended on contralateral breast shape. **Breast reconstruction:** The axilla and subscapula were separated subcutaneously, and the donor LDMF was placed in the chest through the subcutaneous tunnel to avoid flap curling and folding. The location of the flap was determined according to the intraoperative chest incision,

and the redundant incision was repaired. The obtained flap was then sutured and fixed at the upper edge of the pectoralis major muscle, and the muscle adipose tissue of the distal and marginal part of the latissimus dorsi was folded into a cone for final fixing. The shape and size of both breasts were kept consistent. After surgery, negative pressure drainage tubes were placed in the dorsal donor area and axilla for drainage. Patients in CG underwent traditional radical mastectomy, which was performed according to the method of Liu et al. [12]. Patients in CG underwent traditional total mastectomy. A fusiform incision was made, and the tumor, nipple, skin and all breast were removed along the edge of the tumor by 3 cm. The pectoralis major and pectoralis minor were retained. Axillary lymph node dissection was then performed until level II group (included) of axillary lymph nodes.

Postoperative cleaning

The patency of the dorsal drainage tube was maintained. The patients were in the semi-seating and supine position and padded with a soft pillow at the waist and hip to keep the drainage tube unobstructed. Analgesic treatment was performed according to the postoperative pain of patients. The dorsal and axillary drainage tubes were removed when the volume was less than 10 mL/d. Early ambulation was encouraged, and rehabilitation training was carried out 1 week after surgery. Postoperatively, all patients received ET regimen (epirubicin (Shandong New Times Pharmaceutical Co., Ltd., China, SFDA Approval Number: H20213436) + paclitaxel (Shanghai Shangyao Xinya Pharmaceutical Co., Ltd., China, SFDA Approval Number: H20113538)) for adjuvant chemotherapy, and those with axillary lymph node metastasis were treated by postoperative radiation therapy. Endocrine therapy (tamoxifen) was given to patients with estrogen receptor (ER) and/or progesterone receptor (PR) positive.

Endpoints

Primary endpoints: Activities of daily living (ADL) [13] were compared between the two groups before treatment and 1 month after treatment, and the Functional Assessment of Cancer Therapy-Breast Cancer (FACT-B) score was adopted to measure the health related QoL

of BC patients from the following five domains: physical, social, emotional, functional well-being as well as a breast-cancer subscale (BCS) [14]. The Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS) [15] were utilized to compare the anxiety and depression of patients before and one month after treatment. Each of the two scores have 20 items, with the highest score being 80 points and the lowest score being 20 points. The score was in proportion to the severity of anxiety and depression. The postoperative survival of patients was statistically analyzed.

Secondary endpoints: Clinical data, intraoperative indicators (blood loss, wound drainage time, operation time), and postoperative complications were compared. The postoperative patient satisfaction rate was evaluated using a self-made appearance satisfaction questionnaire (scar color, breast scar, breast symmetry). The total score was 100 points, with >85 being very satisfied, 65-85 being satisfied and <65 being dissatisfied. Satisfaction = (very satisfied + satisfied) cases/total cases × 100%. The overall survival rate of the two cohorts was observed.

Statistical analysis

SPSS20.0 and GraphPad 5 software packages were used for data analysis and image rendering, respectively. Categorical and continuous variables were described in the form of (percentages) and (mean ± standard deviation), and the differences were analyzed using the Chi-square test and T test, respectively, with P<0.05 as the significance level.

Results

Comparison of clinical data

The comparison of patient clinical data revealed no significant difference in age, body mass index (BMI), clinical stage, lesion location, ER, PR, human epidermal growth factor receptor 2 (HER2) and menopause between the two cohorts (**Table 1**, P>0.05).

Comparison of QoL scores before and after treatment

We compared the QoL scores of patients before and after treatment using the FACT-B

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Table 1. Comparison of patient baseline data between the two groups

Variables	Control group (n=50)	Research group (n=102)	P value
Age			
≥8 years old	28 (56.00)	56 (54.90)	0.898
<39 years old	22 (44.00)	46 (45.10)	
BMI (kg/m ²)			
≥9	35 (70.00)	72 (70.59)	0.941
<20	15 (30.00)	30 (29.41)	
Clinical staging			
Stage I	28 (56.00)	62 (60.78)	0.683
Stage IIa	16 (32.00)	32 (31.37)	
Stage IIb	6 (12.00)	8 (7.84)	
Lesion location			
Left	26 (52.00)	49 (48.04)	0.646
Right	24 (48.00)	53 (51.96)	
ER			
+	27 (54.00)	60 (58.82)	0.572
-	23 (46.00)	42 (41.18)	
PR			
+	35 (70.00)	65 (63.73)	0.444
-	15 (30.00)	37 (36.27)	
HER2			
+	27 (54.00)	51 (50.00)	0.643
-	23 (46.00)	51 (50.00)	
Pausimonia			
Yes	12 (24.00)	35 (34.31)	0.196
No	38 (76.00)	67 (65.69)	

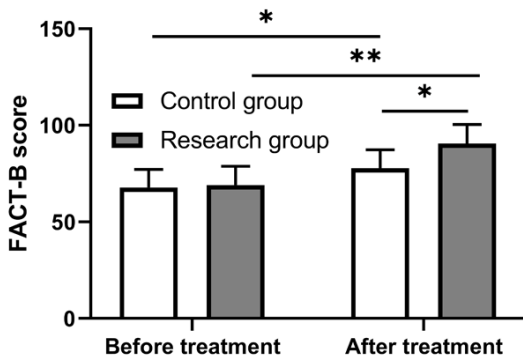


Figure 1. Changes of FACT-B scores in two groups before and after treatment. *P<0.05, **P<0.01.

score. The comparison identified that there was no significant difference in the FACT-B score between the two cohorts before treatment (P>0.05), but after treatment, the score in RG was significantly higher than that in CG (Figure 1, P<0.05).

Anxiety and depression scores before and after treatment

The anxiety and depression of patients were assessed before and after treatment using SAS and SDS scores. The comparison showed no statistical difference in SAS and SDS scores between the two cohorts before treatment (P>0.05), but RG indicated markedly lower SAS and SDS scores of RG than CG after treatment (Figure 2, P<0.05).

Comparison of intraoperative indexes

We also compared the intraoperative indexes between the two cohorts. The results revealed no statistical difference in intraoperative blood loss, wound drainage time and operation time between the two cohorts (Figure 3, P>0.05).

Comparison of postoperative complications

This study also compared the incidence of postoperative complications. Skin flap effusion, flap/marginal necrosis, dyskinesia of the affected limb, and hematoma were observed in 18, 7, 10, and 11 cases respectively in RG, and 6, 4 and 3, and 4 cases respectively in CG. The comparison showed no statistical difference in postoperative complications between the two cohorts (Table 2, P>0.05).

Comparison of postoperative patient satisfaction rate

In this study, the satisfaction degree of patients after treatment was compared. In RG, 80 patients were very satisfied, 22 were satisfied, and 0 were dissatisfied, with a total satisfaction rate of 100.00%. In contrast, 12 patients in CG were very satisfied, 15 were satisfied and 23 were dissatisfied, with a total satisfaction rate of 54.00%. Through comparison, it was found that the satisfaction degree and the overall satisfaction rate of patients were higher in RG than in CG (Table 3, P<0.05).

Comparison of patient survival

Last, we compared the postoperative survival rate between the two cohorts. The follow-up period was up to June 2021, and the follow-up success rate was 100.00%. The comparison showed no statistical difference in the overall survival rate between CG and RG (Figure 4, P>0.05).

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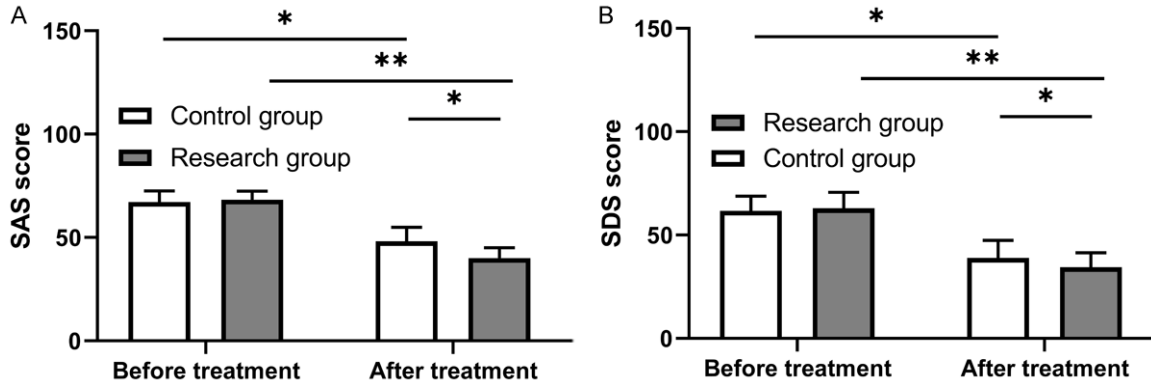


Figure 2. Changes of SAS and SDS scores in two groups before and after treatment. A. Changes of SAS score in two groups before and after treatment. B. Changes of SDS score in two groups before and after treatment. * $P < 0.05$, ** $P < 0.01$.

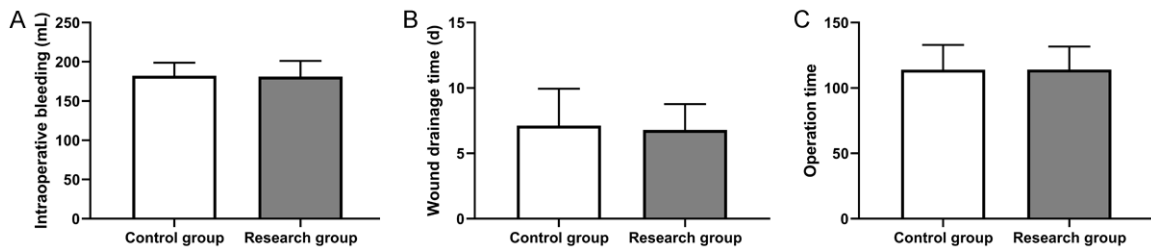


Figure 3. Comparison of intraoperative blood loss, wound drainage time and operation time. A. Comparison of intraoperative blood loss between the two groups. B. Comparison of wound drainage time between the two groups. C. Comparison of operation time between the two groups.

Table 2. Comparison of postoperative complications between the two groups

Groups	Skin flap effusion	Skin flap/marginal necrosis	Dyskinesia of the affected limb	Hematoma
Control group (n=50)	6 (12.00)	4 (8.00)	3 (6.00)	4 (8.00)
Research group (n=102)	18 (17.65)	7 (6.86)	10 (9.80)	11 (10.78)
X^2 value	0.805	0.064	0.621	0.292
P value	0.369	0.799	0.431	0.589

Table 3. Comparison of postoperative satisfaction rate between the two groups

Groups	Very satisfied	Satisfied	Dissatisfied	Overall satisfaction rate
Control group (n=50)	12 (24.00%)	15 (30.00%)	23 (46.00%)	54.00%
Research group (n=102)	80 (78.43%)	22 (21.57%)	0 (0.00%)	100.00%
X^2/Z value		-7.380		55.294
P value		<0.001		<0.001

Discussion

The constant changes in lifestyle and the continuous improvement of people's living standards have driven the increasing incidence of BC-the most common and one of the major

neoplastic diseases threatening women's health [16]. Due to the absence of obvious symptoms in early stage, BC is easily ignored by patients, leading to delayed treatment and poor prognosis [17]. As an important scheme for clinical treatment of early BC, surgical

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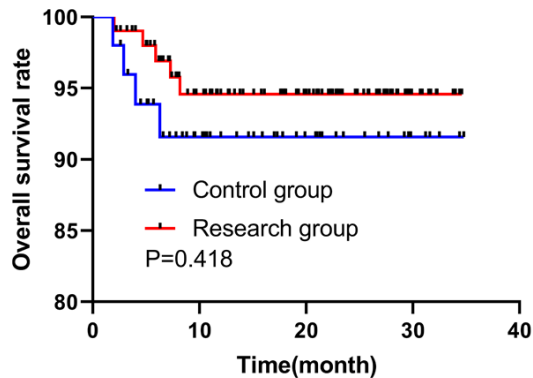


Figure 4. Comparison of patient survival.

resection of tumor lesions can effectively prevent recurrence and metastasis in patients [18]. Generally, radical mastectomy is the first choice in clinical treatment of early BC [19]. However, it will cause breast loss and affect the mood of the patients [20]. Research has shown that patients' emotional stability can promote disease amelioration [21]. Therefore, finding a treatment scheme carries huge implications in alleviating the psychological burden and mitigating the adverse mood of patients.

In recent years, breast-conserving surgery, which is suitable for patients with stage I and II BC and can maintain the integrity of the patient's breast to the greatest extent, has gradually increased in clinical practice [22]. However, in clinical work, we found that Asian women generally have small breasts, which makes it difficult to implement breast-conserving surgery [23]. Therefore, on the basis of breast-conserving surgery, we performed MRM of sparing nipple and areola complex, and carried out the breast reconstruction with LDMF to relieve patients' psychological burden and bad mood. The FACT-B score is an important means to assess the daily living ability of BC patients, which has guiding value in evaluating patients' ADL after BC surgery [24]. SDS and SAS are the simplest and most direct evaluation methods for clinical evaluation of patients' anxiety and depression [25]. In the present study, we first compared the QoL and the anxiety and depression scores after treatment between the two cohorts. It was found that after 1 month of treatment, the FACT-B score were significantly higher, and the SAS and SDS scores were statistically lower in RG than in CG. It indicates that LDMF breast reconstruc-

tion after nipple- and areola-sparing MRM can improve the psychological adaptability of patients with stage I BC and reduce the symptoms of depression and anxiety, which is an effective approach capable of avoiding negative emotions, maintaining a good mood and reducing psychological stress.

Evidence has shown that BC patients receiving breast-conserving surgery will develop various degrees of complications, such as skin flap effusion, skin flap/marginal necrosis and dysfunction of the affected limb [26]. The present study found no significant difference in intra-operative blood loss, wound drainage time, operation time and complication rate between CG and RG, indicating that the two procedures did not increase the risk of complications. Early studies have revealed that the efficacy and satisfaction of complete preservation of nipple areola complex and traditional surgery for early BC are basically the same [27, 28]. But compared with the traditional breast-conserving surgery, nipple-areola complex conservation operation is of great significance in breast reconstruction and improvement of the aesthetic effect and postoperative QoL. In this study, we found that both the satisfaction degree and the overall satisfaction rate of stage I BC patients with LDMF breast reconstruction after nipple- and areola-sparing MRM were higher than the patients with traditional radical mastectomy. Latissimus dorsi is characterized by abundant blood supply, convenient incision and large area. After resection, the shape and function of the back will not be affected, which is convenient for the "shaping" of the breast. Hence, the breast reconstructed with latissimus dorsi is natural, beautiful and symmetrical, which is the key to increasing the postoperative patient satisfaction. The postoperative survival of patients was counted at the end of the study. The follow-up showed that there was no significant difference in mortality between CG and RG, suggesting that the two surgical procedures would not affect the survival of patients.

In this study, we confirmed that breast reconstruction with LDMF after nipple- and areola-sparing MRM can reduce anxiety and depression in patients with stage I BC and increase their QoL. However, there are still some limitations in this study. First of all, as the controls were patients who underwent traditional radi-

cal mastectomy of BC, the aesthetic effect of postoperative breast of patients could not be effectively compared. Second, the short follow-up period results in the inability to clarify whether the two treatments have any effect on the long-term survival of patients. Therefore, it is hoped that more research samples will be included and long-term follow-up can be conducted in future studies to address the limitations.

To sum up, breast reconstruction with LDMF after nipple- and areola-sparing MRM can alleviate the negative mood and improve the QoL of patients with stage I BC.

Disclosure of conflict of interest

None.

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