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ORIGINAL ARTICLE

Clinical significance of breast-conserving surgery for early breast cancer and its impact on patient quality of life

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Summary

Purpose: *To explore the clinical significance of breast-conserving surgery (BCS) for early breast cancer (BC) and its impact on the patient quality of life (QoL).*

Methods: *This retrospective analysis included 156 cases with early BC in the Weihai Municipal Hospital from August 2013 to January 2015. The patients were divided into two groups: 82 patients in the BCS group and 74 patients in the traditional radical surgery group as control group. Length of hospitalization, survival rate, metastasis rate, recurrence rate, surgical complications and QoL questionnaire within two years were compared between groups.*

Results: *There was no difference in the survival rate, recurrence rate, and metastasis rate within 2 years between the BCS and the control group (p>0.05). However, the cosmetic effect, the amount of intraoperative blood loss, average drainage flow volume, duration of surgery and hospitalization, size of incision and infection rate on incision area after surgery were all lower in the BCS group. The QoL and anxiety level were better in the BCS group than in the control group.*

Conclusions: *BCS has a positive impact on patient QoL, and it also presents more advantages in relation to surgical complications and hospitalization compared to traditional radical BC surgery. With the pursuit of aesthetics by women, patients have higher requirements for surgical methods. BCS is worth of further application in the treatment of early BC.*

Key words: *breast-conserving surgery, cosmetic effect, early breast cancer, quality of life, radical mastectomy*

Introduction

Early breast cancer (BC) is a primary epithelial breast malignancy usually originating from the breast glandular epithelial tissue, and with a diameter less than 1 cm, infiltration range less than 5cm in diameter without distant metastasis [1]. With the rapid development of world's economy, people's lifestyles and habits have also changed dramatically. The incidence rates of global malignant diseases have increased significantly, and the incidence rates of BC have also increased significantly [2], and account for about 10% of all malignant tumors and has become second in highest incidence of cancers among women [3], seriously threatening women's physical and mental health, whereas the male breast cancer is rare [4]. It is quite crucial to have an early detection, early diagnosis and early treatment in BC [5]. The standard clinical treatment of BC is mastectomy [6].

By surgically removing the lesion and axillary lymph nodes, the tumor burden is reduced. However, infinite expansion in the scope of surgery can increase the complications and also affect the immune system of patients. Since surgery changes the original breast shape, it is necessary to overcome the psychological pressure of the patient before surgery by explaining the necessity of sur-

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gery, large surgical trauma, and obvious incision and the serious effects on the breast appearance and its impact on the postoperative QoL [7]. Breast conserving surgery (BCS) or partial mastectomy is one of the most common cancer operations in the United States [8]. With the pursuit of aesthetics and understanding BC, their concept has changed dramatically. The principle of modern cancer treatment is to pay attention to the protection of function and shape of breast while improving the QoL of patients after surgery [9]. BCS has been widely promoted in clinical practice. Compared with traditional radical surgery, BCS retains most part of patients' breast, and the cosmetic effect is far better than with radical surgery. In recent years, many studies have shown [10] that the recurrence rate, metastasis rate and survival rate of BCS and radical surgery are similar. However, patients undergoing BCS had a better upper limb function and less complications. It produces less trauma, small incision, fast recovery and postoperative complications such as upper limb edema are significantly reduced. BCS does not affect the appearance of breast and has a good postoperative effect so it is increasingly favored by the patients.

There are many clinical studies on the treatment of BC, discussing whether it is through surgery alone or surgery combined with drugs, and all the research results have contributed to the clinical treatment. However, there are only few studies on the clinical significance of BCS for early BC.

This study aimed to provide a valuable clinical reference for the treatment of early BC by analyzing the clinical significance of BCS for early BC and observing its impact on the patient QoL.

Methods

General information

This was a retrospective analysis of 156 cases of early BC patients treated in Weihai Municipal Hospital from August 2013 to January 2015, including 82 cases of BCS (experimental group), aged 24 to 69 years (mean 47.5±11.8). Also included were 74 cases of traditional radical surgery (control group), aged 25-67 years (mean 46.2 ± 9.5). All patients were diagnosed and met the diagnostic criteria for early BC.

Inclusion and exclusion criteria

Inclusion criteria: Tumor diameter <3cm; appropriate volume of breast to ensure better cosmetic results after surgery; tumor site more than 2cm away from the nipple; unifocal; the pathological examination at the end of the incision was negative; the patient was willing to perform BCS.

Exclusion criteria: Pathologically confirmed metastasis, presence of conditions that would be an obstacle for radiotherapy (pregnancy, connective tissue disorders, history of radiotherapy on breast area, etc), patients refusing BCS, or the cancer is located in the papilla or in the mammary areola.

Methods

Procedure of BCS

After successful anesthesia, the patient is placed in supine position; the side of the upper limb is abducted at 90 degrees; the scapula area is raised; disinfection is routinely used and a sterile towel is placed. Only one incision can be taken if the lesion has a small size. Performing an extensive lumpectomy to the primary lesion to ensure that the distance between the tumor and the margin is greater than 2cm. The margin tissue is extracted and quickly sent for examination, and the operation could can be continued only if each tissue sample is negative. If the margin tissues are positive, then the resection range must be expanded until detected as negative. If both biopsy results are still positive, then the BCS must be abandoned and switched to radical surgery. Lymph nodes are excised by the dermatoglyph of axillary incision and are sent for examination before cleaning. Lymph node dissection is performed if it was confirmed to be negative.

Radical surgery

After successful anesthesia, the patient is placed in supine position; the upper limb is abducted at 90 degrees; the scapula area is raised; disinfection is applied routinely and a sterile towel is placed; a Stewart transverse incision from inside of the sternum line and outside of the midaxillary line is performed. Taking skin incision and free flaps from the clavicle and the costal arch, and also from the midline of the sternum and the front edge of latissimus dorsi. Dissociating the cephalic vein, cutting off the bottom of humerus from pectoralis major muscle, peeling off the cephalic vein from inside, cutting the clavicular part from pectoralis major muscle, pulling down the broken end of pectoralis major muscle and revealing the pectoralis minor muscle. Cutting off the inner and outer fascia of pectoralis minor muscle, separating to the edge of the scapula. Then an electric knife is used to cut off the bottom of pectoralis minor muscle. Cleaning the fat and lymph nodes in the axillary and subclavian region; protecting the chest, thoracodorsal nerve, and remove the specimens; Electrocautery is used to stop blood loss, fix at the lower edge of the incision and stitching the incision layer by layer. After the gauze is placed in the axillary and the subclavian region, the elastic bandages are pressurized, and the drainage tube is removed after 72 h.

Observation indexes

Observing the intraoperative blood loss, average drainage flow volume, duration of surgery, length of incision, postoperative wound infection, hospitalization period and the survival rate, metastasis rate, recurrence rate, complications, QoL questionnaire [11], cosmetic effect [12] and anxiety conditions within two years.

Statistics

Statistical analyses were performed with SPSS 17.0 statistical software (Tianjin Soft Network Technology Co., Ltd.). The measurement data were expressed as mean±standard deviation (SD), using the Student's t-test. The counting data was expressed as percentage (%), using the chi-square test, and $p<0.05$ indicated that the difference was statistically significant.

Results

Comparison of basic data between the two groups

There were no significant differences in gender, age, ethnicity, height, weight, onset time, pathological type, clinical stage, and tumor differentiation between the two groups ($p>0.05$;Table 1).

Table 1. Baseline characteristics of all patients

Characteristics	*BCS group (n=82) n (%)*	*Control group (n=74) n (%)*	t/x^2	*p value*
Age (years),			0.224	0.636
≥45	43 (52.4)	36 (48.6)		
<45	39 (47.5)	38 (51.3)		
Ethnic group			0.062	0.804
Han	78 (95.1)	71 (95.9)		
others	4 (4.8)	3 (4.0)		
Height (cm),			0.010	0.921
<165	35 (42.6)	31 (41.8)		
≥165	47 (57.3)	43 (58.1)		
Weight (kg),			0.138	0.711
<50	39 (47.5)	33 (44.5)		
≥50	43 (52.44)	41 (55.4)		
Onset time, days			0.251	0.617
<90	65 (79.2)	61 (82.4)		
>90	17 (20.7)	13 (17.5)		
Tumor size (cm), mean ± SD	2.23 ± 0.9	2.05 ± 0.81	1.291	0.199
Pathological type			0.042	0.979
Invasive ductal	31 (37.8)	29 (39.1)		
Invasive lobular	45 (54.8)	40 (54.0)		
Others	6 (7.3)	5 (6.7)		
TNM stages			0.018	0.892
I	43 (52.4)	38 (51.3)		
II	39 (47.5)	36 (48.6)		
Tumor differentiation			0.237	0.626
High	76 (92.6)	70 (94.5)		
Low	6 (7.3)	4 (5.4)		

BCS: breast conserving surgery, SD: standard deviation

Table 2. The intraoperative conditions and length of hospitalization between groups (mean±SD)

Variables	*BCS group (n=82)*	*Control group (n=74)*	t/x^2	*p value*
Intraoperative blood loss (mL)	101.4 ± 10.4	199.4 ± 21.3	37.050	<0.001
Average drainage (mL)	201.4 ± 30.3	411.2 ± 60.5	27.750	<0.001
Time of surgery (min)	90.0 ± 14.3	165.4 ± 16.4	30.630	<0.001
Length of incision (cm)	4.39 ± 0.9	10.5 ± 2.3	21.880	<0.001
Post-op wound infection, n (%)	2 (2.44)	5 (6.76)	4.544	0.033
Length of hospital stay (day)	9.5 ± 2.1	15.3 ± 4.2	10.950	<0.001

BCS: breast conserving surgery, SD: standard deviation

Table 3. Evaluation of QoL between the two groups (mean±SD)

Variables	*BCS group (n=82)*	*Control group (n=74)*	t/x^2	*p value*
Physical function	89.3 ± 9.3	75.7 ± 8.4	9.503	<0.001
Psychological function	90.4 ± 7.3	71.3 ± 11.7	12.300	<0.001
Social function	88.3 ± 9.3	74.2 ± 6.6	10.660	<0.001
Environmental function	90.9 ± 9.0	82.4 ± 10.3	5.467	<0.001
Comprehensive ability	89.4 ± 8.9	78.3 ± 10.4	7.172	<0.001

BCS: breast conserving surgery

Table 4. Comparison of postoperative cosmetic effects between the two groups

Variables	*Good n (%)*	*Average n (%)*	*Poor n (%)*
BCS group	45 (54.8)	33 (40.2)	4 (4.8)
Control group	2 (2.7)	11 (14.8)	61 (82.4)
x^2	50.301	12.371	96.260
p	<0.001	<0.001	<0.001

BCS: breast conserving surgery

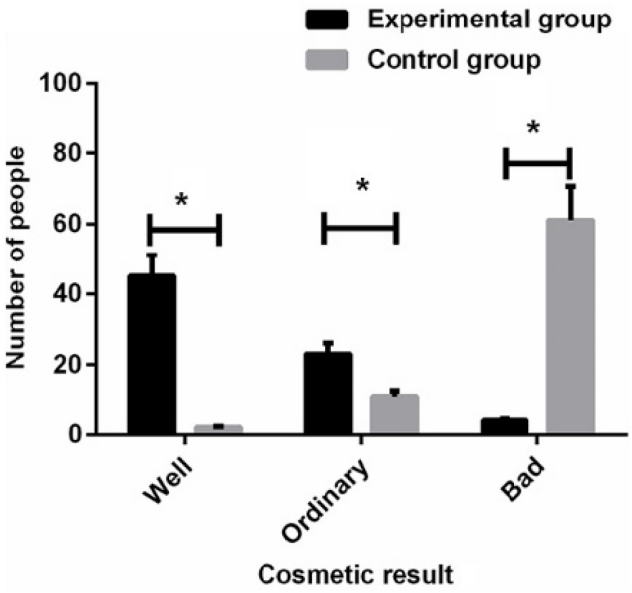

Figure 1. Comparison of postoperative cosmetic effects between both groups [n (%)]. The Figure shows the cosmetic effects of patients in both groups with early breast cancer who underwent breast-conserving surgery and radical mastectomy. The cosmetic effect of the experimental group was compared with the control group and showed significant difference (*p<0.05).

Hospitalization and intraoperative conditions

The amount of intraoperative blood loss in the experimental group was 101.45 ± 10.41 mL, drainage flow volume 201.48 ± 30.39 mL, duration of surgery 90.04 ± 14.32 min, and incision length 4.39 ± 0.95 cm. There were two (2.44%) cases that developed infection on the incision area. The length of hospitalization was 9.55 ± 2.15 days. In the control group the amount of intraoperative blood loss was 199.46 ± 11.31 mL, drainage flow volume 411.27 ± 60.55 mL, length of operation 165.45 ± 16.43 min, and length of incision 10.56 ± 2.35 cm. There were 5 (6.76%) cases developing postoperative incision infection, and the length of hospitalization was 15.38±4.26 days. Compared with the control group, the BCS group had significantly less intraoperative blood loss and drainage flow volume (p<0.05), shorter incision length (p<0.05), and shorter operation time and length of hospitalization (p<0.05) (Table 2).

Evaluation of QoL

The evaluation of QoL between the patients in both groups showed that the experimental group had a physical function (89.32 ± 9.35), psychological function (90.48 ± 7.37), social function (88.32 ± 9.39), environmental function (90.91 ± 9.09), and comprehensive ability (89.47 ± 8.97). The evaluation of the control group had a physical function (75.72±8.43), psychological function (71.39±11.72), social function (74.28±6.67), environmental function (82.41±10.33), and comprehensive ability (89.47 ± 8.97). The 5 factors in the evaluation of QoL in the experimental group were all higher than in the control group, and the differences were statistically significant (p<0.05) (Table 3).

Comparison of cosmetic effects between both groups

The cosmetic effects of patients in both groups were evaluated according to the cosmetic evalu-

Table 5. Comparison of postoperative anxiety between the two groups

Variables	*No anxiety n (%)*	*Occasional anxiety n (%)*	*Constant anxiety n (%)*	*Complete anxiety n (%)*
BCS group	69 (84.1)	8 (9.7)	4 (4.8)	1 (1.2)
Control group	39 (52.70)	17 (22.9)	12 (16.2)	6 (8.1)
x^2	18.051	5.049	5.433	4.307
p	<0.001	0.025	0.020	0.038

BCS: breast conserving surgery

Table 6. Comparison of two-year recurrence, metastasis and survival rates between the two groups

Variables	*Recurrence rate*		*Metastasis rate*		*Survival rate*	
	1 year n (%)	*2 years n (%)*	*1 year n (%)*	*2 years n (%)*	*1 year n (%)*	*2 years n (%)*
BCS group (n= 82)	0	3 (3.6)	0	4 (4.8)	82 (100.0)	81 (98.7)
Control group (n=74)	0	2 (2.7)	0	3 (4.0)	74 (100.0)	73 (98.6)
x^2	/	0.115	/	0.062	/	0.005
p	/	0.735	/	0.804	/	0.942

ation criteria after BCS. The experimental group showed 45 good cases (54.88%), 33 average cases (40.24%) and 4 poor cases (4.87%). The control group showed 2 good cases (2.71%), 11 (14.8%) average cases and 61 (82.4%) poor cases. The difference between the two groups was statistically significant (p<0.05) (Table 4 and Figure 1).

Analysis of postoperative anxiety of patients between both groups

After postoperative telephone follow-up with patients in both groups, the anxiety was analyzed according to the self-rating anxiety scale (SAS) filled in by each patient. The results showed that in the BCS group, there were 69 (84.1%) cases with no anxiety, 8 (9.7%) cases with occasional anxiety, 4 (4.8%) cases with constant anxiety and 1 (1.22%) case with complete anxiety. In the control group, there were 39 (52.7%) cases without anxiety, 17 (22.9%) cases with occasional anxiety, 12 (16.2%) cases with constant anxiety and 6 (8.1%) cases with complete anxiety. The proportion of patients without anxiety in the experimental group was significantly higher than in the control group (p<0.05). The proportion of patients with anxiety, constant anxiety and complete anxiety was significantly lower than in the control group (p<0.05, Table 5).

Comparisons of two-year recurrence, metastasis and survival rates between groups

In the first year, there were no patients with recurrence or death in both groups. In the first two years of the BCS group, there were 3 (3.6%) cases of recurrence, 4 (4.8%) patients developed distant metastasis and 81 (98.7%) patients were still alive. In the first two years of the control group, there were 2 (2.7%) cases with recurrence, 3 (4.0%) cases with distant metastasis and 73 (98.6%) cases were still alive. The above results showed no statistically significant difference between the two groups (p>0.05, Table 6).

Discussion

Breast cancer is one of the most common malignant tumors that seriously affect the physical and mental functions and can even threaten the women's life [13,14]. The current etiologic mechanism has not been fully understood [15]. It is not suitable to use surgery or other traumatic treatments once the disease has progressed to late stages, which can only be focus on conservative treatment [16-18]. In general, tumor resection is the best treatment option, which has a good impact on prognosis, a low recurrence rate and high 5-year survival rate [19]. Therefore, breast-conserving surgery and radical surgery has become two of the most important methods for both doctors and patients.

For the treatment of early breast cancer, breast-conserving surgery and radical surgery have become the problem of choice for doctors and patients in recent years. The results of various studies are different, and many patients in the clinic believe that radical surgery has a high safety rate, low postoperative recurrence rate and good 5-year

survival. Aytekin et al [20] believe breast-conserving surgery is the preferred method for treating early breast cancer. In order to clarify this point of view, we analyzed the clinical significance of breast-conserving surgery and radical surgery for early breast cancer and the impact on the patient QoL. The results showed that the intraoperative time, length of hospitalization, QoL, cosmetic effects and anxiety rates of patients in the breast-conserving group were better than in the radical surgery group, and the difference was statistically significant.

Also, the number of postoperative incision infections was lower in the breast-conserving surgery than in the radical surgery group. Breast-conserving surgery has a small incision, less intraoperative blood loss and lower probability of postoperative wound infection. The drainage flow volume has reduced due to the small resection trauma, and the operation time is also relatively shorter. Also, fast recovery rate of the wounds shortened the length of hospitalization. Kunkler et al [21] showed a result similar with our study. By comparing the QoL of patients in both groups, it was found that the QoL of patients with breast-conserving surgery was better than the radical surgery patients in terms of physical function, psychological function, social function, environmental function and other comprehensive conditions. Also, by considering many factors, breast is an important part of women's body structure, which is a symbol of maternity as well as a confidence factor for women in social interactions. However, the QoL becomes poorer for patients who underwent radical surgery. Down et al [22] have also proposed a similar view. Adimulam et al [23] suggested that breast-conserving surgery for early breast cancer has a good cosmetic effect. This study also showed that after breast-conserving surgery, the postoperative cosmetic effect of patients was much better compared with radical surgery. This conclusion was also the same in the Horiguchi et al study [24]. Patients with radical mastectomy lost their female secondary sexual characteristics, which caused mental inferiority, lower sense of self-esteem, accumulated anxiety and poorer QoL. This conclusion is the same with the views of Lowery et al [25]. Also many research organizations in the United States, Milan and Europe etc. [26] have supported the same viewpoint.

The results of this study may lack extensive representativeness and should be interpreted with caution.

In summary, breast-conserving surgery has less intraoperative blood loss, small incision, is less time-consuming, with fast postoperative recovery and it offers good cosmetic effect. With the pursuit of aesthetics by women, patients have higher requirements for surgical methods, therefore breast-conserving surgery is worthy of further application in the treatment of early breast cancer.

Conflict of interests

The authors declare no conflict of interests.

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