

Analysis on risk factors of recurrence and metastasis of breast cancer after breast-conserving surgery for patients with breast cancer.

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Abstract

Objective: This study aimed to analyse the risk factors of the recurrence and metastasis of breast cancer after breast-conserving surgery.

Methods: There were 102 breast cancer patients who underwent breast surgery reservations in 404 Hospital of the Chinese People's Liberation Army from January 2011 to December 2014. We had recorded these cases' 5-y recurrence rate and transfer rate after 1-5 y follow-up and retrospectively analysed the clinical data (including age, tumor size, margin status, receptor status and lymph node metastasis, etc.). The aim of this study was to analyse and summarize the risk factors for breast cancer patients who underwent tumor recurrence and metastasis after breast surgery.

Results: The patients were followed up for one to five years. Their 5-y recurrence rate was 10.78% and the transfer rate was 8.82%. According to Cox proportional hazards regression model, breast cancer breast tumor recurrence risk factors include: tumor volume>2 cm, margin invasion positive, HER-2 receptor-positive, estrogen receptor-positive, lymph node metastasis and tumor stage III (HR=3.7, 5.3, 3.8, 5.5, 5.3, 3.7). Tumor metastasis risk factors include: tumor volume>2 cm, HER-2 receptor-positive, estrogen receptor-positive, lymph node metastasis and tumor stage III (HR=5.3, 3.4, 2.3, 4.6, and 2.9).

Conclusion: Breast cancer patients retained the breast after the tumor volume>2 cm, with cutting edge invasion, HER-2 and estrogen receptor-positive, patients with lymph node metastasis, and stage III is associated with postoperative tumor recurrence. If tumor volume>2 cm, HER-2 and estrogen receptor-positive, patients with lymph node metastasis and stage III are related to tumor metastasis after operation.

Keywords: Breast cancer, Breast surgery, Tumor recurrence, Tumor metastasis, Risk factors.

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Introduction

As a common malignant tumor, breast cancer is mainly treated with surgery, postoperative radiotherapy and chemotherapy. In recent years, more and more patients would like to retain the breast besides a radical cure. In this case, breast conserving surgery has become more and more widely used on clinic [1]. Relevant results in recent years have showed that the tumor metastasis rate and survival rate of the patients treated with breast conserving surgery in stages I and II were like those of the patients receiving total mastectomy.

Moreover, the quality of life of patients treated with breast conserving surgery was better and their rate of local recurrence was higher than that of the patients undergoing total mastectomy [2,3]. Therefore, the analysis and summary on risk factors of the recurrence and metastasis of breast cancer after breast-conserving surgery has important necessary to provide

clinical guidance for the selection of operation and predict recurrence and metastasis and prognosis. This study retrospectively analysed the clinical data of 102 cases with breast cancer that underwent breast conserving surgery in our department of general surgery from January 2011 to December 2014. The results were reported as follows.

Materials and Methods

General materials

102 cases at the age of 21-64 (50.5 ± 1.5) and received breast conserving surgery in our hospital department of general surgery were selected randomly from January 2011 to December 2014. TNM stage: 57 cases of stage I, 30 cases of stage II, 5 cases of stage III, and 10 cases were unknown. Among them, 18 cases were treated with local extensive

resection and 84 cases underwent quadrant resection+axillary lymph node dissection.

Methods

Treatment status: Among the 102 cases, 37 patients received chemotherapy before operation and they were treated one time per week and 2-3 times continuously. The remaining 65 patients underwent surgical treatment, including extensive local excision of the tumor (16 cases), resection margins and tumor distance of 2-3 cm and reconstruction of breast shape after resection. In addition, there were 77 patients (75.5%) who received radiotherapy and chemotherapy after operation.

Follow up

102 breast cancer patients were followed up by telephone and outpatient review after operation for 1 to 5 y, (24.5 ± 10.5) months on average. The content of the follow-up included the patients' local recurrence and distant metastasis followed by an analysis of the clinical data of the patients with tumor recurrence and metastasis, which named their age, tumor size, margin status (positive margin: the margin from the 5 mm memory in the tumor tissue), lymph node metastasis, human epidermal growth factor receptor-2 (HER-2) expression and so on.

Statistical method

IBM SPSS 17 statistical software was used for data statistics and analysis. Cox proportional hazards regression analysis was used to analyse the risk factors. The Cox model was represented by hazard ratios with 95% confidence intervals and related P value. If $P < 0.05$, the difference was statistically significant.

Results

General clinical features of patients

Among the 102 patients, 10 patients had ductal carcinoma *in situ* (9.8%) and 92 (90.20%) had invasive carcinomas. The tumor volume was less than 2 cm in 72 (70.59%) cases but more than 2 cm in 30 cases (29.41%). There were 18 cases (17.65%) of N0 with Lymph node metastasis stage, 14 cases (13.73%) of N1, 30 cases (29.41) of N2, 30 cases (29.41) of N3 and 10 cases (9.80%) of NX (Table 1).

Table 1. General clinical feature of patients.

Variate	n	%
Tumor types		
Ductal carcinoma <i>in situ</i>	10	9.80
Invasive carcinomas	92	90.20
Neoplasm staging		
I	57	55.88

II	30	29.41
III	5	4.90
Unknown	10	9.81
Tumor volume		
≤ 2.0 cm	72	70.59
>2.0 cm	30	29.41
Lymph node metastasis staging		
N0	18	17.65
N1	14	13.73
N2	30	29.41
N3	30	29.41
NX	10	9.80
Estrogen receptor status		
Positive (P)	79	77.45
Negative (N)	23	22.55
HER2 receptor status		
P	42	41.18
N	60	58.82
Chemotherapy		
Yes	77	75.49
No	25	24.51
Radiotherapy		
Yes	62	60.78
No	40	39.22
Hormone therapy		
Yes	56	54.90
No	46	45.10
Marginal erosion		
Yes	70	68.63
No	32	31.37

Follow-up

The 102 patients were followed up by one to five years and the results showed that 11 (10.78%) cases were recurred, 9 cases (8.82%) were transferred and the survival rate for 5 y was 96.08% (98/102). Among the 4 patients who died after the operation, 2 died because of breast cancer recurrence and metastasis and 2 died because of other diseases (Figure 1).

Relative factors of tumor recurrence and metastasis after breast-conserving surgery

The patients' age, size of tumor, margin status, HER-2 status, postoperative radiotherapy and chemotherapy, lymph node

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status were included into single factor variable. We concluded that the related factors affecting tumor recurrence were the size of tumor, margin status, HER-2 status, postoperative radiotherapy and chemotherapy, lymph node status and the

related factors affecting tumor metastasis were about age, size of tumor, HER-2 status, postoperative radiotherapy and chemotherapy, lymph node status (Table 2).

Table 2. Analysis on relative risk factors of recurrence and metastasis after breast-conserving surgery for patients with breast cancer after 5 y.

Risk factors	Tumor recurrence			Tumor recurrence		
	Hazard ratio	95% CI	P	Hazard ratio	95% CI	P
Age	0.7	0.21-2.52	0.619	0.7	0.25-2.13	0.56
Tumor volume	3.7	1.42-9.83	0.008	5.3	1.74-16.04	0.003
Margin infiltrate	5.3	1.74-16.04	0.003	1.9	0.80-4.65	0.144
HER-2 receptor	3.8	1.36-10.72	0.011	3.4	2.00-5.69	0.001
Estrogen receptor	5.5	2.96-10.23	0.001	2.3	1.13-4.78	0.022
Lymphatic metastasis	5.3	1.74-16.04	0.003	4.6	1.84-11.71	0.001
Stages	3.7	1.42-9.82	0.008	2.9	1.29-6.64	0.01
Tumor type	0.9	0.20-3.77	0.849	1.2	0.28-5.07	0.811

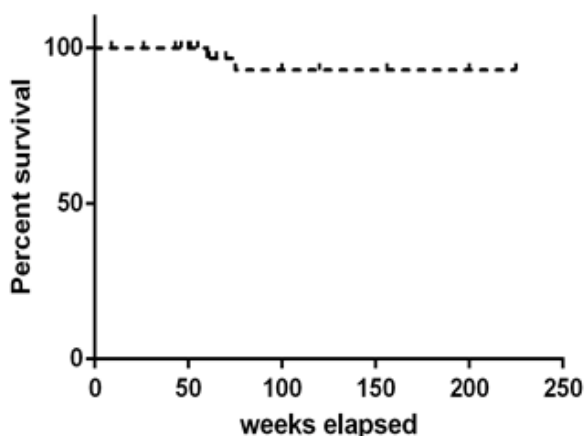


Figure 1. Survival status of the patients in five years after breast-conserving surgery.

Discussion

In recent years, breast-conserving surgery has become the first option for patients who have breast cancer, especially for those in early stage. According to recent studies, there was no significant difference in the rate of distant metastasis and survival of breast-conserving surgery when compared with mastectomy.

In addition, women in modern society have a higher requirement for breast appearance and quality of life. However, there are also studies showing that compared with radical mastectomy, the recurrence rate of breast conserving surgery is higher after surgery. Therefore, on the basis of how to ensure complete resection of the tumor and keep the satisfactory appearance of the breast at the same time, how to take effective measures to control or reduce the rate of recurrence and

metastasis have become the main focus of the current study [4]. Recent studies indicated that the clinical factors related to recurrence rate and metastasis rate of breast surgery included surgical indications, age of patients, size of patient’s tumor, lymph node metastasis, whether patients had a margin of infiltration, HER-2 receptor, estrogen receptor and other factors [5]. It was proposed in the study by Ali et al. [6] that the survival rate of metastasis-free overall survival rate of breast cancer patients were 95.4% and 99.1% after 5 y of breast conserving surgery. It should be noted that region tumor always may relapse in two or three years after the operation. At the same time, the results of multiple regression analysis displayed that risk factors affecting patients of local recurrence of tumor after breast conserving surgery included advanced age, lymph node metastasis, and HER-2 receptor positive. This study analysed and summarized the clinical data of 102 cases that underwent breast conserving surgery in our hospital. The data showed that the recurrence rate was 10.78%, metastasis rate was 8.82% and survival rate after 5 y was 96.08%. Cox proportional hazards regression analysis displayed that the independent risk factors affecting the recurrence of breast were the over 2 cm volume of tumor, margin invasion positive, HER-2 receptor positive, estrogen receptor positive, lymph node metastasis and tumor stage III (HR were 3.7, 5.3, 3.8, 5.5, 5.3, 3.7). This was because if the tumor became larger in size size, staged lately or associated with cutting edge invasion, it was quite possible to develop into intraductal carcinoma which has recurrence rate similar to that of invasive carcinoma. And sometimes it’s difficult to prevent its recurrence by radiotherapy and chemotherapy before or after the operation. To suppress tumor recurrence, a tip for this kind of breast cancer patients was to add the radiation and chemotherapy or hormone therapy after the breast conserving surgery [7]. In addition, the results of this study showed that the risk factors of tumor metastasis included over 2 cm tumor volume, HER-2 receptor positive, estrogen receptor positive, lymph node

metastasis and tumor stage III (HR were 5.3, 3.4, 2.3, 4.6, 2.9). This study found no correlation between tumor recurrence and metastasis with patients' age, which may be related to tumor staging, tumor size, and self-management in patients of different ages. There are many studies on the factors related to the local recurrence of breast cancer after mastectomy but few about postoperative metastasis for the moment [8]. Some reports demonstrated that relative factors of distant metastasis after breast conserving surgery included in age, diameter of the tumor [9-11]. By using the Cox proportional hazards regression model, this study illustrated that the factors related to tumor metastasis after breast conserving surgery were tumor volume, lymph node metastasis, HER-2 and estrogen receptor positive. Therefore, we should select suitable operation mode strictly according to the clinical indication. Usually, we would advise the patients with breast cancer in stages I and II to take breast conserving surgery according to the size of the tumor, the presence of lymph node metastasis, HER-2 and estrogen receptors. In summary, risk factors of breast tumor recurrence after breast conserving surgery contain tumor volume of over 2 cm, margin of invasion, HER-2 and estrogen receptor positive, lymph node metastasis and stage III. The related risk factors of tumor metastasis after surgery included tumor volume over 2 cm, HER-2, estrogen receptor positive, lymph node metastasis and stage III. It is recommended that postoperative chemoradiotherapy and hormone therapy should be used to inhibit and reduce recurrence and metastasis in patients of this kind.

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