

Study on sentinel lymph node biopsy and its application in breast conserving surgery for early breast cancer.

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Abstract

This study is to investigate the accuracy of Sentinel Lymph Node Biopsy (SLNB) in predicting axillary lymph node metastasis and its application in breast conserving surgery for early breast cancer. The clinical data of SLNB of 448 patients were retrospectively analyzed. The patients with negative result of SLNB were not performed with Axillary Lymph Node Dissection (ALND) (experimental group), but treated with breast conserving surgery. The effect of experimental group was compared with traditional operation (control group). 448 patients with early breast cancer were examined with SLNB. The result showed that 439 cases were successfully detected, 9 cases were not detected, and 15 cases were detected with false negative SLNB among 448 patients with early breast cancer. Detection rate was 98.0% (439/448). Sensitivity was 92.8% (194/209). Accurate rate was 95.7% (332/347). False negative rate was 7.2% (15/209). The operation time, bleeding volume, extubation time, total flow rate and incidence of complication in the experimental group were less than those in the control group. The difference between the two groups was quite significant (P<0.05). And the breast cosmetic effect was good after operation. It is feasible for the patients with early breast cancer to be treated with breast conserving surgery combined with SLNB. The operation is simple, the incidence of complication is low, and the recovery is rapid.

Keywords: Sentinel lymph node biopsy, Breast conserving surgery, Breast cancer.

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Introduction

Sentinel lymph node biopsy performed in the patients with negative sentinel lymph node (SLN) can reduce recurrence rate of ALND and incidence of complication [1]. Breast conserving surgery combined with SLNB can improve the living quality and axillary beauty effect of the patients with breast cancer [2]. In the research, the authors further verified the accuracy of prediction of axillary lymph node metastasis detected with SLNB and its application in early breast cancer by reviewing the clinical data of SLNB of 448 patients.

Materials and Methods

Clinical data

448 cases of breast cancer patients with T1-2N0M0 were treated in Department of Breast Oncology in Affiliated Cancer Hospital of Zhengzhou University from 9, 2013 to 9, 2015. All patients were female. Their age was from 20 to 85. The average age was 50.2. All patients were in accordance with the following conditions: the clinical examination of axillary

without touching lymphadenectasis, distant organs without metastasis, patients without performance of chemotherapy, radiotherapy as well as other therapies, patients with performance of SLNB, tumor solitary, besides pregnancy or lactating patients with breast cancer and those who are allergic to eikonogen. All patients with positive sentinel lymph node or without successful detection were performed with ALND. Patients with negative sentinel lymph node could choose performance of SLNB or ALND. Routine pathological results are as the standard in the operation of SLNB. If the pathological results are positive, but SLNB is negative, the same treatment would be performed with patients of the positive SLNB. The pathological conditions of the 448 patients were as follows: intraductal carcinoma 23 cases (5.1%), invasive breast cancer 425 cases (94.9%). 92 cases of negative SLN patients (maximum diameter of the tumor was not more than 3 cm) voluntarily chose to breast conserving surgery (experimental group). The rest 347 cases were treated with the traditional breast cancer surgery (control group). There was no statistical difference between the basic data (Table 1) of

experimental group and control group ($P>0.05$). But the two groups had comparability.

Table 1. Basic data.

	Experimental group	Control group	P-value
Age	49.47 ± 9.99	50.58 ± 10.62	0.67
BMI	25.3 ± 5.8	26.1 ± 5.3	0.135
Ductal carcinoma <i>in situ</i>	5	18	
Invasive breast cancer	87	329	
Number of sentinel lymph node	4.08	6	
Clinical stages	I	30	0.098
	II	62	

Methods

The 448 patients were adopted with radionuclide technetium [^{99m}Tc] sulfur colloid mixture combined with methylene blue injection developing tracer method to determine SLN. On the day before surgery, 3, 6, 9, 12 points of the breast tissue of the patients were selected to inject ^{99m}Tc sulfur colloid mixture. In 15 minutes before surgery, methylene blue was injected into the same places of patients. And the injection sites of skin were massaged for at least 5 minutes. Gamma detector was applied into detecting the whole breast, and repeatedly exploring the distribution of hot spots of the radioactive drug then which were marked on the skin. These spots were the location of the sentinel lymph node. Choose the appropriate incision, remove the sentinel lymph node. At the same time, look for the lymph vessel stained blue in the subcutaneous tissue, then dissect from the lymph vessel to axillary to the lymph node stained blue which is the sentinel lymph node step by step. In the surgery, if the rapid pathological diagnosis of frozen SLN is negative, the wound would be closed. If the rapid pathological diagnosis of frozen SLN is positive, ALND would be performed.

The control group was adopted modified radical mastectomy, namely the breast resection plus ipsilateral axillary lymph node dissection. According to the Berg axillary lymph node classification criteria, dissect to the I, II level [3]. If the tumor is located above the horizontal line of the nipple of the breast, the wound of the patients in the experimental group would be an arc. If the tumor is located under the horizontal line of the nipple of the breast, the wound of the patients in the experimental group would be radial. Then remove the tissue around 1 to 2 cm, and do the pathological examination of the rapid frozen section. If the edge of incision is negative, the patients would be performed by breast conserving surgery.

Observational index and counting method

The counting method of the accuracy of SLNB in predicting axillary lymph node metastasis is in accordance with the evaluation criteria of sentinel lymph node biopsy in Louisville University in the United States [4]. The methods were as

follows: Detection rate=(the number of cases SLN successfully detected/the number of cases involved in the study) *100%; Sensitivity=(the number of cases with positive SLNB metastasis/the number of cases with axillary lymph node metastasis) *100%; Accurate rate=(the sum of the cases of true posit and negative SLNB/ the total number of cases performed by ALND and detected by SLNB) *100%; False negative rate=(the number of cases of false negative SLNB/ the number of cases with axillary lymph node metastasis) *100%.

Perioperative observation index includes operating time, blood loss in operation, time to extubation, total drainage, complication rate, recurrent rate, etc.

Postoperative follow-up and breast cosmetic result evaluation

Postoperative follow-up of 1~37 months, recheck one time every 3~6 months. According to the results of follow-up and re-examination, the differences of complication rate and recurrent rate between the experimental group and the control group were collected. According to the standard of Joint Center for Radiation Therapy, the breast cosmetic result was divided into four levels of the excellent, the good and the poor [5].

Statistical method

SPSS 18.0 is a type of statistical analysis software, which was adopted to analyze data. *t* was used to test measurement data. X^2 was adopted to check count data.

Results

Conditions of sentinel lymph node detection

439 patients were successfully detected, and 9 patients were not detected among 448 cases of early breast cancer patients. 347 cases were performed by axillary lymph node dissection among 439 cases detected. The detection rate of sentinel lymph node biopsy was 98.0% (439/448), the accurate rare was 95.7% (332/347) and the false negative rate was 7.2% (15/209). The overall number of SLN detected was 1792 in 439 cases of SLN

examinees. The number of patients detected with 1 SLN was 31. The number of patients detected with 2 SLN was 57. The number of patients detected with 3 SLN was 108. The number of patients detected with 4 SLN was 97. The number of patients detected with more than 4 SLN was 146. The average number of SLN was 4.08/per person. The sum of non-sentinel lymph node (NSLN) was 2681 in 347 cases of patients performed by ALND. The number of SLN in one case was 0~25. The average number of SLN was 6.0 per person.

Table 2. The operative index of the experimental group and the control group.

Group	Operation Time (min)	Bleeding volume of surgery (ml)	Time to extubation (d)	Total drainage (ml)
Experimental group	62.8 ± 11.4	58.8 ± 12.0	4.8 ± 0.9	102.6 ± 11.3
Control group	99.3 ± 11.8	157.0 ± 12.3	29.0 ± 5.2	255.8 ± 12.2
t	21.85	56.386	45.784	89.886
P	0.001	0.001	0.001	0.001

Comparison of surgery cosmetic result of the two groups

The good rate of surgery cosmetic result in the experimental group was 98.9% in postoperative 1 year, and that of the control group was 80.1%, which showed that the experimental group was better than the control group. The difference between the two groups was statistically significant (P<0.05). See the Table 3.

Table 3. The comparison of surgery cosmetic result of the two groups.

Groups	Cases	Excellent	Good	Poor	Good rate (%)	P-value
Experimental group	92	61	30	1	98.9	<0.05
Control group	347	189	89	69	80.1	

Comparison of complications

92 cases with breast cancer in the experimental group appeared without complications of upper limb numbness, swelling and necrosis of the flap after surgery. Two cases appeared with a little effusion in the axillary. The complication rate was 2.2%. 30 cases appeared upper limb swelling, 4 cases with necrosis of the flap, 5 cases with subcutaneous effusion among 100 cases in the control group after surgery. The complication rate was 39.0%. The complication rate of experimental group was less than that of control group. The difference of the two groups was statistically significant (P<0.05).

Comparison of recurrent rate

The recurrent rate of the experimental group was 1.1% (1/92) and that of the control group was 9.0% (9/100) after one year. The difference between the two groups was statistically significant (P<0.05).

Comparison of perioperative period index between the two groups

Operation time, bleeding volume of surgery, time to extubation, and total drainage in experimental group were much less than those in control group. The difference between the two groups was statistically significant (P<0.001). See the Table 2.

Discussion

The incidence of breast cancer is increasing year by year, which is mainly based on lymph node metastasis as a route [6,7]. At present, ALND of breast cancer is the most accurate method to evaluate the condition of axillary lymph node, which also caused postoperative complications, such as upper limb swelling, pain, paresthesia, limitation of upper limb activity, etc. at the same time that seriously damaged the living quality of prognosis of patients [8]. The majority of early breast cancer patients without axillary lymph node metastasis, therefore, not all patients performed by ALND can be benefit. Only a small part of the patients were beneficiaries, however, the most patients received excessive treatment. SLNB is a minimally invasive, highly accurate method for detecting axillary metastasis, which has been widely recognized by the medical community. It can provide the accurate staging of axillary lymph node [9]. The SLNB replacement of ALND, for SLN negative patients, the recurrent rate and incidence of complication are low and the postoperative living quality is improved. The results from ALMANAC trial showed that there were 5% lymphedema and 11% anaesthesia happened in patients treated with SLNB within 12 months [10].

Breast conserving surgery is one of the methods for treating breast cancer. There is no statistical significance in overall survival rate and local control rate between breast conserving surgery and modified radical mastectomy. It has been the operation of first choice for treating early breast cancer in Europe and America [11]. It is necessary to comply with relevant standards in selecting cases in order to improve the curative effect and the postoperative breast shape effect. The clinical guideline of National Comprehensive Cancer Network (NCCN) for breast cancer in 2005 had defined it that breast cancer patients in stage I, II without contraindication could be treated with breast conserving surgery [12].

The result of the study shows that breast conserving surgery combined with SLNB is feasible, and it can be better to ensure

the normal operation of breast conserving surgery and reduce the postoperative complications and recurrent rate. The application of combined methods will enable the treatment of early breast cancer surgery to enter the era of individualized treatment.

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