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Short communications

Comparison of peritumoral and subareolar injection of Tc^{99m} sulphur colloid and blue-dye for detection of the sentinel lymph node in breast cancer

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Abstract

BACKGROUND: The new trend in diagnosis of the lymph node is sentinel node biopsy. This method has become increasingly accepted as a minimally invasive alternative to routine axillary dissection. Although the results of numerous studies have shown that sentinel node biopsy can accurately determine the axillary nodal status, the identification rates and false-negative rates have been variable. The sentinel lymph node is defined as the first node in the lymphatic basin that receives the primary lymphatic flow.

MATERIAL AND METHODS: Between September 1998 and August 2002 123 patients with primary operative breast cancer without clinical palpable axillary lymph nodes were enrolled in the study. There were two groups of patients according to sentinel node identification technique: 51 patients (Group I) received parenchymal, peritumoral injection of 1.0 ml of 16 MBq Tc^{99m}-radiolabelled sulphur colloid and single intradermal injection of blue-dye over the tumour. The next 72 patients (Group II) received intradermal, periareolar one-site injection of 0.5 ml of 16 MBq Tc^{99m}-radiolabelled sulphur colloid and blue-dye.

RESULTS: Sentinel lymph node was found in 41 (80.4%) cases in Group I and in 67 (93.0%) cases in Group II ($p = 0.028$). The localisation of the axillary lymph node as a "hot spot" visualised by lymphoscintigraphy was successful in 39/51 (76.5%) cases in Group I and 67/72 (93.0%) in Group II, $p = 0.004$). In both groups the success of sentinel node identification in the axillary region by lymphoscintigraphy was connected with sentinel lymph node finding during surgery (Group I: $p < 0.001$, Group II: $p < 0.001$).

CONCLUSIONS: This study shows that intradermal, periareolar one-site injection of Tc^{99m}-radiolabelled sulphur colloid and blue-dye is superior to peritumoral 4-sites injections Tc^{99m}-radiolabelled sulphur colloid and single intradermal injection of blue-dye over the tumour in sentinel lymph node identification.

Key words: sentinel node, breast cancer, lymphoscintigraphy

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Introduction

Axillary node status remains the most important prognostic indicator of survival in breast cancer but the role of axillary lymph node dissection is one of the most controversial areas in the management of invasive breast cancer. Between 8% and 10% of breast tumours drain outside the axilla (internal mammary nodes, supraclavicular nodes) and approximately 3% of these are metastatic. Furthermore, between 70% and 80% of patients with axillary node dissection do not have nodes metastasis [9].

The new trend in diagnosis of the lymph node is sentinel node biopsy. This method has become increasingly accepted as a minimally invasive alternative to routine axillary dissection. Although the results of numerous studies have shown that sentinel node

biopsy can accurately determine the axillary nodal status, the identification rates and false-negative rates have been variable [3–5, 7, 8]. The sentinel lymph node is defined as the first node in the lymphatic basin that receives the primary lymphatic flow.

We performed this analysis to compare two methods of sentinel node identification: peritumoral and subdermal, periareolar. In both of these methods we used blue-dye and isotope techniques. One day prior to the surgery lymphoscintigraphy was performed in all cases.

Material and methods

Between September 1998 and August 2002 123 patients with primary operative breast cancer without clinical palpable axillary lymph nodes were enrolled in the study. There were two groups of patients according to sentinel node identification technique: 51 patients (Group I) received parenchymal, peritumoral injection of 1.0 ml of 16 MBq Tc^{99m}-radiolabelled sulphur colloid and single intradermal injection of blue-dye over the tumour. The next 72 patients (Group II) received intradermal, periareolar one-site injection of 0.5 ml of 16 MBq Tc^{99m}-radiolabelled sulphur colloid and blue-dye. The isotope was injected one day prior to surgery. The blue-dye marker was injected 15 min before surgical procedure. The volume of isotope or blue-dye marker for one-site injection was 0.5–1.0 ml. In all cases one day before surgery lymphoscintigraphy was performed. During surgery the sentinel lymph node was visualised by blue-dye technique and using the gamma-probe guided method. The details of the technique of lymphoscintigraphy, isotope and blue-dye intraoperative sentinel lymph node identification methods have been previously described [17, 18].

The average age of patients in Group I was 52 years and in Group II was 53.8 years. The median tumour size was 22.8 mm in Group I and 22.1 mm in Group II. Most of the patients were in T1c or T2 in TNM classification (84.3% and 83.3%, respectively). The characteristics of patients both Group I and II are shown in Table 1.

The tumour localisation was defined according to breast quadrants: upper outer (UO), upper inner (UI), lower outer (LO), lower inner (LI) and Central (C). The characteristics of tumour localisation are shown in Table 2.

Results

Sentinel lymph node was found in 41 (80.4%) cases in Group I and in 67 (93.0%) cases in Group II ($p = 0.028$). The localisation of the axillary lymph node as a "hot spot" visualised by lymphoscintigraphy was successful in 39/51 (76.5) cases in Group I and in 67/72 (93.0%) in Group II, ($p = 0.004$).

The lymphoscintigraphy showed drainage to internal mammary or supraclavicular nodes in 6 cases in Group I (14.0%) and in 7 cases in Group II (8.8%), $p = 0.443$.

In both groups the success of sentinel node identification in the axillary region by lymphoscintigraphy was connected with sentinel lymph node finding during surgery (Group I: $p < 0.001$, Group II: $p < 0.001$).

The tumour localisation and tumour size in clinical assessment were not connected with the sentinel lymph node identification rate in the axillary region.

Table 1. Characteristics of patients

	Group I	Group II
No. of patients	51	72
Average age	52.0	53.8
Tumour size in clinical assessment	22.8	22.1
Tumour size (T grade)		
T1a	0	1
T1b	1	1
T1c	15	31
T2	28	29
T0	7	10

Table 2. The tumour localisation according to breast quadrants

Quadrants	Group I	Group III
UO	26	31
UI	1	10
LO	1	4
LI	1	3
UO/UI	10	13
UI/LI	1	2
LO/LI	3	4
UO/LO	6	4
Central	2	1

Discussion

Sentinel lymph node biopsy guided by pre-surgical lymphoscintigraphy, intraoperative gamma-probe and blue-dye technique proves to be accurate with a success rate near to 95% [7]. In many reports a combination method of blue-dye and radioisotope is superior to blue-dye or isotope only [3–5, 7, 8]. The site of blue-dye and radiotracer may be intradermal [2, 5, 11], subdermal [1, 3, 6, 10] or peritumoral [5–7, 11, 20].

We demonstrate two different methods of sentinel lymph node identification. One is based on peritumoral radioisotope injection and intradermal blue-dye injection and the second on intradermal, periareolar injection of radioisotope and blue-dye. In all cases pre-surgical lymphoscintigraphy was performed.

The tumour size and localisation in breast quadrants did not influence the sentinel node detection rate.

In the peritumoral radioisotope method (Group I) the sentinel node was found in 80.4% cases v. 93.0% cases in Group II ($p = 0.028$). This confirms data from published reports that dermal injection of radioactive colloid is superior to peritumoral injection [11].

Lymphoscintigraphy defines the pattern of lymph flow and may prevent failure or false-negative biopsies [13]. It is essential for visualising the sentinel lymph node [12] but the failure of sentinel visualisation in lymphoscintigraphy is not connected with the intraoperative gamma-probe guided or/and blue-dye success identification rate. But on the other hand the identification of the sentinel node in lymphoscintigraphy is connected with the high rate of intraoperative sentinel finding [14]. Results from our study confirm these data: the success of sentinel node identification in the

axillary region by lymphoscintigraphy was connected with sentinel lymph node finding during surgery.

One of the important roles of lymphoscintigraphy is the identification of lymph flow directions to other regions than the axillary one [15–19]. In our study lymphoscintigraphy showed drainage to internal mammary or supraclavicular nodes in Group I (14.0%) and in Group II (8.8%), $p = 0.443$.

Conclusions

This study demonstrates that intradermal, periareolar one-site injection of Tc^{99m}-radiolabelled sulphur colloid and blue-dye is superior to peritumoral 4-sites injections Tc^{99m}-radiolabelled sulphur colloid and single intradermal injection of blue-dye over the tumour in sentinel lymph node identification. Positive lymphoscintigraphy ("hot spot") is connected with the high success rate of axillary sentinel lymph node identification.

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