

## LYMPHATIC MAPPING AND SENTINEL LYMPH NODE BIOPSY IN THE PATIENTS WITH BREAST CANCER

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### ABSTRACT

**Objective:** To identify the feasibility of the lymphatic mapping and sentinel node biopsy (SNB) in patients with breast cancer and to examine whether the characteristics of the sentinel lymph node (SLN) accurately predict the status of axillary node. **Methods:** 33 patients with breast cancer intraoperatively and postoperatively underwent a lymphatic mapping and the SNB using Patent Blue. **Results:** The SLNs were found in 30 of 33 patients (90.9%), the SLN accurately predicted the status of the axillary in 29 (96.7%). In one case the SLN was negative, but other axillary nodes were tumor positive. **Conclusion:** This study confirmed that the procedure of lymphatic mapping and SNB in the patients with breast cancer is feasibility, and that the histological characteristics of the SLN accurately predict the status of the axillary node. We believe that this technique might replace axillary lymph node dissection for breast cancer patients with negative axillae in the future.

**Key words:** Breast cancer, Lymphatic mapping, Sentinel node biopsy

Axillary lymph node dissection (ALND) is always standard part for a variety of surgical treatments of breast cancer. Knowledge of the status of axillary nodes presents important information for staging and prognosis, but it remains controversial that ALND provides local control of disease and offer survival

benefit. Some authors have questioned the wisdom of continuing to do ALND, when the risk of axillary metastasis in the early case is small, and the postoperative complications are usually seen. The intraoperative lymphatic mapping and the sentinel lymph node biopsy (sentinel lymphadenectomy, SLND) was introduced in the management of breast cancer by Giuliano<sup>[1]</sup> in 1994, according to the concept of sentinel lymph node (SLN). So far the Chinese breast cancer patients data is not available. This report describes lymphatic mapping and SLND in 33 patients with breast cancer, in order to examine whether the characteristics of SLN accurately predict the status of axillary node.

### MATERIALS AND METHODS

#### Clinical Features

Between December 1998 and August 1999, 33 female patients diagnosed by core biopsy or intraoperative frozen sections with a mean age of 41 years were studied. In 16 patients the left breast was affected and in 17 patients the right breast. Twenty-three patients had a tumor in the upper outer quadrant, three in the lower outer quadrant, four in the upper quadrant and two in the lower inner quadrant, one patient had medially situated tumor. The mean diameter of the tumors was 2.3 cm (range, 1.0 - 5.5 cm). Most women (n=27) had stage II breast cancer while 5 had stage I and one had stage III breast cancer. Pathological classification: infiltrating ductal carcinoma in 16, medullary carcinoma in 3, simple carcinoma in 5, scirrhous carcinoma in 2, adenocarcinoma in 3, canceration of intraductal papilloma in 1, infiltrating lobular carcinoma in 3. The women with suspected multicentric or distant metastases breast cancer or underwent prior surgical treatment, or recurrence, or pregnant were excluded in this study.

Received June 15, 2000, accepted October 12, 2000.

This work was supported by a grant from CIDA(Canadian International Development Agency).

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## Preparation of Vital Blue Dye

The patent blue V dye (Made in SIGMA) was diluted to 1% solution with distilled, and the solution was passed through a 0.22 $\mu$ m millipor filter by pressure, and underwent high sterilization, the resulting preparation was divided into 5 ml ampule, which was sealed and kept in refrigeration (-4°C).

## Technique of Localization

Under general or peridural anaesthesia and after preparing and draping the surgical field, at the point, in a clockwise direction, 12, 3, 6, 9, 1 ml Patent blue V dye was injected with a 7-gauge needle into the subcutaneous or breast parenchyma at the biopsy site around the region of the tumor. To ensure an even distribution, the injected region was pressed slightly by palm for ten minutes. Immediately after wards, a standard modified radical mastectomy was performed. During surgery, keeping the operation field clear, a special note was made of the drainage pattern of blue-colored lymphatic vessels encountered during operation. After operation, blue-stained lymphatic vessels were traced and dissected to find the most proximal lymph node of the mass, the and thus, the sentinel lymph node (SLN, sometimes groups of nodes, SLNs), was excised and submitted separately for a serial frozen section histological examination. The remaining axillary nodes and specimen were sent to the pathological department for routine pathological examination.

## RESULTS

During operation, lymphatic drainage to the direction of internal mammary nodes was observed in 4 patients with the tumor in the quadrant, 2 of them were found also lymphatic drainage to axillary nodes. Lymphatic drainage to the direction of internal mammary nodes and axillary nodes were found simultaneously in 4 patients with the tumor in the upper outer quadrant.

30 of 33 (90.9%) were identified as sentinel nodes, a SLN could not be found in 3 patients, two of them, the primary tumor had been located medially, in one patient with the tumor in the upper outer quadrant. In ten patients, blue-stained second-echelon nodes, receiving drainage from the SLNs, were identified. A mean number of 1.6 SLN (Range from 0 to 3) was excised per patient.

In 19 cases, the SLNs were positive for tumor. In 11 of them, the subsequent axillary nodes were positive for tumor, and in 8 of them, the subsequent

axillary nodes were negative for tumor. In 11 cases the SLNs were negative for tumor. In 10 of them, the subsequent axillary nodes were negative for tumor, whereas in one of them, the subsequent nodes were positive for tumor, (false negative). The accurate rate of the SLN predicting the status of the axillary is 96.7% (29/30). There was a skip metastases in one of 3 patients not found the SLN.

## DISCUSSION

Thirty-three patients with breast cancer intraoperatively and postoperatively underwent a lymphatic mapping and the SNB using the patent blue, according to the concept of SLN biopsy proposed by Morton and colleagues<sup>[2]</sup> in the treatment of melanoma and the technique first introduced to patients with breast cancer by Giuliano, et al.<sup>[1]</sup> Some overseas reports<sup>[1,3-10]</sup> to date on SLN in breast cancer were as follows: the rates of detection of the SLN were 66% - 100%, and the accurate rates of prediction of axillary nodal status were between 84% - 100%, using blue dye or radionuclide technique, and combination of two methods. In the current study, the rate of detection of the SLN was 90.9% (30 of 33 patients) by tracing blue-stained lymphatic vessels, the rate of prediction of the status of axillary nodes was 96.7% (29 of 30 patients). Our experiences are similar to that of others above reports. No SLN was found in three patients, several explanations for these failures, that may be lack of unity of materials and techniques for lymphatic mapping in addition to insufficient surgical procedure and proficiency. The rate of detection of the SLN was 66% in the first reported by Giuliano, et al<sup>[1]</sup> using the blue dye. In their last report, the rate of detection of the SLN increase to 94%.<sup>[3]</sup> And then, the primary tumor was situated in the upper inner quadrant breast, the blue-stained lymphatic channels leading to the internal mammary nodes were found in 2 patients during operation. In this condition, the SLNs were not found after examining the specimen seen from different angles. This shows that the primary tumor in the upper inner quadrant may have only drained in a medial direction to the internal mammary nodes. Furthermore, the rate of detection of the SLN was influenced by the primary tumor size. The rate of detection of the SLN may be 100 per cent in the primary tumor size less than 1 cm.<sup>[5,6]</sup> In one patient with large size tumor (T<sub>3</sub>), in whom no blue node was found, the lymphatic channels may be obstructed by tumor cells, and which result in preventing the accumulation of the blue dye, or the routing lymphatic drainage was changed. And therefore, the

SLNs could not be found.

In the present study, there was residue disease in the axilla after removing the SLNs in 11 of the 19 sentinel node-positive patients, and there was one false negative patient of the 11 sentinel node-negative patients. This finding confirms that the spread of breast cancer proceeds in an orderly fashion from the tumor to the regional axillary nodes. The purpose of this study was to investigate whether SLN could precisely predict the status of axillary nodes. However, there was one “skip” metastasis, and the SLN tested negative with axillary nodes that tested positive. Because of using serial sectioning of SLNs to detect micrometastases, one of interpretations of this result is probably the anatomic variation of local lymphatic channel, or the change of routine lymphatic drainage caused by cancer; Another is the failure of detecting the SLNs. Therefore, the accuracy of predicting the status of axillary nodes might greatly be increased by adding serial section along with immunohistochemical staining<sup>[11]</sup> and the polymerase chain reaction.<sup>[12]</sup>

We conclude that the technique of the lymphatic mapping and sentinel node biopsy (SNB) is possible to predict the status of the axillary node in patients with breast cancer, but there are some problems to be resolved. For instance, the investigations on internal mammary nodes biopsy have not been reported by now, because about 20% of breast cancer may drain the internal mammary nodes. A multi-center randomized clinical trial should be done to further advance our knowledge of biological characteristics of breast cancer, and to evaluate clinical application of this technique. We believe that this technique might replace axillary node dissection in the surgical treatment of breast cancer patients with negative axillae in the future.

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