Diagnostic and Interventional Imaging (2016) **97**, 611—615

ORIGINAL ARTICLE /*Breast imaging*

Prevalence and clinical significance of supra- or infraclavicular drainage on preoperative lymphoscintigraphy in women with breast cancer

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KEYWORDS
Sentinel lymph node;
Lymphoscintigraphy;
Breast cancer;
Supra/infra;
Extra-axillary

Abstract
Objective: Preoperative sentinel lymph node (SLN) mapping by lymphoscintigraphy is helpful to evaluate extra-axillary SLNs over a wider range than the blue dye method. However, the clinical value of extra-axillary SLNs remains uncertain. The goal of this study was to determine the prevalence and clinical significance of supra- or infraclavicular drainage on preoperative lymphoscintigraphy in women with breast cancer.
Materials and methods: We retrospectively reviewed the files of 942 consecutive breast cancer women who underwent preoperative lymphoscintigraphy for SLN biopsy at our institution between April 2004 and March 2015.
Results: Supra- or infraclavicular drainage was detected in 5/942 women (0.5%) on preoperative lymphoscintigraphy. An axillary hot spot was detected in all five women, and a positive axillary SLN was detected in four women. Breast tumor locations were the upper inner or outer quadrants in four women and the lower outer quadrant in one woman. The median follow-up period was 75 months (mean: 92; range: 26—111 months). Recurrence outside the axilla was found in three (60%) women. The woman with a negative SLN status did not undergo adjuvant chemotherapy, but developed extra-axillary lymph node recurrence 3 years after primary surgery. No patient died of metastatic breast cancer at the last follow-up.

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http://dx.doi.org/10.1016/j.diii.2016.03.005

Conclusions: The detection of the supra- or infraclavicular SLNs on lymphoscintigraphy may provide additional staging information to tailor individual treatment regimens with regard to the potential risk of recurrence or metastasis of breast cancer.

The axillary lymph node status is an important prognostic indicator in breast cancer [1]. However, axillary lymph node dissection (ALND) may be associated with an increased risk of several postsurgical complications, such as lymphedema, chronic shoulder pain, and infection [2]. A sentinel lymph node (SLN) is defined as the first lymph node that receives lymph flow from a primary tumor and contains higher number of invading tumor cells than other regional nodes. Axillary SLN biopsy is currently an effective method for axillary staging in women with breast cancer and excluding axillary SLN metastasis to avoid ALND [3—5].

Preoperative SLN mapping by lymphoscintigraphy is helpful to evaluate extra-axillary SLNs over a wider range than the blue dye method [6]. However, the clinical value of extra-axillary SLNs remains uncertain, and no clear recommendations exist for the management of extra-axillary SLNs detected on lymphoscintigraphy. Some studies have suggested the clinical relevance of SLNs at unusual locations detected on lymphoscintigraphy, such as internal mammary chain nodes and contralateral SLNs [7,8].

The goal of this study was to determine the prevalence and clinical significance of supra- or infraclavicular drainage on preoperative lymphoscintigraphy in women with breast cancer.

Materials and methods

We reviewed the files of all women with breast cancer who underwent preoperative lymphoscintigraphy before SLN biopsy at our institution between April 2004 and March 2015 who met the following criteria: (a) pathologically confirmed primary breast carcinoma and (b) supra- or infraclavicular uptake node was detected on preoperative lymphoscintigraphy. The institutional review board approved this retrospective study and waived the requirement of patient consent. Primary tumor characteristics, past medical history, lymphoscintigraphy pattern, treatment modalities, incidence of recurrence, and treatment outcome of all patients were evaluated.

Preoperative SLN mapping was performed with 185 MBq of ^{99m}Tc-phytate in 0.4 mL of saline aliquoted in four doses subdermally injected at each of four sites surrounding the tumor or areola. Lymphoscintigraphy was performed one day before or on the day of surgery. Delayed lymphoscintigraphic images were typically obtained within 2 h after radiotracer injection. Focal accumulations of radioactivity detected on scintigraphy were localized externally and marked on the skin. Women in our study were identified by searching on picture archiving and communication system database. Two nuclear medicine physicians (T.T. and S.S.) blinded to all clinical information reviewed all the lymphoscintigrams and relevant radiology reports. Differences in their findings were resolved by discussion and by reaching a consensus. All women underwent axillary SLN biopsy using intraoperative gamma probe detection and blue dye methods.

Results

A total of 942 women underwent lymphoscintigraphy at our institution between April 2004 and March 2015, and uptake by the supra- or infraclavicular SLNs on lymphoscintigraphy was observed in five (0.53%) women (Table 1). In the 5 women, the radiotracer was injected at peritumoral sites. Axillary hot spots were identified in all five women (Figs. 1 and 2), and a positive axillary SLN was identified in four (80%) women. One woman had internal mammary chain hot spots. No crossed lymphatics to a contralateral axillary node were detected.

The median age of the women was 55 years (mean ± standard deviation [SD], 56 ± 15.5; range, 35—78 years), and the median primary tumor size was 2.5 cm (mean ± SD, 2.3 ± 1.32; range, 1.2—5.3 cm). Four breast tumors were located in the upper inner or outer quadrant and one in the lower outer quadrant. All primary tumors were histopathologically confirmed as invasive ductal carcinomas. At the time of initial diagnosis, two tumors were stage IA, two were stage IIA, and one was stage IIIC. The median follow-up period was 75 months (mean ± SD, 92 ± 33.7; range, 26—111 months). Because of initial skin and supraclavicular lymph node involvement, one patient underwent preoperative chemotherapy, whereas all the five women received adjuvant systemic postoperative chemotherapy or radiotherapy. One patient underwent previous lumpectomy of the same breast 21 months before primary surgery and ALND without radiotherapy. All women underwent lumpectomy and axillary SLN biopsy. Recurrence outside the axilla was reported in three women. The woman with a negative SLN status did not undergo adjuvant chemotherapy and developed lymph node recurrence 3 years after primary surgery. One patient developed a second primary cancer in the contralateral breast after 7 years. No women died of metastatic breast cancer at the last follow-up.