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CASE REPORT

Sentinel lymph node mapping in ectopic breast cancer: A case report evaluating the efficacy of peri-areolar versus peri-tumoral injection techniques

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ABSTRACT

We present a rare case of primary breast cancer occurring within accessory breast tissue located in the left axillary region who was referred to our department for sentinel lymph node (SLN) mapping. Initial peri-tumoral injection of the radiotracer didn't show any axillary SLN. However, when the tracer was re-injection in the peri-areolar region of the normal (eutopic) breast, it successfully identified axillary sentinel node which was most clearly seen best on SPECT/CT images. This case underscores the feasibility of sentinel node mapping in cancer of ectopic breast tissue, highlighting that injection in the peri-areolar region of the eutopic breast appears to be a more effective technique.

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INTRODUCTION

The incidence of primary breast cancer within accessory breast tissue is a rarity, constituting less than 1% of cases and often posing a diagnostic challenge due to the potential for confusion with axillary lymph node metastasis. Notably, the axilla accounts as a common location for ectopic breast tissue, with two-thirds of cases manifesting in this region [1, 2]. Similar to eutopic breast tissue, both benign conditions—such as hamartoma, fibroadenoma, or mastitis—and malignant transformations can occur in ectopic breast tissue. The incidence of primary breast carcinoma in ectopic breast tissue is reported to range from 0.3% to 0.6% [3]. Accurate differentiation between axillary lymph node metastasis and malignancy in the accessory breast is pivotal for guiding surgical decisions, avoiding unnecessary mastectomies [4, 5]. In this report, we present a case of lymphoscintigraphy in ectopic breast cancer located in the left axilla where the initial peri-tumoral injection failed to unveil sentinel lymph node (SLN). However, injection in the peri-areolar region of the eutopic breast identified an axillary SLN, which, upon pathological assessment, was found to be negative for tumoral involvement.

CASE PRESENTATION

A post-menopausal 62-year-old woman presented with a mass in the accessory breast in the left axillary region, with core needle biopsy suggesting invasive ductal carcinoma. Physical examinations and mammograms indicated normal findings in both eutopic breasts and axillae. Therefore, before surgery the patient was referred to our department for breast lymphoscintigraphy. Lymphoscintigraphy was performed 1 hour after peri-tumoral injection of 37 MBq [^{99m}Tc]Tc-Phytate intradermally. Planar (Figure 1A) and single-photon emission tomography (SPECT)/computed tomography (CT) (Figure 1B) images didn't reveal any axillary SLN, even in delayed images acquired 12 hours later. Hence, re-injection of the radiotracer was done intradermally in the peri-areolar region of the eutopic breast (18.5 MBq) after negative delayed images and lymphoscintigraphy was repeated 30 minutes post-injection. Subsequent planar (Figure 1C) and SPECT/CT (Figure 1D) images of the breast and axillary region showed a focus of tracer activity corresponding to a SLN at the level I of the left axillary region (green arrow).

Afterward, the patient underwent surgery to remove the accessory breast, and the SLN was harvested. Pathological findings from both frozen and permanent samples showed no evidence of metastatic involvement in the SLN.

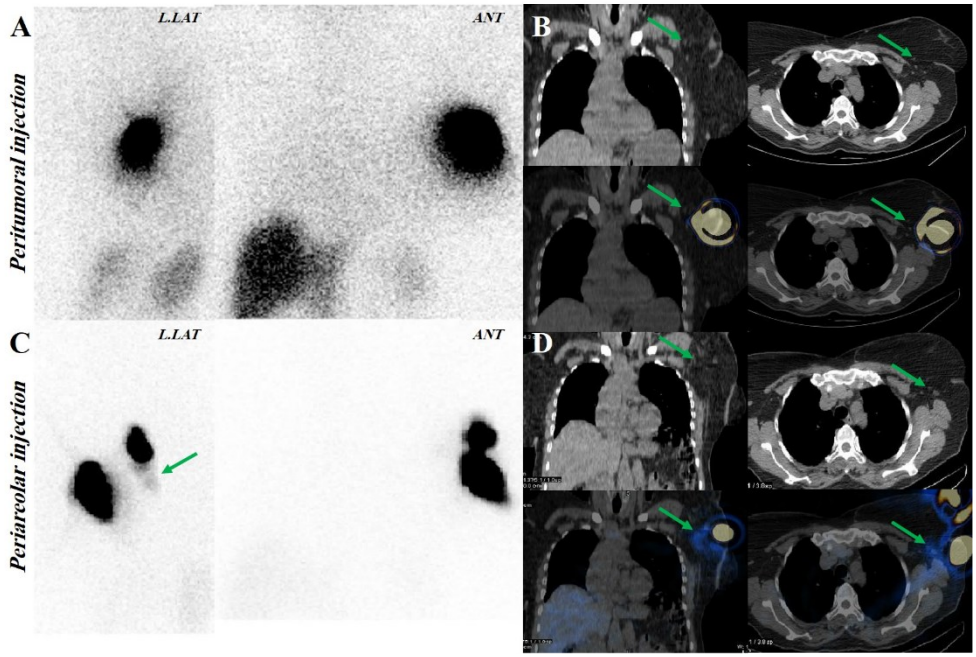

Figure 1. The planar images (A) one hour after peri-tumoral injection shows no focal uptake corresponding to sentinel lymph node on the initial SPECT/CT images (B). The planar images (C) 30 minutes after injection in the peri-areolar region of the eutopic breast shows a smeared focal uptake (green arrow) inferior to the initial injection site, corresponding to a sentinel lymph node in the level I of the left axillary region on the SPECT/CT images (D)

DISCUSSION

The embryonic origin of breast tissue, stemming from the mammary ridges during gestation, often results in the regression of these ridges, except in the pectoral area, forming the eutopic breast [6]. In cases of incomplete regression, accessory breasts, areolae, or nipples may develop anywhere along the milk line, predominantly in the axillary region [7]. Malignant neoplasms in ectopic breast tissues are rare, with invasive ductal carcinoma being the predominant pathology [8]. Axillary ectopic breast tissue accounts for approximately 90% of malignancies among the accessory breasts. Diagnosing ectopic breast carcinoma is often challenging, which can result in delayed recognition due to confusion with other conditions, such as subcutaneous lipoma, or because of the absence of noticeable growth [9]. Accurate diagnosis relies on thorough history taking, physical examination, and imaging techniques, including fine-needle aspiration or core needle biopsy [2]. Treatment follows the TNM classification and includes regional lymph node staging alongside mass excision [9].

SLN biopsy, utilizing lymphoscintigraphy with technetium-based radiopharmaceuticals, is the preferred method for regional lymph node staging in breast cancer [10]. While lymphatic drainage mapping in eutopic breast cancer has achieved clinical acceptance, the same mapping in ectopic breast cancers remains a challenge, particularly regarding the injection site [11, 12]. Several case reports are available regarding SLN mapping and biopsy in ectopic axillary breast cancers [4, 13–20]. However, the preferred injection site has not been discussed in detail. Both peri-tumoral and peri-areolar injections were used with successful mapping. Peri-tumoral injections are especially problematic due to the "shine-through" effect of the injection site which hampers the detection of axillary SLNs [11,12]. Injections far from the axilla, in the peri-areolar area of the eutopic breast, can be a suitable alternative technique for SLN mapping of ectopic axillary breast cancers which can resolve the limitation [4].

Although studies on breast lymphatic mapping have identified varying patterns, the axilla has been established as the principal drainage pathway [21]. Studies in the field of lymphatic mapping have established the concept of functional lymphatic mapping of the breast, demonstrating that lymphatic drainage typically flows toward the lower axilla. Regardless of the technique employed—whether peri-tumoral, intra-tumoral, or peri-areolar injections—high concordance is observed in identifying sentinel lymph nodes. The connections between collecting lymphatic vessels from the tumor site and those from the skin and subdermal lymphatics help to explain the concordance observed between intraparenchymal and superficial injections in most patients. Given the greater feasibility of peri-areolar injections compared to the other methods, there is an increasing preference for adopting peri-areolar techniques for mapping purposes [22, 23]. Ectopic breast tissue located in the axilla is included within the functional lymphatic mapping territory of the breast, which further supports the use of peri-areolar injections as a viable and simpler method expected to yield the same results as peri-tumoral and intra-tumoral injections [23–25]. It is important to note that the detection rate of sentinel lymph nodes using peri-tumoral and intra-tumoral injections in eutopic breast lymphoscintigraphy has been shown to be lower. This phenomenon may be attributed to the more complex injection techniques associated with peri-tumoral and intratumoral injections, as well as the inherent characteristics of the lymphatic pathways within the internal or external lymphatic systems of the breast [21]. Given that we can expect similar results in ectopic breast lymphoscintigraphy, the lower incidence of these cases highlights the need for further evidence, such as our experience, to determine if peri-areolar injections yield a higher detection rate in ectopic breast mapping compared to the other two methods. In our case, intradermal peri-areolar injection was successful whereas the peri-tumoral injection failed to detect the SLN.

CONCLUSION

Lymphoscintigraphy has proven to be a valuable tool for sampling SLNs in TNM classification of ectopic breast cancers, particularly those located in the axilla. Based on our experience with the case of ectopic axillary breast cancer presented, we found that peri-areolar injection was more effective than peri-tumoral injection for identifying the axillary sentinel lymph node. However, further research is necessary to validate the feasibility and accuracy of this method.

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