Unusual Contralateral Axillary Lymph Node Metastasis in a Second Primary Breast Cancer Detected by FDG PET/CT and Lymphoscintigraphy

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Abstract Contralateral metastatic axillary lymph nodes in a patient with breast cancer is a rare condition. Here, we present a 55-year-old woman with a second primary breast cancer. The patient underwent ¹⁸F-fluorodeoxyglucose positron emission tomography/computed tomography (FDG PET/CT) for staging work-up. Additionally, preoperative lymphoscintigraphy was performed to detect sentinel lymph nodes. FDG PET/CT demonstrated increased FDG uptake in the left nipple and right axillary lymph nodes. Lymphoscintigraphy identified the right axillary lymph nodes which was consistent with the FDG PET/CT findings. This case emphasizes the usefulness of FDG PET/CT and lymphoscintigraphy for identifying unpredictable contralateral axillary lymph node metastasis from a second primary breast cancer.

Keywords PET/CT · Sentinel lymph node · Lymphoscintigraphy · Breast cancer

Introduction

Breast cancer is the second most common malignancy in Korean women [1]. The most frequently used treatment op-

tion for early-stage breast cancer is breast-conserving surgery with both sentinel lymph node dissection and radiotherapy [2]. The completeness of sentinel lymph node dissection is known to be correlated with prognosis of breast cancer [3]. Therefore, it is important to localize the tumor and dissect the sentinel lymph nodes. Contralateral lymph node metastases are an unusual finding in breast cancer [4]. The reported incidence of contralateral axillary lymph node metastases is between 3.5% and 6% in patients with breast cancer [5]. Furthermore, altered contralateral lymphatic drainage is extremely rare after curative breast cancer treatment [4].

¹⁸F-Fluorodeoxyglucose positron emission tomography/computed tomography (FDG PET/CT) is a commonly used nuclear imaging tool for initial staging of breast cancer [6]. Previous studies have shown that hypermetabolic lymph nodes in the axilla match well with metastatic sentinel lymph nodes [7, 8]. However, there are some limitations to identifying axillary lymph node metastasis only with FDG PET/CT. Abnormal uptake of FDG is observed in reactive lymph nodes. Also, there is a report of metastasis detected in some lymph nodes without grossly increased FDG uptake [9].

Lymphoscintigraphy has emerged over the past two decades as a method for identifying and localizing sentinel lymph nodes in patients with breast cancer and melanoma. It has been shown that a sentinel lymph node with significant radiotracer uptake may have accumulated metastatic cells; therefore, they should be surgically removed and tested for metastatic cells [10]. In most patients, ipsilateral axillary lymph nodes are shown on lymphoscintigraphy, and in some patients internal mammary lymph nodes are shown. However, altered contralateral axillary drainage is extremely rare after curative breast cancer treatment [4, 11].

We describe here the case of a patient with a second primary breast cancer with contralateral axillary lymph node metastasis detected on preoperative FDG PET/CT and lymphoscintigraphy.

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Case Report

A 55-year-old woman was referred to our center for further evaluation of a left nipple lesion which was found at a regular physical check-up. She had a history of left breast cancer 5 years previously. At that time, preoperative lymphoscintigraphy was performed and showed increased tracer accumulation in the left axillary lymph nodes. She underwent left breast-conserving surgery with removal of four sentinel lymph nodes and then radiotherapy. The pathologic diagnosis was invasive mucinous carcinoma without lymph node metastasis. She had taken tamoxifen for 5 years after surgery. On regular follow-up, a left nipple mass was found on physical examination. Subsequently, an excisional biopsy of the left nipple was performed, and the pathologic finding suggested clinically a second primary breast cancer.

FDG PET/CT was performed for staging of a second primary breast cancer (Fig. 1a–c). On the FDG PET/CT images, the left nipple lesion showed focally increased FDG uptake (Fig. 1b) with a maximal standardized uptake value (SUVmax) of 4.4. Additionally, the contralateral axillary lymph nodes demonstrated mildly increased FDG uptake (Fig. 1c) with SUVmax 1.6, which suggested the presence of both reactive lymph nodes and metastatic lymph nodes. Breast-conserving surgery for the left nipple lesion was planned. Preoperative lymphoscintigraphy was performed to

localize the sentinel lymph node. Lymphoscintigraphy showed radioactivity in the right axilla which was suspected to represent the contralateral sentinel lymph nodes (Fig. 1d). Lymphoscintigraphy showed radioactivity in the left axillary sentinel lymph nodes before surgery for the initial primary breast cancer (Fig. 1e).

The lymphoscintigraphic agent used was a technetium-99m-labeled colloid. The patient received an intradermal injection of radiotracer to the areolar–cutaneous border of the left breast. Lymphoscintigraphy was started 1 min after injection and was continued for 15–20 min. The volume of tracer injected was 0.5 mL and the amount of activity injected was 0.8 mCi. In view of the FDG PET/CT and lymphoscintigraphy findings, the surgeons dissected the sentinel lymph node in the right axilla following breast-conserving surgery. On pathologic examination, the left nipple mass was diagnosed as invasive ductal carcinoma, and the right axillary lymph nodes as metastatic ductal carcinoma. At the time of this report, the patient was under close follow-up after surgery with adjuvant chemotherapy and aromatase inhibitor treatment.

Discussion

We present here a patient with a second primary left breast cancer and contralateral axillary lymph nodes metastases.

Fig. 1 Imaging in a 55-year-old woman with a suspected second primary breast cancer. **a–c** PET/CT imaging: **a** the maximal intensity projection image shows increased FDG uptake; **b**, **c** key fused transverse images show **(b)** a left nipple mass with increased FDG uptake (SUVmax 4.4), and **(c)** mildly increased FDG uptake in the contralateral axillary lymph

nodes (SUVmax 1.6). **d**, **e** Lymphoscintigraphy anteroposterior planar images show foci of increased tracer accumulation in the right axillary area (**d**), indicating the presence of axillary sentinel lymph nodes, and in the left axillary area (**e**) before surgery for the initial primary breast cancer

These were detected on preoperative FDG PET/CT and lymphoscintigraphy, and confirmed by lymph node biopsy and pathologic diagnosis.

Breast cancer frequently spreads first to the ipsilateral axillary lymph nodes from the primary tumor. Although contralateral axillary lymph node metastasis is normally regarded as a distant event, studies have shown that altered lymphatic drainage is possible after previous breast surgery. Lymphoscintigraphy in patients who have previously undergone breast or axillary surgery can show altered lymphatic drainage to the contralateral nodal basins including the contralateral axilla, internal mammary chain, and supraclavicular regions [12–15]. Therefore, the location of the sentinel lymph nodes becomes unpredictable at the time of a second primary or recurrent ipsilateral breast cancer [16].

This case suggests that consideration should be given to the possibility of contralateral axillary lymph node metastasis from a second primary malignancy when reading FDG PET/CT images in breast cancer patients who have undergone previous breast surgery. FDG PET/CT has been shown to be a useful diagnostic tool for the evaluation of a second primary malignancy in breast cancer patients [17]. In this case, there was increased FDG uptake in the left nipple and right axillary lymph nodes and tracer accumulation was visualized in the right axillary area on lymphoscintigraphy. The right axillary lymph node was finally pathologically confirmed as metastatic invasive ductal carcinoma.

Contralateral axillary lymph node metastasis is very rare. Management is complicated when contralateral axillary lymph node metastasis occurs as the first event of relapse after treatment of the primary tumor [18]. Traditionally, the contralateral axillary lymph node basin is considered a distant site. However, altered lymphatic drainage after previous surgery is not uncommon. Even though observed in a small population, the survival of patients with contralateral axillary lymph node metastasis is not comparable to those with distant disease. This might indicate that contralateral axillary lymph node metastasis can be considered a physiologic regional lymph node metastasis [19].

It has been postulated that lymphatic blockage by tumor infiltration or damage caused by previous surgical intervention might lead to altered lymphatic drainage [20]. Therefore, routine lymphoscintigraphy should be considered in this group of patients, as it has the potential to change disease stage and management. Detection of a contralateral axillary sentinel lymph node on lymphoscintigraphy in breast cancer is very rare (0.2%), and detected sentinel lymph nodes should be excised due to their clinical significance [10].

In conclusion, in this case report we describe FDG PET/CT and lymphoscintigraphy findings that demonstrate “anatomically contralateral, physiologically ipsilateral” axillary lymph node metastasis, considering the patient’s medical history. When alteration in lymphatic drainage is suspected in

a patient with a history of breast surgery, contralateral axillary lymph node metastasis should be considered. FDG PET/CT and lymphoscintigraphy may be useful for localizing the metastatic lesions.

Compliance with Ethical Standards

Conflicts of Interest None.

Ethical Approval This article is a case report for which approval by an institutional review board is waived.

Informed Consent Informed consent was obtained from the subject of this case report.

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