



# Unusual US Findings of Diffuse Large B-Cell Lymphoma of the Breast: A Case Report

유방의 B세포 림프종의 비전형적 초음파 영상 소견: 증례 보고

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Lymphoma is an uncommon type of breast malignancy, with low prevalence. The ultrasonographic findings of breast lymphoma have been described as nonspecific. Breast lymphoma most commonly appears as a solitary hypoechoic mass on US, and usually shows hypervascularity on color Doppler US. Herein, we report an unusual case of breast lymphoma that presented as multiple bilateral hyperechoic nodules on US.

**Index terms** Case Report; Lymphoma; B-Cell; Breast; Ultrasound

## INTRODUCTION

Lymphoma is an uncommon type of breast malignancy with a prevalence as low as 0.04%–0.7% (1, 2). Imaging findings of breast lymphoma have been described as nonspecific, leading to difficulties in distinguishing breast lymphoma from other benign or malignant breast diseases. A few studies have reported the common US features of breast lymphoma (3, 4). Although breast lymphomas usually present as hypoechoic solid masses, hyper- and mixed echogenicity are reportedly uncommon features. Herein, we report a case of diffuse large B-cell lymphoma (DLBCL) of the breast and describe the relevant US characteristics.

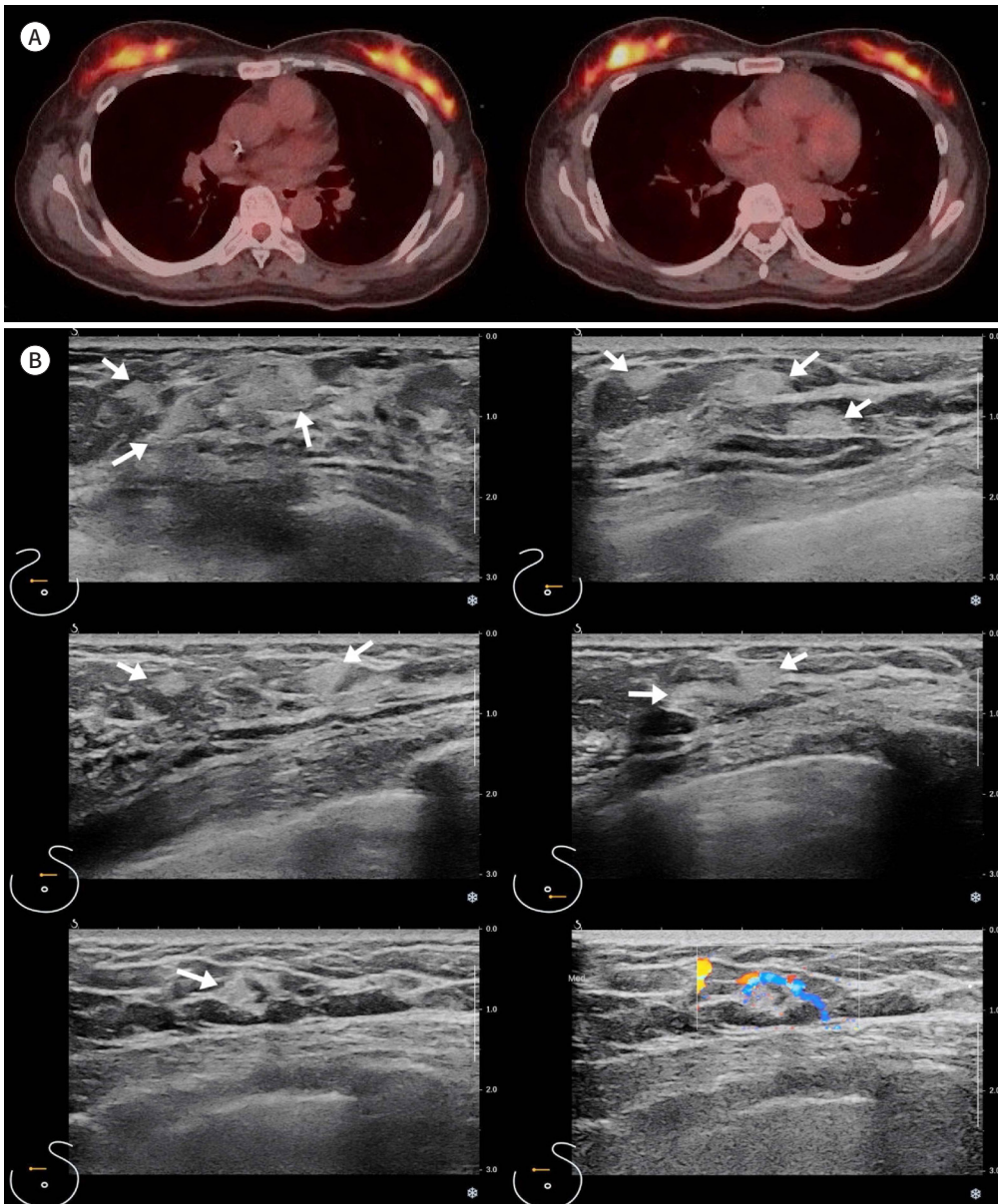
## CASE REPORT

A 50-year-old woman presented to the emergency department of our institution with uncontrolled cancer-related pain despite receiving medication. The patient was diagnosed as having DLBCL involving the bone marrow, liver, and spleen. The patient underwent systemic chemotherapy with three cycles of rituximab plus cyclophosphamide, doxorubicin, vincristine, and prednisone (R-CHOP) regimen at our institution.

**Fig. 1.** Diffuse large B-cell lymphoma in a 50-year-old woman.

**A.**  $^{18}\text{F}$ -FDG PET/CT shows diffuse hypermetabolic infiltration and nodular lesions in bilateral breast parenchyma.

**B.** Breast US shows multiple oval shaped hyperechoic nodules in both breasts (arrows) with increased internal and peripheral vascularity.



Upon admission,  $^{18}\text{F}$ -FDG PET/CT was performed. The PET/CT showed newly developed diffuse hypermetabolic infiltration in both breasts. Multiple nodular hypermetabolic lesions were observed bilaterally in the breast parenchyma (Fig. 1A). Subsequently, mammography and US were performed. Mammography revealed no solid masses or other abnormal findings. Breast US revealed numerous variably sized hyperechoic nodules scattered within both breasts. The nodules were oval or irregular in shape, circumscribed or indistinct in margins, and parallel in orientation. The nodules exhibited increased internal and peripheral vascularity (Fig. 1B). There was a 1-cm lymph node with 6.5-mm cortical thickening at the left axil-

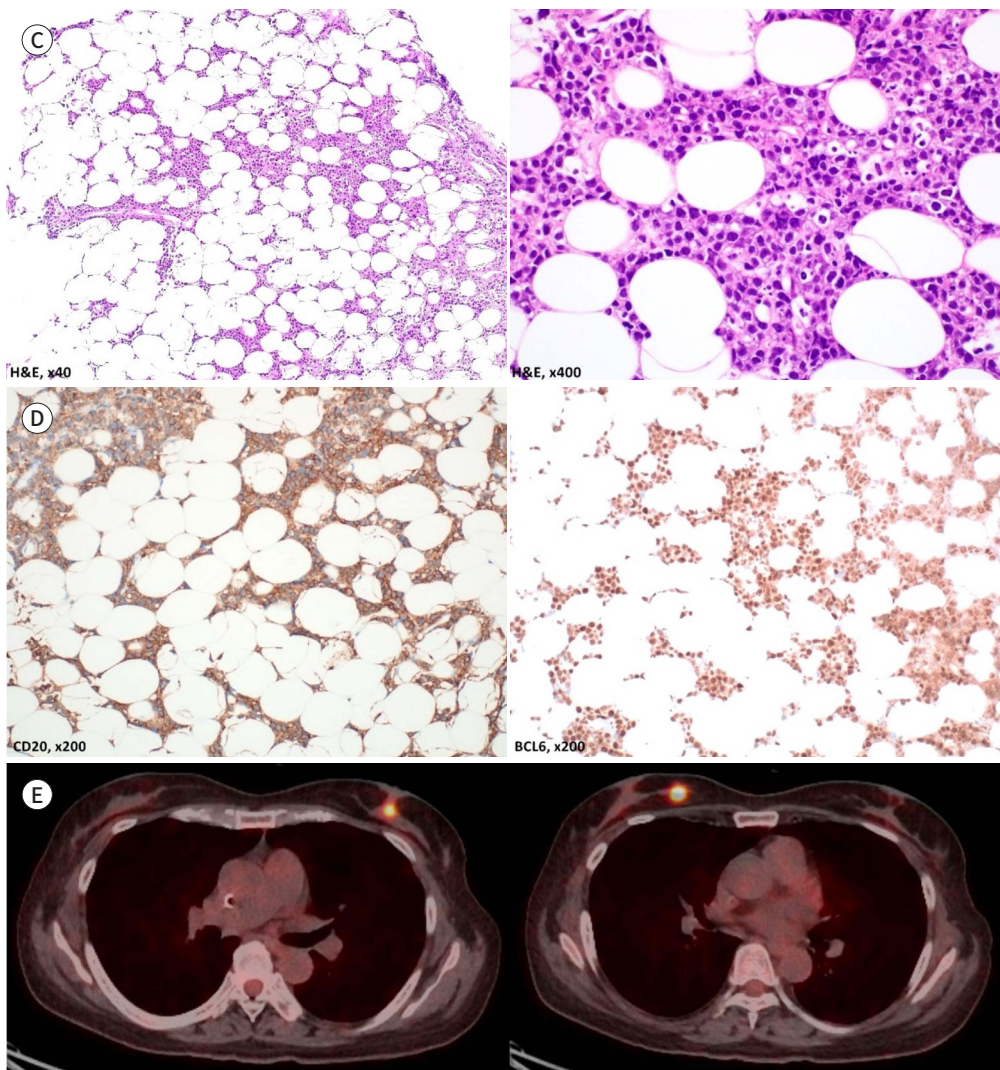
**Fig. 1.** Diffuse large B-cell lymphoma in a 50-year-old woman.

**C.** Microscopic examination demonstrates an infiltration of the fibrofatty stroma of the breast by cords and sheets of large pleomorphic discohesive malignant cells with hyperchromatic nuclei and scanty cytoplasm.

**D.** Immunohistochemical staining results of tumor cells show diffuse positive membranous expression for CD20 and diffuse positive nucleus expression for BCL6.

**E.**  $^{18}\text{F}$ -FDG PET/CT obtained 2 months after three cycles of ICE chemotherapy shows two hypermetabolic nodular lesions in bilateral breast parenchyma.

H&E = hematoxylin and eosin, ICE = ifosfamide, carboplatin, and etoposide



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The patient underwent US-guided core-needle biopsy for the largest hyperechoic lesion in the right breast at the 11 o'clock position. Hematoxylin and eosin staining revealed infiltration of the breast stroma by cords and sheets of large pleomorphic discohesive cells with hyperchromatic nuclei and scanty cytoplasm (Fig. 1C). Immunohistochemically, the neoplastic cells showed diffuse cytoplasmic staining for CD20 and diffuse nuclear staining for BCL6 (Fig. 1D). These histopathological findings supported the diagnosis of DLBCL of the breast and confirmed the diagnosis of secondary breast lymphoma. The patient was administered second-line systemic chemotherapy with ifosfamide, carboplatin, and etoposide (ICE). PET/CT images obtained 2 months after three cycles of ICE chemotherapy showed interval decreased hypermetabolic infiltration with remaining two hypermetabolic nodular lesions in both breasts (Fig. 1E).

This retrospective case report was prepared according to the ethical principles in the Declaration of Helsinki.

## DISCUSSION

Lymphoma is a common hematological malignancy. However, it is an uncommon type of breast cancer. Breast lymphoma may occur as either a primary or secondary lesion. Primary breast lymphoma accounts for 0.04%–0.5% of all breast malignancies (1, 3). Most primary breast lymphomas are B-cell type, with DLBCL representing the predominant histological type. Secondary breast lymphoma is more common than primary disease. In the present case, the patient presented with secondary involvement of the breast due to DLBCL.

Most cases of breast lymphoma are unilateral and primary breast lymphoma typically manifests as a solitary mass. Bilateral involvement and multiple masses are identified more commonly in secondary breast lymphomas (1, 3, 5-7). FDG PET/CT of breast lymphoma can present unilateral or bilateral breast involvement and show unifocal, multifocal, or diffuse FDG uptake (4, 8). Our case, although less common, showed bilateral and multiple nodular uptakes with diffuse increased FDG accumulation.

The US features of breast lymphoma are nonspecific, depicting masses that can be oval or irregular in shape with circumscribed or indistinct margins. A hypoechoic solid oval or round mass is the most common US finding. Mixed hypo- and hyperechoic masses on US were found in 23% of breast lymphoma cases in a study by Yang et al (4). On Doppler US, lymphomas are usually hypervascular. The sonographic features of our case correlated with some of the common findings of other studies (3, 4, 9). However, our case was unusual in that the US findings showed hyperechoic nodules. As hyperechoic nodules in the breast are frequently benign, our case highlights the importance of evaluating malignancy in hyperechoic lesions. Malignant breast lesions are typically hypoechoic. However, breast malignancies such as invasive ductal and invasive lobular carcinoma, lymphoma, and sarcoma can occasionally present as hyperechoic lesions, mimicking benign lesions (10). To distinguish malignant tumors from benign lesions in the breast, other US features such as hypervascularization on color Doppler examination should be considered.

In conclusion, we report unusual US features of breast lymphoma presenting as multiple

hyperechoic masses. Due to its rare occurrence and nonspecific radiological features, it is difficult to distinguish breast lymphoma from other breast lesions. Breast malignancies, including lymphoma, infrequently manifest as hyperechoic lesions on US, thereby mimicking benign lesions. The search for additional worrisome US features will be helpful for differential diagnosis and appropriate management.

### Author Contributions

Conceptualization, W.O.H.; data curation, L.K.E., W.O.H., K.C.Y.; formal analysis, L.K.E., W.O.H.; investigation, L.K.E., W.O.H.; methodology, W.O.H.; project administration, W.O.H.; resources, L.K.E., W.O.H.; supervision, W.O.H.; writing—original draft, L.K.E.; writing—review & editing, all authors.

### Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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## 유방의 B세포 림프종의 비전형적 초음파 영상 소견: 증례 보고

이경은<sup>1</sup> · 우옥희<sup>1\*</sup> · 김정열<sup>2</sup> · 조규란<sup>3</sup> · 서보경<sup>4</sup>

유방 림프종은 유방 악성 종양의 드문 형태로 유병률이 낮다. 유방 림프종의 초음파 소견은 비특이적인 것으로 알려져 있다. 일반적으로 유방 림프종은 초음파에서 저에코의 단일 종괴로 보이며, 칼라 도플러 초음파에서 고혈관성을 보인다. 이에 저자들은 초음파에서 양측 유방에 다수의 고에코의 결절들로 보이는 비전형적인 유방 림프종의 증례를 보고한다.

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