








Primary Malignant Melanoma of the Breast Presenting as a Breast Abscess: A Case Report

유방 농양으로 발현한 유방의 원발성 악성 흑색종: 증례 보고


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Received January 23, 2022

Revised July 7, 2022

Accepted October 23, 2022

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Primary malignant melanoma in breast parenchyma (PMB) is an extremely rare disease, and the most common presentation is a palpable breast lump. To the best of our knowledge, a case of PMB presenting as a breast abscess has not been reported in English literatures. We present a case of PMB that manifested as a recurrent breast abscess in a 71-year-old woman. On MRI, an enhancing solid mass with a cystic or necrotic portion was revealed with some high signal intensities on precontrast-enhanced T1-weighted images and a dark rim on T2-weighted images. The MRI features played a pivotal role in identifying the underlying malignant condition and making an accurate diagnosis of this rare case of PMB with unusual clinical presentation.

Index terms Breast Neoplasms; Melanoma; Magnetic Resonance Imaging

INTRODUCTION

Melanomas develop from dendritic melanocytes mostly in the skin, mucosal epithelia, eyes, and leptomeninges (1). Malignant melanoma of the breast may present as a primary le-

sion in the breast or metastatic disease (1-3). Malignant melanomas are one of the most common sources of breast metastases except for those from contralateral breast tumors; however, primary malignant melanoma in the breast is very rare, accounting for less than 0.5% of breast cancers (1, 2). Moreover, most of these malignant melanomas are derived from the skin overlying the breast, and the primary malignant melanoma in breast parenchyma (PMB) is extremely scarce that only a few cases have been reported in the literature.

The most common presentation of PMB is reported as a palpable lump in the breast, and no case of PMB presenting as a breast abscess has been reported thus far. Herein, we report the case of a 71-year-old woman with PMB that manifested as a recurrent breast abscess and describe the features of MRI.

CASE REPORT

A 71-year-old woman presented with swelling and a warm sensation in the right breast that started a week prior to the presentation. She had no previous history of breast disease or family history of breast cancer. She had type II diabetes mellitus which had not been controlled with medication. On physical examination, there was a palpable lump that measured over 10 cm in the upper outer quadrant of the right breast with diffuse swelling and redness on the overlying skin. Her body temperature was 37.4°C. Laboratory examination revealed that her leukocyte count was 18740/mm³ with 79.9% neutrophils and C-reactive protein of 25.10 mg/dL. Because the size of the lump was very large and the patient complained of discomfort, mammography and US evaluation could not be performed. Instead, a chest CT scan was performed with contrast enhancement, which revealed a 12 cm × 12 cm mass with irregular margins consisting of cystic components and some enhancing solid portions in the upper outer quadrant of the right breast (Fig. 1A). A core-needle biopsy was performed under US guidance, and the pathologic result indicated an abscess with a ruptured benign cyst. A

Fig. 1. Primary malignant melanoma of the breast parenchyma in a 71-year-old woman presenting with swelling and warm sensation in the right breast.

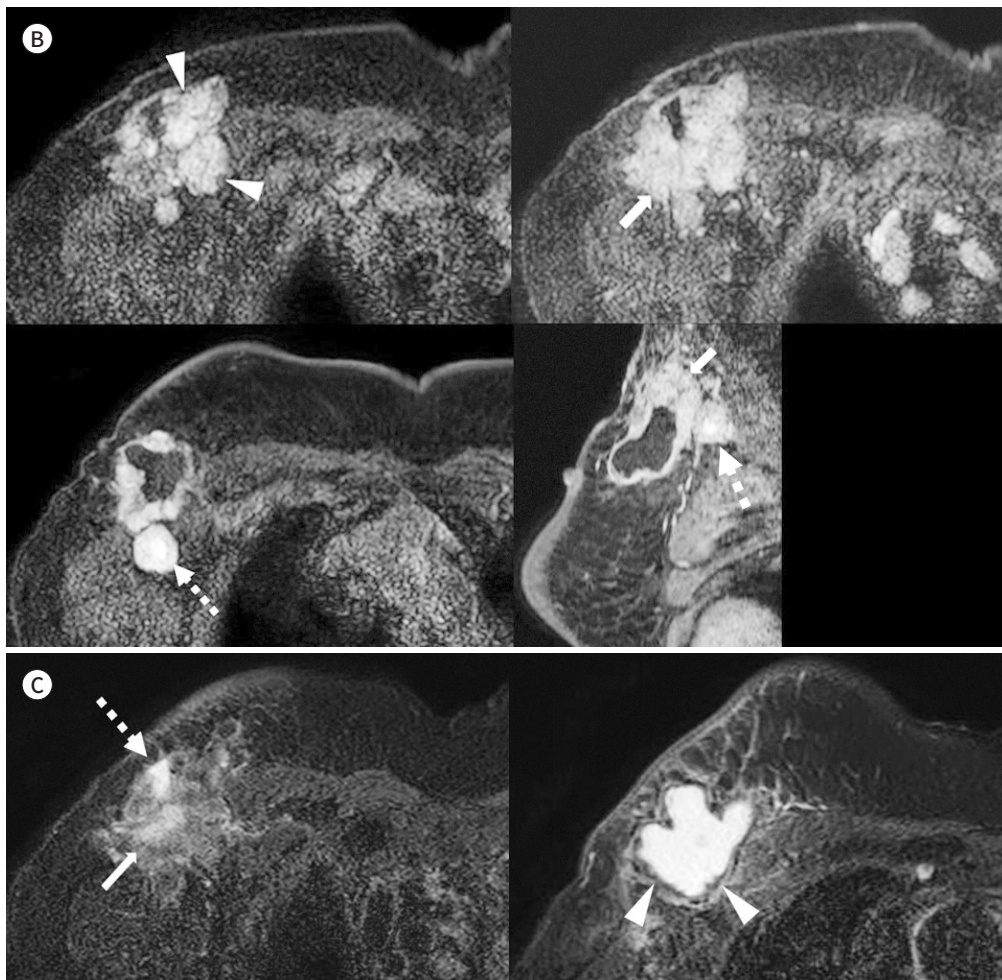
A. In the contrast-enhanced chest CT scan performed at initial presentation, axial and coronal reconstructed CT images reveal a 12 cm × 12 cm sized, irregular mass with mainly cystic and some enhancing solid portion (arrows) in the upper outer quadrant of the right breast extending to the axilla.



Fig. 1. Primary malignant melanoma of the breast parenchyma in a 71-year-old woman presenting with swelling and warm sensation in the right breast.

B. Breast MRI was performed 2 months following the initial presentation. The axial fat-suppressed precontrast-enhanced T1-weighted image of the right breast shows a high signal intensity area (arrowheads) within the irregular mass, and the axial postcontrast-enhanced T1-weighted image reveals that the other part of the mass shows enhancement (arrow) with infiltration in the surrounding soft tissue. A portion of the axillary lymph node also shows a high signal intensity area on precontrast-enhanced T1-weighted image (dotted arrow). The sagittal-reformatted image of postcontrast-enhanced T1-weighted images show a solid component in the upper portion of the mass (arrow), cystic or necrotic component in the lower portion of the mass, and an enlarged axillary lymph node posterior to the mass (dotted arrow).

C. On axial T2-weighted images, the mass shows intermediate signal intensity in the solid portion (arrow) and high signal intensity in the cystic or necrotic portion (dotted arrow). Notably, the mass is surrounded by a dark rim (arrowheads).

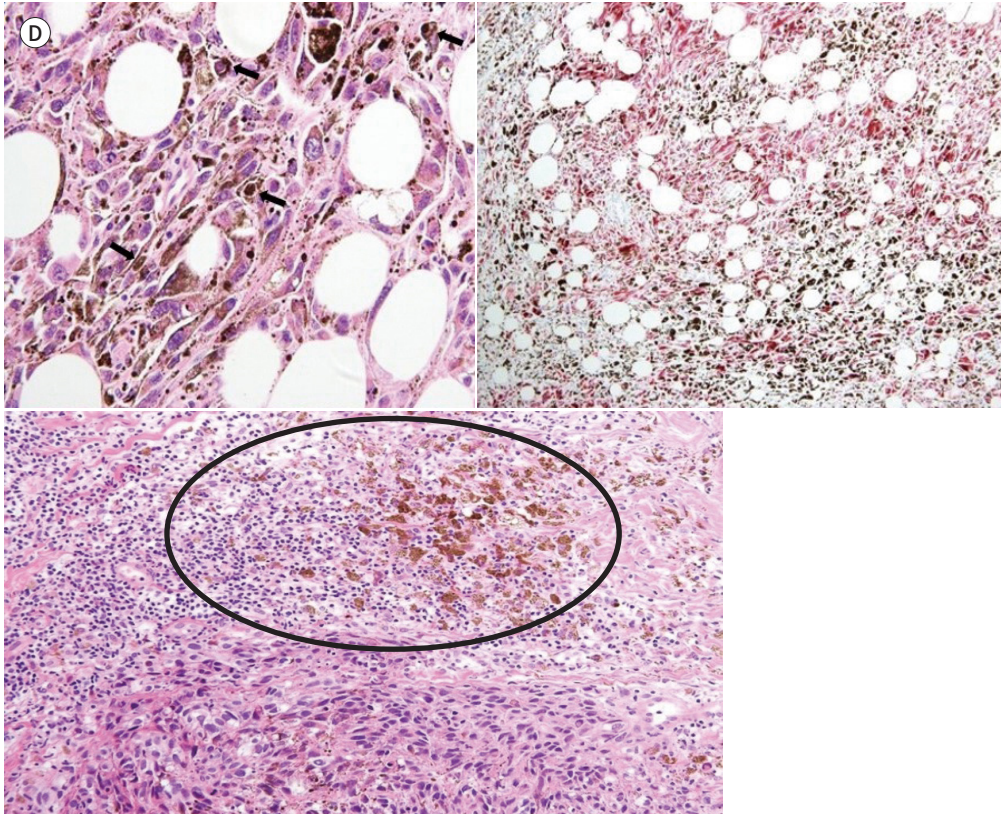


tissue culture was positive for *Staphylococcus aureus*. The lesion was assessed as a peripheral nonpuerperal abscess, and the patient received antibiotic treatment with drainage of 155 cc of dark brown-colored fluid through a Jackson-Pratt (JP) drain for three days.

However, the swelling in the right breast continued to recur and about 80 to 200 cc of dirty brown-colored fluid was aspirated every week for two months. In addition, an ulcerative lesion developed on the skin of the previous aspiration site approximately 1 month following the first procedure. An incisional biopsy was performed for the skin lesion, and the patho-

Fig. 1. Primary malignant melanoma of the breast parenchyma in a 71-year-old woman presenting with swelling and warm sensation in the right breast.

D. Photomicroscopic image shows infiltration of brownish melanin-laden macrophages around atypical melanocytes (black arrows, upper left panel; $\times 400$, H&E stain). These melanocytes and melanin pigments show positive results for immunohistochemical staining with Melan-A (upper right panel; $\times 400$). The areas seen as a dark rim on T2-weighted images are composed of dense inflammatory cells containing brownish melanin pigments that surround the melanoma (circle, lower panel; $\times 400$, H&E stain).
H&E = hematoxylin and eosin



logic result revealed a cyst with chronic inflammation and old hemorrhage. As the symptoms continued to recur, breast MRI was performed with a 3T MR scanner (Ingenia, Philips Healthcare, Best, the Netherlands).

On MRI, an 11 cm \times 9.5 cm \times 5 cm irregular mass was observed in the upper outer quadrant of the right breast extending to the axilla. There was some enhancing solid component in the upper portion of the mass and, notably, a part of the mass showed high signal intensity on the fat-suppressed T1-weighted precontrast-enhanced images (Fig. 1B). The solid component showed low signal intensity on T2-weighted images, and the cystic component in the lower portion of the mass was surrounded by a dark rim on T2-weighted images (Fig. 1C). In addition, a 2.3 cm round lymph node was observed in the level I area of the right axilla, and this also revealed high signal intensity on T1-weighted precontrast-enhanced images (Fig. 1B). The mass was considered as Breast Imaging Reporting and Data System category 4, and partial mastectomy with axillary lymph node excision was performed. A 9.5 cm \times 5 cm lobulated black-colored mass with a 10% necrotic component was identified on gross specimen, and the excised lymph node also showed black-tan color. Immunohistochemical staining re-

vealed positive results for HMB-45 and MART-1/Melan-A, and malignant melanoma with lymph node metastasis was confirmed based on pathological findings (Fig. 1D). Complete skin examination was negative for cutaneous primary melanoma. Fundoscopic examination, ENT examination, chest CT, abdomen and pelvis CT, and brain MRI as well as whole-body PET-CT scan revealed no evidence of primary melanoma in other parts of the body.

The Institutional Review Board of Dankook University Hospital approved this retrospective case study and waived the requirement for informed consent, and this retrospective case report was performed according to the relevant guidelines and regulations (IRB No. 2021-08-034).

DISCUSSION

Breast carcinoma rarely mimics an abscess, accounting for less than 1% of all breast carcinomas (4). Such unusual manifestation of a neoplasm leads to delayed diagnosis and treatment, and consequently poor prognosis. In our case, the clinical presentation of the patient as well as the pathologic examination and tissue culture of the core-needle biopsy specimen supported the diagnosis of peripheral nonpuerperal abscess, which generally occur in elderly women with diabetes, commonly associated with *Staphylococcus aureus* (5). The recurrent symptoms and development of skin lesion were not typical of the usual clinical course of peripheral nonpuerperal abscess, and MRI played a decisive role in suspecting the underlying malignancy and proceeding with appropriate management.

PMB is extremely rare, and most literature regarding breast melanomas is focused on those metastasized from other primary sites or those on the breast skin (1, 6, 7). The pathogenesis of PMB is not well established; however, it is hypothesized that PMB is a 1) metastatic tumor from an unknown primary tumor or a completely regressed primary tumor, 2) primary tumor arising from an ectopic melanocyte in the breast, or 3) result of the metaplastic transformation of a mammary duct precursor (1). Before establishing a diagnosis of PMB, it is important to exclude the presence of malignant melanoma in other sites of the body. In our case, careful physical examination of the entire skin and PET-CT scan revealed no evidence of primary malignant melanoma in other locations.

The most common presentation of PMB in previous studies is a palpable lump in the breast (1-3, 6, 8-10). There has been no report of a case that presented as a breast abscess. The prognosis of PMB is difficult to ascertain based on the few available studies, but the general prognosis of primary non-cutaneous malignant melanoma is poor owing to delayed diagnosis (6). Though there is no treatment guideline for PMB, radical surgical resection with free margins combined with axillary node resection or sentinel node resection is usually performed (3, 6, 10).

Little is known concerning the imaging features of PMB. A few case reports described the mammographic and ultrasonographic features of PMB. It often appears as a benign lesion with a well-defined margin and without calcification on mammography, and as a round, microlobulated, and hypoechoic mass on ultrasound with variable vascularity on color Doppler study (2, 8). To date, there has been only one report that described MRI findings (2). According to this report, PMB was shown as a circumscribed mass with heterogeneously high signal intensity and a dark rim on T2-weighted images and showed irregular rim and septal enhancement on contrast-enhanced images.

In our case, the margin of the mass was mostly circumscribed, but some parts of the mass had an indistinct margin with surrounding infiltrations. This may have been due to an associated inflammatory condition of the mass. On T2-weighted images, the mass showed intermediate signal intensity except for the cystic or necrotic portion, unlike the one in the previous report (2). However, in the lower portion of the mass, which had a predominantly cystic component, a dark rim was surrounding the mass on T2-weighted images and showed enhancement on contrast-enhanced images, similar to the features described in the previous report (2). In our case, the aggregates of melanin-laden macrophages admixed with melanoma cells were surrounding the cystic area on microscopic examination; thus, we assume that these macrophages could have attributed to the features of dark rim on T2-weighted images. The presence of cystic or necrotic portion inside the mass was also a common feature of the two reported cases. Notably, in our case, a portion of the mass, as well as the metastatic axillary lymph node, showed some high signal intensity on T1-weighted precontrast-enhanced images and intermediate or dark signal intensity on T2-weighted images, which is a well-known feature of malignant melanomas that occur in other more common sites of the body. Characteristic signal intensity features of malignant melanomas are associated with T1- and T2-shortening effects of the paramagnetic property of melanin. Though, high signal intensities on T1-weighted precontrast-enhanced images is not a specific feature of malignant melanoma, as methemoglobin in subacute hemorrhages can also produce similar features. Therefore, advanced breast cancer with hemorrhage as well as metastasis from a tumor with hemorrhagic features needed to be included in the differential diagnosis.

In conclusion, we present a case of PMB that clinically presented as a recurrent breast abscess. MRI features provided important clues in suspecting the underlying malignant condition and initiating appropriate management.

Author Contributions

Conceptualization, K.H.J.; investigation, K.H.J., C.H.I.; project administration, K.H.J., C.H.I.; resources, K.H.J., M.J., L.Y.M., K.Y.M.; supervision, K.H.J.; visualization, K.H.J., C.H.I., K.Y.M.; writing—original draft, K.H.J., C.H.I.; and writing—review & editing, K.H.J., M.J., L.Y.M., K.Y.M.

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

Funding

None

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유방 농양으로 발현한 유방의 원발성 악성 흑색종: 증례 보고

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유방 실질의 원발성 악성 흑색종은 극히 드물며, 대부분 유방 내 만져지는 종괴로 나타난다. 유방 농양으로 나타난 원발성 악성 흑색종은 아직까지 영문 문헌에 보고된 바 없다. 저자들은 반복적으로 재발하는 유방 농양이 있었던 71세 여자 환자에서 진단된 유방 실질의 원발성 악성 흑색종을 보고하고자 한다. 유방 자기공명영상 검사에서 조영증강되는 고형 부분과 낭성 또는 괴사 부분을 동반한 종괴가 있었고, 조영 전 T1 강조 영상에서 높은 신호 강도인 부분과 T2 강조 영상에서 어두운 신호 강도인 테두리가 있었다. 재발성 유방 농양의 임상 소견을 보인 본 증례에서 기저의 악성 질환 가능성을 의심하고 정확한 진단을 얻는 데 MRI 소견이 결정적인 역할을 하였다.

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