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Case Report

Relapsed multiple myeloma manifesting as extramedullary plasmacytoma of the breast: Imaging findings

Misugi Urano, MD[a,], Fatmaelzahraa Abdelfattah Denewar, MD[a], Ryo Okabe, MD[a], Hirokazu Komatsu, MD[b,c], Yumi Wanifuchi-Endo, MD[d], Tatsuya Toyama, MD[d], Yuta Shibamoto, MD[a]*

[a] *Department of Radiology, Nagoya City University Graduate School of Medical Sciences, 1 Kawasumi, Mizuhocho, Mizuho-ku, Nagoya, Japan*

[b] *Department of Hematology and Oncology, Nagoya City University Graduate School of Medical Sciences, Nagoya, Japan*

[c] *Division of Chemotherapy, Nagoya City University Hospital, Japan*

[d] *Department of Breast Surgery, Nagoya City University Graduate School of Medical Sciences, Nagoya, Japan*

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ABSTRACT

Extramedullary plasmacytoma of the breast (EPB), a manifestation of multiple myeloma (MM), is very rare. It is important to recognize the imaging findings of EPB because it may be the first manifestation of relapsed MM. An 85-year-old woman presented with a lump in her right breast 4 years after the complete remission of MM. She underwent mammography and ultrasonography, which showed an oval circumscribed mass and an irregular circumscribed heterogeneous solid mass, respectively. Following ultrasound-guided vacuum-assisted breast biopsy, this lesion was confirmed to be EPB. Whole-body computed tomography showed multiple new osteolytic lesions and other multiple extramedullary lesions in addition to EPB in the right breast. The final diagnosis was relapsed MM with multiple extramedullary plasmacytoma.

Introduction

Multiple myeloma (MM) is a malignant monoclonal neoplasm of plasma cells that primarily involves the bone marrow. MM was previously an incurable cancer; however, proteasome inhibitors, including bortezomib and carfilzomib, and immunomodulatory drugs, such as lenalidomide and thalidomide, have markedly improved the survival of MM patients [1]. Extraosseous manifestations potentially develop in any

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* Corresponding author.
E-mail addresses: m_urano@med.nagoya-cu.ac.jp (M. Urano), zahra.denewar@gmail.com (F.A. Denewar), okabecon@gmail.com (R. Okabe), komatsu@med.nagoya-cu.ac.jp (H. Komatsu), yendo424@med.nagoya-cu.ac.jp (Y. Wanifuchi-Endo), t.toyama@med.nagoya-cu.ac.jp (T. Toyama), yshiba@med.nagoya-cu.ac.jp (Y. Shibamoto).

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tissues, but are commonly detected in the lymph nodes, spleen, skin, kidneys, lungs, and pancreas [2]. The imaging findings of extraosseous myeloma are nonspecific and may mimic other disorders. Therefore, extramedullary plasmacytoma of the breast (EPB), which is extremely rare, is included in the differential diagnosis of unilateral or bilateral mammary masses [2,3]. It is important to recognize EPB because it represents an opportunity to identify relapsed MM. When evaluating a patient with EPB, it is essential to distinguish whether the lesion is solitary or concurrent with MM because patients with extraosseous myeloma have significantly shorter overall survival as well as shorter progression-free survival due to bone marrow involvement [4]. We herein report the image findings of an 85-year-old woman with MM in remission who relapsed with extramedullary plasmacytoma (EMP) involving multiple organs as well as a literature review.

Case report

In January 2018, an 85-year-old woman presented with a right breast lump that she had had for 3 months. There was no associated breast pain, skin change, or nipple discharge. She had been diagnosed with MM with multiple spine pathologic fractures and multiple intercostal extramedullary soft tissue masses in August 2014. At that time, a bone marrow biopsy showed increased mature plasma cells. This patient had anemia, mild renal insufficiency, and serum and urine monoclonal protein elevation. The patient underwent 4 cycles of chemotherapy with melphalan, prednisolone, and bortezomib. Two years later, a follow-up with magnetic resonance imaging (MRI) of the whole spine showed tumor recurrence and she received radiotherapy to the spinal region. After the radiotherapy, her MM was in complete remission until the emergence of the breast lump 2 years later.

A physical examination revealed a 4.5 × 4 cm mass in the upper inner quadrant of the right breast. Skin dimpling and signs of inflammation were not present. There was no axillary or supraclavicular lymphadenopathy. Mammography (MMG) confirmed an oval circumscribed high density mass in the upper inner quadrant of the right breast (Fig. 1). Ultrasonography (US) subsequently showed an oval circumscribed heterogeneous solid 3.6 × 3.3 cm mass that exhibited partial shadowing combined with enhancement parallel to the pectoralis major (Fig. 2). The mass showed no tissue distortion, inflammation, or fibrotic reaction. The patient underwent US-guided vacuum-assisted breast biopsy using an 11-gauge vacuum suction device (Mammotome; Ethicon Endo Surgery, Inc., Cincinnati, OH). A histopathological examination showed the nodular proliferation of atypical plasmacytoid cells (Fig. 3a). Immunohistochemical staining revealed that tumor cells were positive for kappa light chains and CD138 (Fig. 3b, c), while cyclin D1 was negative.

Whole-body computed tomography (CT) was performed in a systemic evaluation of the patient. CT images showed a right oval circumscribed, but partly irregular homogeneously enhanced breast mass (Fig. 4). In addition to multiple new osteolytic lesions partly complicated by pathological fractures, other extramedullary lesions involving subcutaneous tissues,

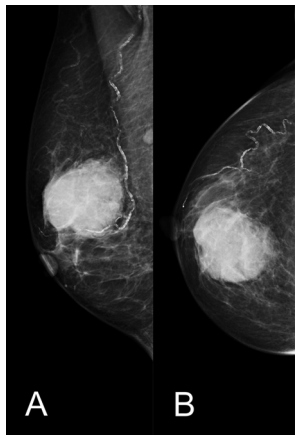

Fig. 1 – Mammography of the right breast in mediolateral oblique (A) and craniocaudal (B) views showed an oval circumscribed high density mass.

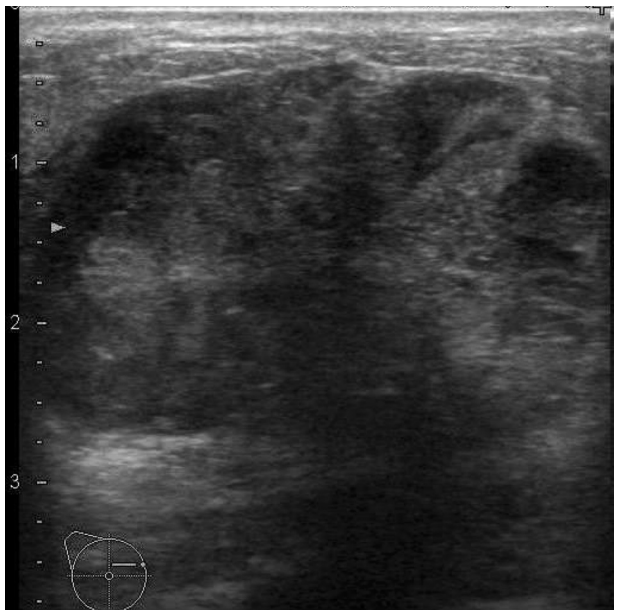

Fig. 2 – Ultrasonography showed an oval circumscribed heterogeneous solid mass parallel to the pectoralis major. The posterior features combined partial shadowing and enhancement.

the lungs, pleura, lymph nodes, thyroid, pancreas (Fig. 5), and peritoneum (Fig. 6) were detected. Serum and urine immunoelectrophoresis both revealed monoclonal protein elevations. Therefore, the patient was diagnosed with relapsed MM with breast plasmacytoma.

The patient was treated with lenalidomide and dexamethasone because she was 85-year-old and unfit to more intensive treatment. In addition, she was suffering from Alzheimer's disease. This also prevented the application of radiation therapy. Six months later, multiple lesions had shrunk, but remained visible on CT. Serum and urine monoclonal protein elevations persisted.

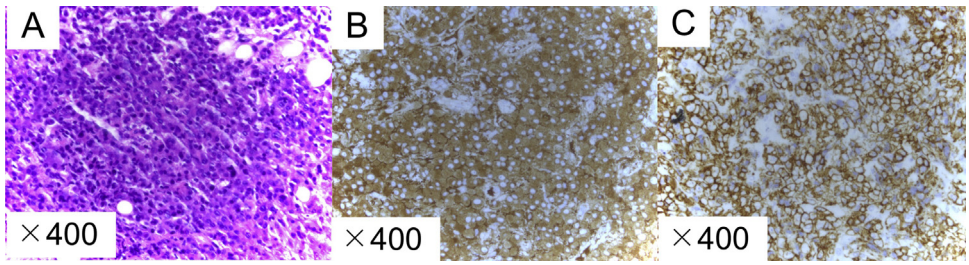

Fig. 3 – Histopathological analysis. (A) HE stains showed the infiltration of atypical plasmacytoid cells with enlarged nuclei and prominent nucleoli. (B) Photomicrographs showed a positive reaction for CD 138 indicating a plasma cell origin. (C) Kappa immunohistochemical staining showed strong and diffuse positivity for kappa. Lambda immunohistochemical staining was negative (not shown).

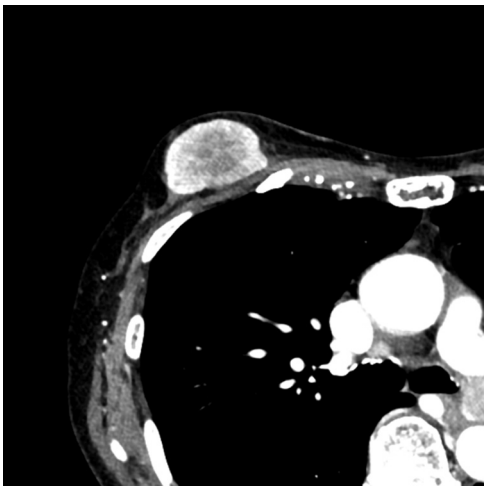

Fig. 4 – An axial enhanced CT image of the right breast showed a right oval circumscribed homogeneously enhanced breast mass.

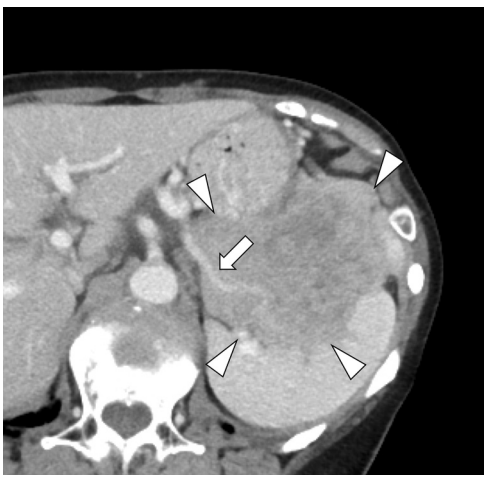

Fig. 5 – An axial enhanced CT image showed an enlarged and homogeneous pancreatic tail mass (arrowheads) with a narrowed splenic artery (arrow) and interruption of the splenic vein.

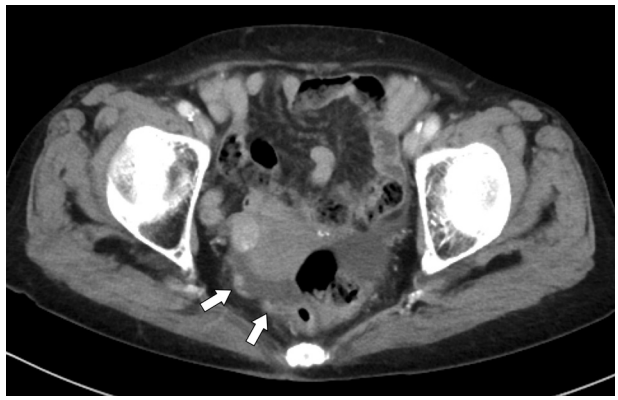

Fig. 6 – An axial enhanced CT image showed a thickened and enhanced peritoneum in the pouch of Douglas (arrows).

Discussion

Solitary plasmacytoma may be classified into 2 groups depending on its location: solitary plasmacytoma of the bone involving an osseous site and EMP involving an extraosseous site [5]. Solitary plasmacytoma of the bone mostly occurs in the bones of the axial skeleton, such as the vertebra and skull [2,5]. EMP is most often located in the head and neck region, mainly in the upper aero-digestive tract, such as the nasal cavity and nasopharynx, but may also occur in the gastrointestinal tract, urinary bladder, central nervous system, thyroid, breasts, testes, parotid gland, lymph nodes, and skin [5]. EMP may represent the initial manifestation of systemic MM or may herald the recurrence of previously treated or quiescent MM. The incidence of EMP at relapse has increased in recent decades [3,4]. The National Comprehensive Cancer Network panel [6] recommended a skeletal survey, skeletal MRI, whole-body low-dose CT, and/or ^{18}F-fluorodeoxyglucose positron emission tomography-CT, as clinically indicated for MM patients who responded to primary therapy.

EPB is detected clinically or radiologically. The majority of reported cases have been those with the synchronous diagnosis of MM. EPB may present on MMG as a mass or diffuse infiltration. Breast masses manifest as round or oval high density masses with circumscribed, obscured, or indistinct

margins. Lobulated masses or those with microcalcifications are extremely rare [7]. On US, EPB appears as a hypoechoic or heterogeneous mass with circumscribed, microlobulated, or indistinct margins. Posterior features show various patterns. Color Doppler US shows a mass with hypervascularity [6]. On MRI, breast lesions show low and intermediate signal intensities on T2-weighted and T1-weighted images, respectively, with hypervascularity [7]. In this manner, EPB shows nonspecific radiological findings mimicking breast cancer or a benign breast mass [7]. CT findings of EPB are limited to a few reports [8]. Previous studies on the radiological manifestations of plasmacytomas in other parts of the body indicate that EMP is nonspecific, but compatible with solid tumors with invariable enhancement [9].

In our patient, the breast mass showed an oval circumscribed mass on MMG and an irregular circumscribed heterogeneous solid mass on US. The mass was classified as categories 4B and 4C according to the Breast Imaging Reporting and Data System for MMG and US, respectively [10]. The radiological diagnosis was breast cancer or EPB, and US-guided biopsy was performed. Whole-body CT provides additional information for detecting multiple lesions and is useful for the management of patients with MM.

In conclusion, EPB shows nonspecific radiological findings mimicking breast cancer. However, radiologists need to consider plasmacytoma in the differential diagnosis of breast lesions, particularly in patients with MM.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.radcr.2019.02.018.

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