CASE REPORT

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Bilateral Myeloid Sarcoma of Breast: A Case Report and Discussion

Lian Li, Zhi Liu, Huiling Zhang, Yudie Zou, Yingjia Li

Department of Ultrasound, Nanfang Hospital, Southern Medical University, Guangzhou, Guangdong, China

ABSTRACT

Myeloid sarcoma (MS) involving the breast is rare. We reviewed a case of a 21-year-old female with palpable masses in the bilateral breasts without medullary acute myeloid leukemia. Ultrasound revealed irregular, indistinct, and complex hypoechoic masses with internal blood flow and hyperechoic halos in the bilateral breasts. A biopsy was subsequently recommended, and MS was confirmed. Further cytogenetic evaluation of breast biopsy specimens demonstrated positive t(16;16)(p13.1;q22) translocation. The patient was admitted for chemotherapy. Subsequent follow-up breast ultrasound following chemotherapy revealed a notable treatment response. This report aims to delineate the ultrasound characteristics of breast MS and the utilization of ultrasound in the evaluation of early response to chemotherapy.

Keywords: Myeloid sarcoma; breast; ultrasonography

KEY POINTS

- Myeloid sarcoma (MS) involving bilateral breast is rare but aggressive.
- Ultrasound plays a certain role in the initial evaluation of breast MS.
- The assessment of therapeutic response involves the use of ultrasound.

Introduction

Myeloid sarcoma (MS), also known as granulocytic sarcoma or chloroma, is a rare subtype of acute myeloid leukemia (AML) that involves the extramedullary proliferation of myeloid blasts. It often occurs concomitantly with AML or myelodysplastic diseases, and rarely without bone marrow involvement (1, 2). MS involving the breast is even rarer. Imaging knowledge of breast MS remains limited due to its rarity. This study aims to enhance the understanding of ultrasound characteristics of the disease.

Case Presentation

A 21-year-old female presented to our breast clinic with a 6-month history of rapidly enlarging palpable and painless breast masses in January 2024. She denied any other notable medical history. A physical examination revealed firm lumps measuring 60×55 mm and 20×15 mm, respectively, in the left and right subareolar areas. The presence of light skin edema was observed in the central retroareolar region of both breasts.

Corresponding Author: Yingjia Li Prof. Dr.
E-mail: lyjia@smu.edu.cn **ORCID:** orcid.org/0009-0004-1206-8608
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The ultrasound revealed two distinct masses in the right breast. The first mass, measuring 50×42 mm, was identified in the central retroareolar region, while the second, measuring 50×21 mm, was located in the upper outer quadrant (Figure 1). The masses were irregularly shaped with indistinct margins, a non-homogeneous hypoechoic central portion, and a hyperechoic peripheral halo. Relatively rich internal blood flow signals with a resistance index of 0.57 were observed. Concurrently, in the left breast, a substantial hypoechoic mass was identified in the central retroareolar region, measuring approximately 74×50 mm. Additionally, a smaller hypoechoic mass was detected in the upper inner quadrant (Figure 2). These masses presented similarly in appearance on ultrasound. Furthermore, an abnormal lymph node measuring 15×8 mm was identified in the left axilla, characterized by cortical thickening, loss of lymphoid follicles, and a hyperechoic peripheral halo (Figure 2). The patient was given a breast imaging-reporting and data system classification of 4b. In light of the potential radiation exposure, the recommendation was made to opt for an ultrasound-guided biopsy over mammography.

Pathology showed breast tissue with diffuse infiltrate of blasts, consistent with MS (Figure 3). The neoplastic cells were strongly positive for myeloperoxidase, CD33, CD43, and CD34, and partially positive for CD117 and CD68. The patient went on to have a bone marrow biopsy, yielding no clear evidence of medullary ALM. Subsequent cytogenetic testing of breast biopsy specimens demonstrated positive t(16;16)(p13.1;q22) translocation (*GBFβ-MYH11* gene). Fluorine-18 fluorodeoxyglucose positron emission tomography-computed tomography (PET-CT) imaging revealed multiple metabolically active masses in both breasts, as well as metabolic activity in lymph nodes, intestinal wall at the terminal ileum, uterus, bilateral ovaries, left perineum, and left parieto-occipital subcutaneous tissue and muscles.

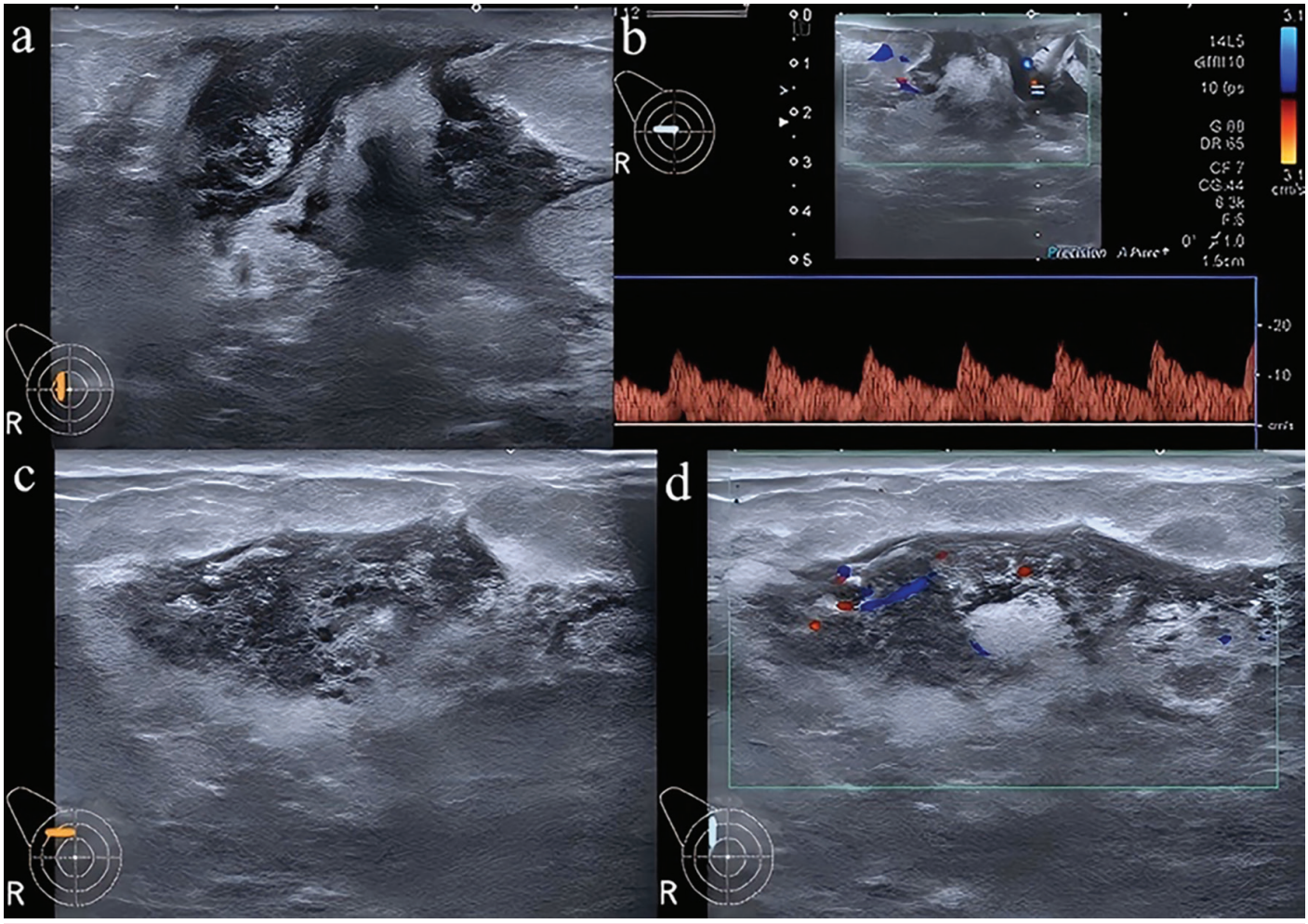

Figure 1. Ultrasound images of the right breast. Ultrasound revealed a non-homogeneous hypoechoic mass in the central retroareolar region (a). Doppler ultrasound revealed that the mass exhibited internal blood flow with a moderate resistance index (b). The second mass was located in the upper outer quadrant (c), with relatively rich internal blood flow signals (d)

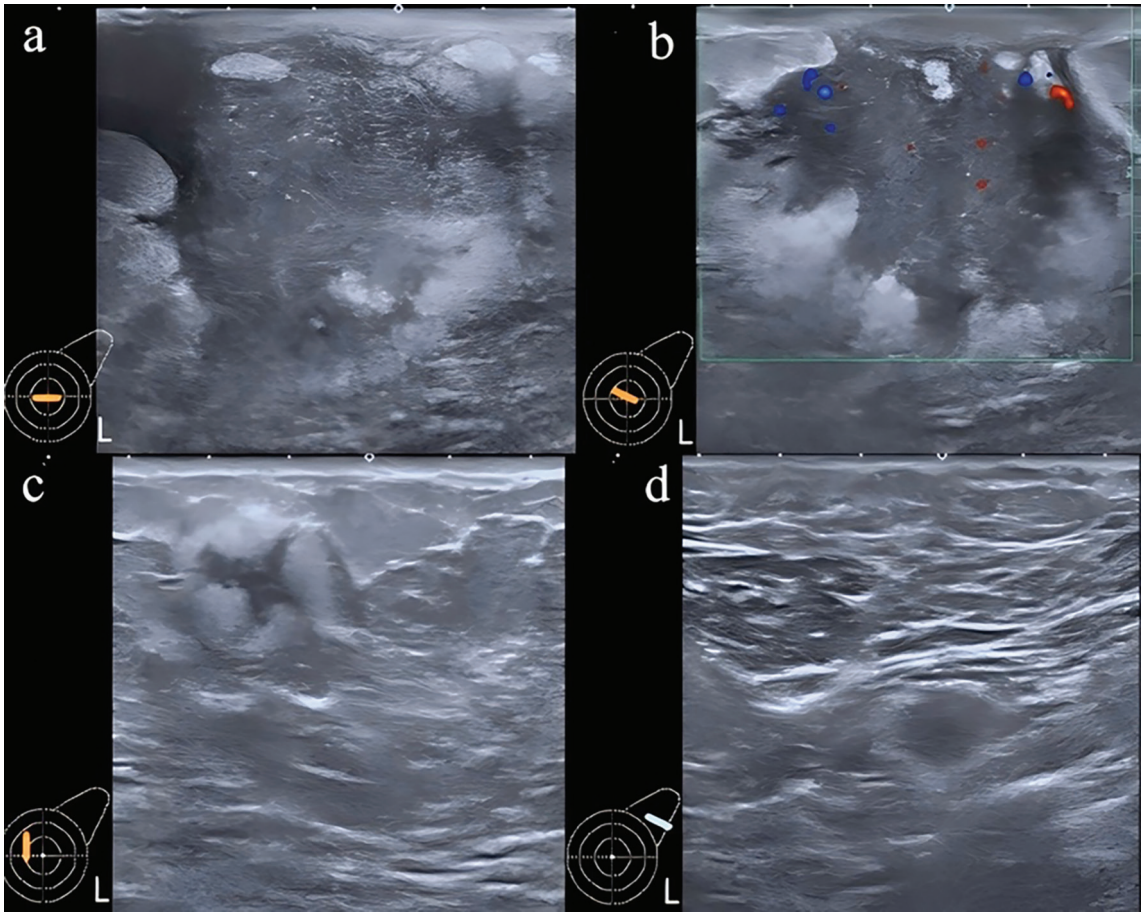

Figure 2. Ultrasound images of the left breast and left axilla. A substantial hypoechoic mass was revealed by ultrasound in the central retroareolar region (a), accompanied by relatively rich internal blood flow signals (b). The second mass was located in the upper inner quadrant (c). An abnormal lymph node was identified in the left axilla (d)

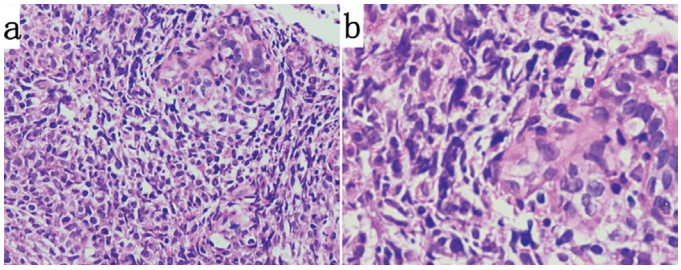

Figure 3. Hematoxylin and eosin-stained sections of the core biopsy showed a diffuse infiltration of intermediate-sized atypical mononuclear cells with ovoid to irregular nuclear contours (a, 200x; b, 400x)

The patient was referred to hematological oncology, where she underwent six cycles of chemotherapy comprising cytarabine and sorafenib. Following the first cycle of chemotherapy, ultrasound imaging demonstrated a notable treatment response (Figure 4). The mass in the upper inner quadrant of the left breast and the left axillary lymph node disappeared. A PET-CT scan, conducted after four cycles of chemotherapy, revealed no evidence of residual tumors. At the latest follow-up in May 2025, the patient was thriving and disease-free.

Discussion and Conclusion

MS is a distinct entity among myeloid neoplasms. It is characterized by the development of tumor masses, consisting of immature myeloid cells at extramedullary sites. MS involving the breast is rare. Breast MS is characterized by the presence of masses in the breast with rapid enlargement. Patients typically present to breast clinics, and breast ultrasound is most frequently utilized.

We reviewed prior literature. Breast MS is always characterized by irregular shape, indistinct margin, and hypoechoic pattern (3-14). Furthermore, the presentation of breast MS may manifest as an oval form with a circumscribed margin (15). The current case adds additional imaging evidence to the limited literature. In this case, the internal echo pattern of the lesions in the left breast was completely hypoechoic, while the lesions in the right breast manifested as non-homogeneous hypoechoic. We

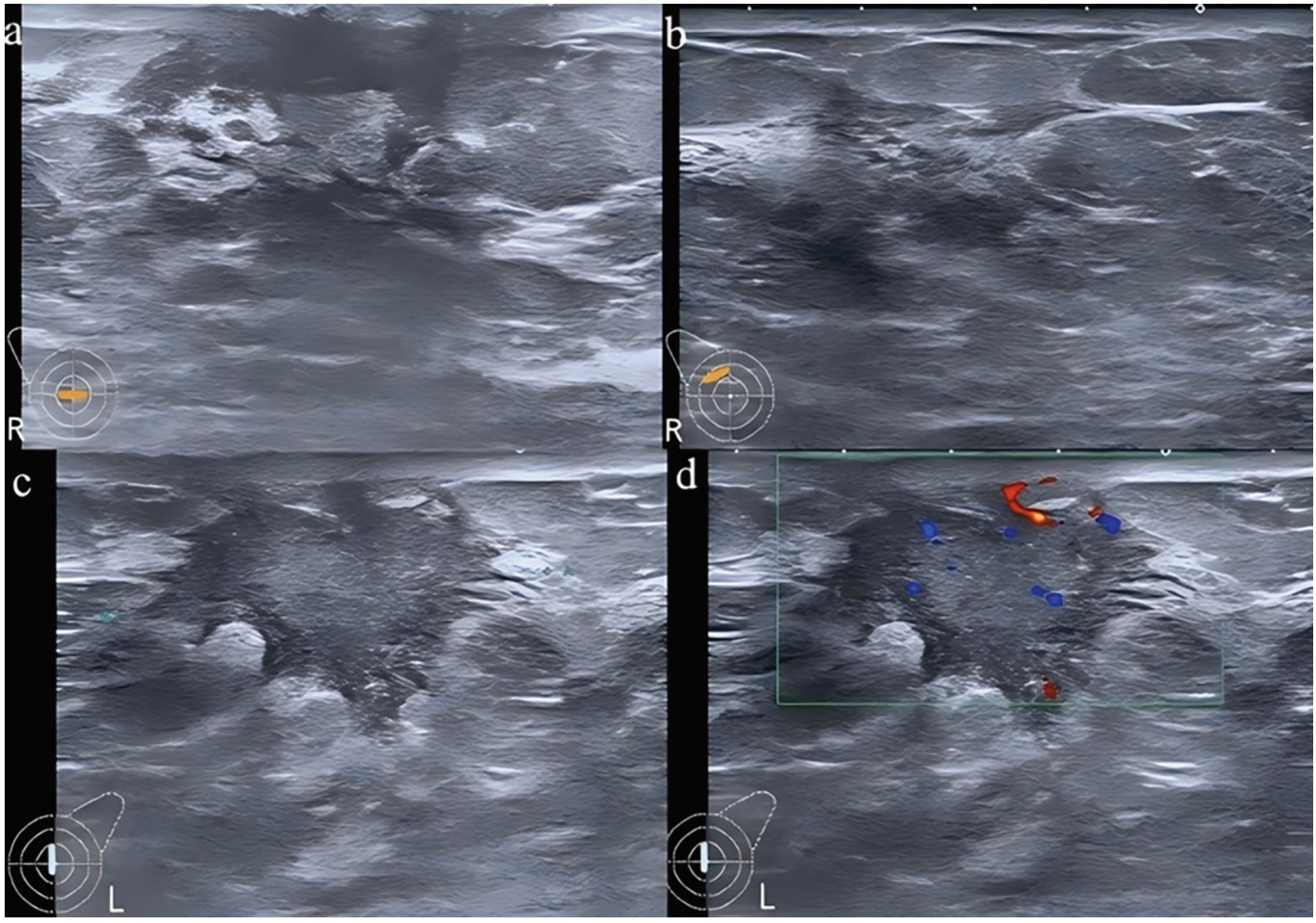

Figure 4. Following the first cycle of chemotherapy, ultrasound imaging demonstrated a notable treatment response in the right breast masses (a, b), as well as a reduction in the size of the central retroareolar mass in the left breast (c). Notably, rich blood flow signals remained observable in the latter (d)

speculated that the internal echo pattern exhibited variability due to the extent of infiltration by immature myeloid cells and the presence of residual lobules and ducts.

Though the relatively non-specific imaging characteristics of breast MS, ultrasound may play a certain role in the initial evaluation. Bilateral breast involvement with multiple masses is comparatively common in breast MS (3, 5, 9-12, 15). Interestingly, in cases involving multiple lesions, ultrasound mass characteristics demonstrate a tendency to manifest similarly (3, 5, 9-12, 15). Echogenic halo is common in breast MS (3-5, 9, 11-14). While calcification is rare in breast MS. Histopathological and immunohistochemical examinations are necessary for confirming the final diagnosis. Following admission to chemotherapy, breast ultrasound is a simple and effective modality for assessing the early therapeutic response.

Though relatively non-specific, breast MS tends to present as irregular, indistinct, and complex hypoechoic masses with internal blood flow on ultrasound. Hyperechoic halos are common. Ultrasound may play a certain role in the initial evaluation and follow-up therapeutic response assessment of breast MS.

Ethics

Informed Consent: The patient provided written informed consent for publication of the data and images in this case report.

Footnotes

Authorship Contributions

Concept: L.L.; Design: L.L., Y.L.; Data Collection or Processing: Z.L., H.Z., Y.Z.; Analysis or Interpretation: Z.L., H.Z., Y.Z.; Literature Search: L.L.; Writing: L.L., Y.L.

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