

CASE REPORT

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Acute lymphoblastic leukemia simulating breast carcinoma

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Abstract

Background: Breast metastasis in hematological malignancies is a rare phenomenon, and it is primarily seen in acute myeloid leukemia (AML). In patients with acute lymphoblastic leukemia (ALL), this condition is even rarer. Case presentation.

We present a case of a precursor B cell ALL involving breast in a 40-year-old female and its imaging features on mammography and ultrasound. Histopathology of core needle biopsy (CNB) specimen allowed us to diagnose ALL with extramedullary metastases. The patient was referred to oncology for further management.

Conclusion: To conclude, ALL infiltrating breast is rare but should be given due consideration, especially in the cases of known primary hematopoietic malignancy, particularly in patients presenting with a history of sudden lumps in the breast. A CNB can give reliable results in combination with flow cytometry and immunocytochemistry, circumventing the need for an excisional biopsy and allowing the commencement of early treatment.

Keywords: Acute lymphoblastic leukemia, Breast metastasis, Mammography, Ultrasound

Background

Acute Lymphoblastic leukemia (ALL) encompasses a group of heterogeneous lymphoid neoplasms with involvement of precursor B or T cell neoplasms [1]. Leukemic metastasis to the breast is an uncommon manifestation and is more commonly seen with Acute myeloid leukemia (AML) [2, 3]. However, its involvement is seen in the settings of diffuse systemic disease, in patients with recurrence or after radiotherapy [4]. A solitary breast lump may be the only presenting complaint of the patient. However, multiple metastatic lesions involving bilateral breasts may also be the mode of manifestation of this disease [3, 5]. Clinically these also present as well-circumscribed, mobile, multiple, rapidly increasing in number, or otherwise described as mushroom growths in literature [1, 2].

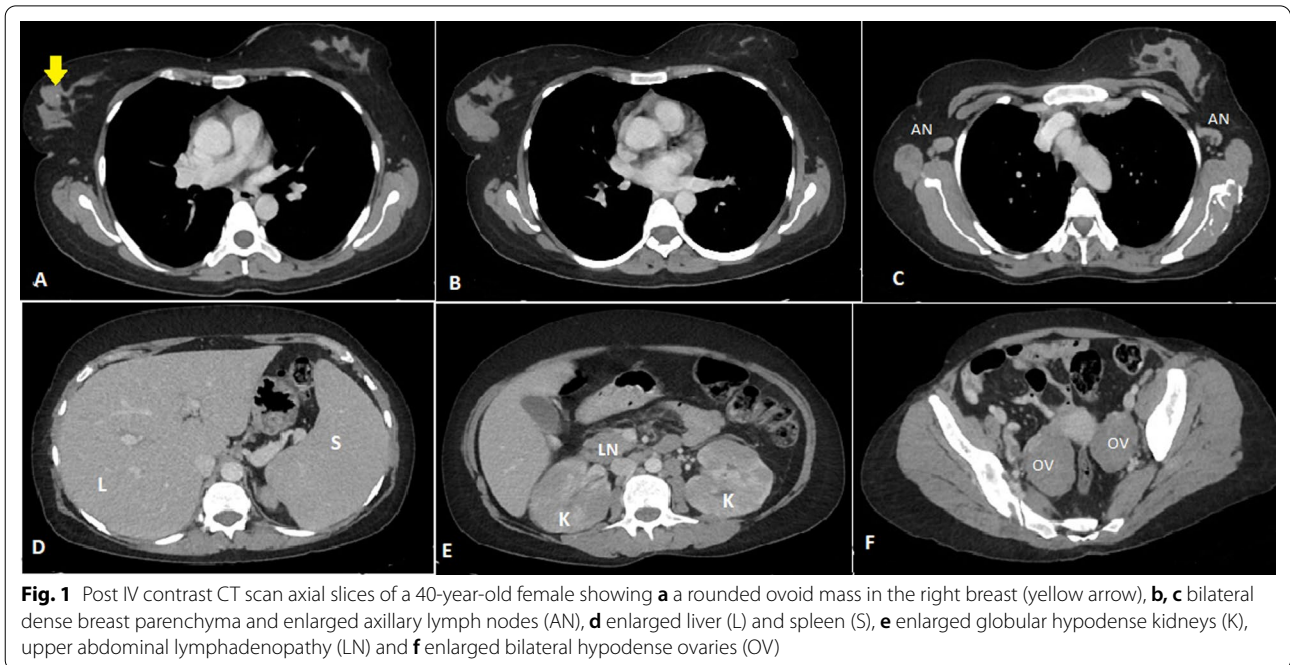
In mammography, findings can be nonspecific, variable, showing heterogeneously dense breast parenchyma

due to leukemic infiltration or young breast having increased fibroglandular component [6]. Well-defined lesions having benign appearances, or an ill-defined mass mimicking primary breast carcinoma may be seen. Microcalcifications that are commonly associated with primary breast cancer (invasive ductal carcinoma) are not seen with ALL [1, 6].

Ultrasonography is very helpful in patients with dense breast parenchyma, in which mammography may be inconclusive [3, 6]. Diagnostic accuracy of ultrasound in such cases may be improved by using Doppler and strain elastography, which may indicate the hardness of the mass, which, if found, is associated with malignancy.

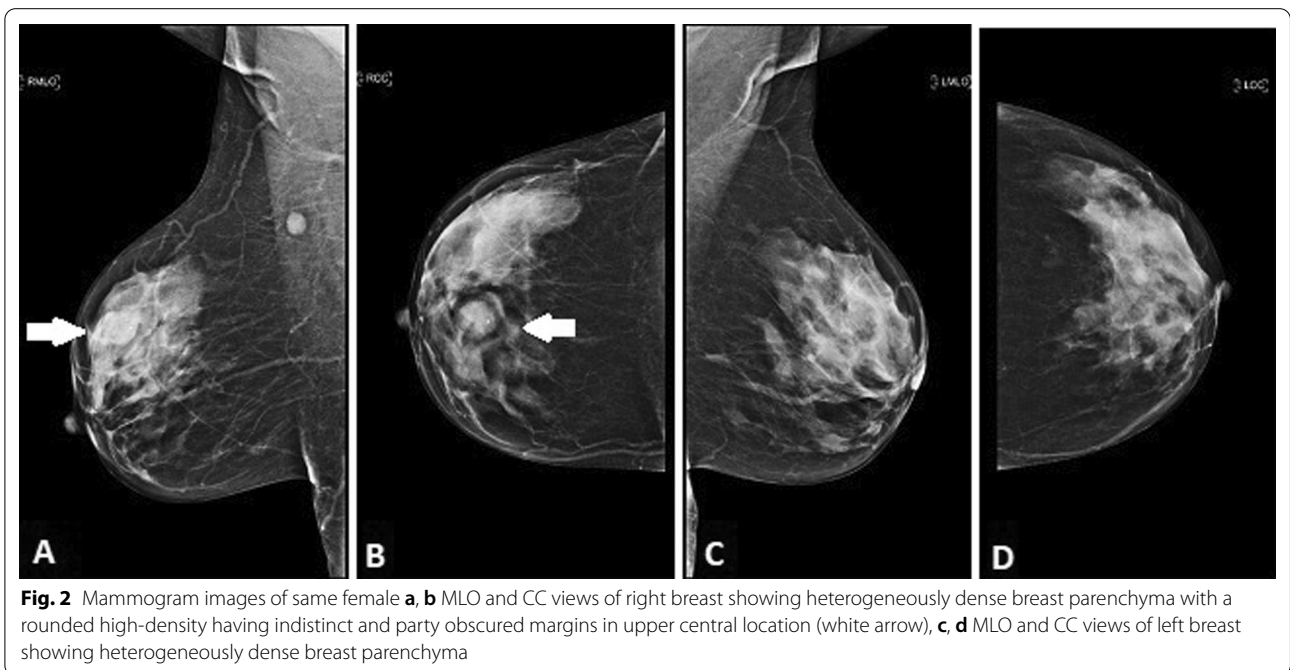
While MDCT has low diagnostic value in the evaluation and characterization of breast lesions, it is essential for the radiologist reporting the scan to identify breast lesions when present as a benign or suspicious-looking lesion requiring additional workup; this is particularly important in case of incidental lesions. Irregular margins and shape with spiculated contours and heterogenous enhancement are the universal characteristics of a malignant mass that can be confidently

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reported even on CT [7]. In ALL, due to leukemic infiltration of surrounding glandular parenchyma, one might see indistinct margins of the mass; however, even in dense breast, a coincident mass may be better visualized than mammography [8]. CT also has added benefit of identifying and screening the other breast. Axillary lymphadenopathy is another clue to

diagnosing leukemic disorder or lymphoma especially when bilateral, in the absence of known primary breast cancer [7]. Other ancillary findings like pleural effusion or involvement of mediastinal lymph nodes increase the value of MDCT in not only pointing to a correct diagnosis but also staging the malignancy [7, 8].



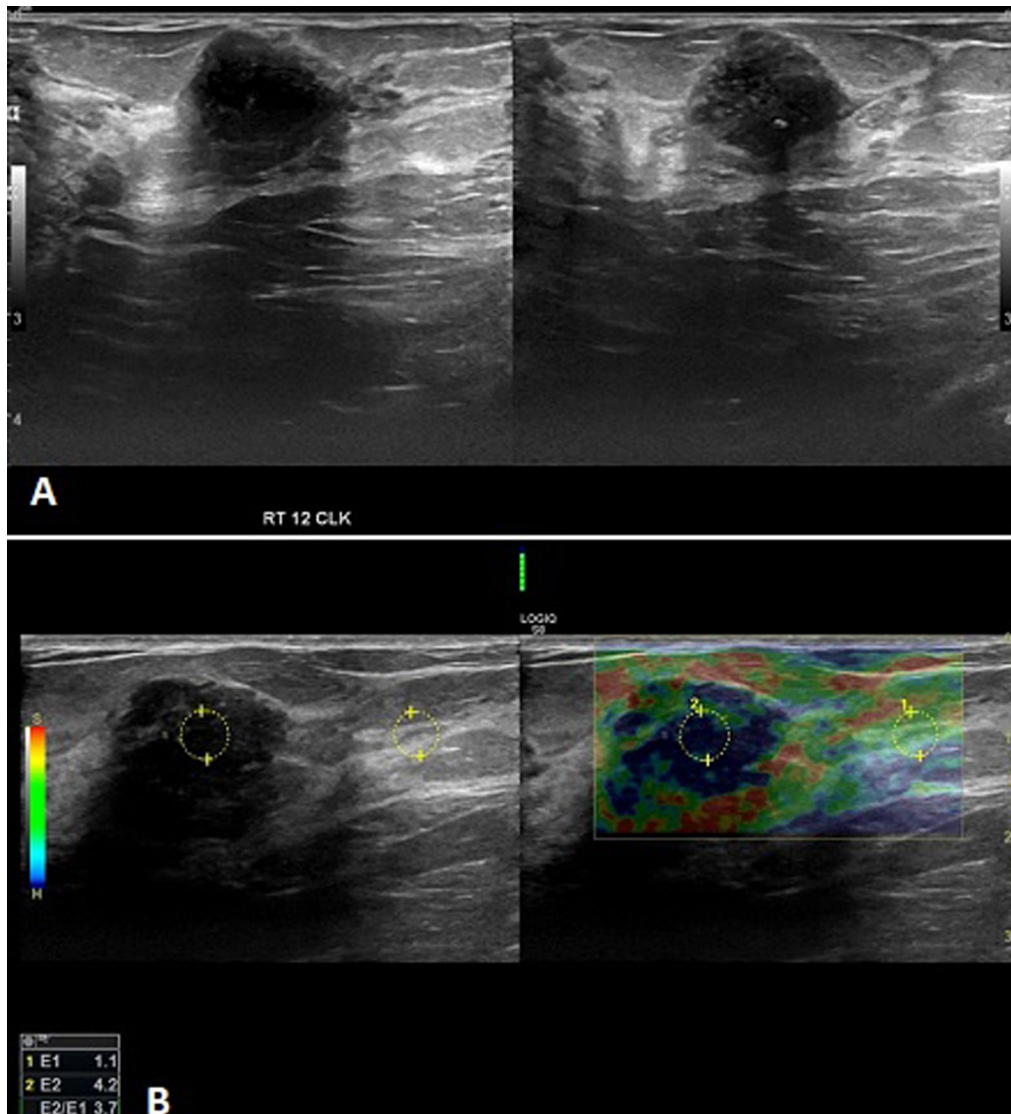


Fig. 3 Ultrasound of same lesion as described in mammogram in right breast 12 o'clock position showing **a** a rounded hypoechoic lesion with micro-lobulations and angular margins having posterior acoustic shadowing, **b** strain elastography was also performed with ratio of 3.7 which indicated hard lesion

As described in the literature, MRI findings consist of hyperintense signal abnormality on T2 sequences within these lesions with early enhancement [5, 9]. The enhancement pattern is often ring-type due to central necrotic areas bounded by peripheral vascular supply to the lesions. Malignant masses show restricted diffusion on DWI sequences with low ADC values owing to increased cellularity [10].

Definitive diagnosis can only be based on histopathology, which is the gold standard, immunohistochemistry, and flow cytometry [9].

We present a case of ALL diagnosed by bone marrow biopsy involving the breast and discuss her mammogram and ultrasound features.

Case presentation

A 40-year-old female patient was admitted to our hospital presenting complaints of high-grade fever, lethargy, and abdominal distention for four months. She also had a complaint of a lump in her right breast for one month.

Her lab analysis which included complete blood count, showed bicytopenia with a total leukocyte count of $1 \times 10^3/\text{mm}^3$ (leukopenia with absolute neutropenia

(ANC) = 500/ μ L), a hemoglobin level of 8.9 mg/dL (moderate anemia with anisopoikilocytosis), and a platelet count of $184 \times 10^3/\mu$ L. In addition, she had 5% blast cells.

She underwent CT chest, abdomen, and pelvis to diagnose suspected hematological malignancy, which reported significant hepatosplenomegaly with bilaterally enlarged kidneys having hypo-enhancing areas. There were also bulky hypodense ovaries, enlarged abdominopelvic lymph nodes, and an ovoid soft-tissue density nodule in the right breast (Fig. 1a–f). On mammography (Fig. 2a–d), she had heterogeneously dense (type C) breast parenchyma, which may obscure small masses. A rounded high-density mass was seen in the right breast with indistinct and partly obscured margins was seen in an upper central location at 12 o'clock position with internal few punctuate microcalcifications, having a measurement of 22×18 mm (Fig. 2b). Targeted ultrasound of the same area corresponding to the mammogram confirmed a rounded hypoechoic lesion with microlobulations and angular margins having posterior acoustic shadowing (Fig. 3a). The patient was categorized as BIRADS- 4c (highly suspicious for malignancy) in the right breast and advised biopsy. Strain elastography was also performed with a ratio of 3.7, which indicated a relatively hard lesion (Fig. 3b). Additional ill-defined heterogeneous areas with interspersed hypoechoic areas were seen in the upper outer quadrants of both breasts with increased vascularity on Doppler flow, suggesting inflammation. Rounded enlarged pathological axillary lymph nodes were also seen bilaterally.

The CNB of the lump indicated an atypical lymphoid infiltrate composed of small cells with scanty cytoplasm and immature chromatin. Immunohistochemistry showed positive TdT, PAX-5, and CD 3 markers. Overall findings were suggestive of involvement by precursor B lymphoblastic leukemia/lymphoma. In addition, CBC showed atypical cells on bone marrow aspirate confirmed to be precursor B lymphoblastic leukemia with positive CD 20 and Philadelphia chromosome 9:22. Thus, establishing the diagnosis of ALL with breast and axillary lymph node metastasis.

She was started on chemotherapy with HCVAD protocol cycle 1; however, she could not follow up in our oncology department and was referred to another hospital due to financial issues.

Conclusions

Differential diagnosis of bilateral breast involvement, especially in young females with cytopenias, should include ALL and prompt biopsy for clinical/radiologically benign or malignant appearing masses [2, 5, 8]. This will aid in formulating a definite diagnosis and allow rapid

initiation of treatment. In addition, local treatment alone can induce disease remission and better prognosis in patients having leukemic infiltration [8].

To conclude, ALL infiltrating breast is rare but should be given due consideration, especially in known primary hematopoietic malignancy, particularly in patients presenting with a history of sudden lumps in the breast. A CNB can give reliable results in combination with flow cytometry and immunocytochemistry, circumventing the need for an excisional biopsy and allowing the commencement of early treatment.

Abbreviations

AML: Acute myeloid leukemia; ALL: Acute lymphoblastic leukemia; MRI: Magnetic resonance imaging; CT: Computed tomography; CNB: Core needle biopsy; ANC: Absolute neutrophil count; BIRADS: Breast imaging-reporting and data system.

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