Chronic Lymphocytic Leukemia and Invasive Ductal Carcinoma Presenting as a Collision Breast Tumor

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Clinical Practice Points

- Although breast cancer is the second most common cancer in women, secondary breast involvement by extramammary malignancies is rare, with lymphomas and leukemias being the most common.
- We present an extremely rare case of a collision tumor in the breast composed of invasive ductal carcinoma, a primary breast cancer, and chronic lymphocytic leukemia (CLL).
- Imaging findings of CLL within the breast differ from those typically seen in carcinoma—characterized by a nonmass enhancement on magnetic resonance imaging with type I curve on dynamic subtracted images and as an area of heterogeneous tissue on ultrasound images.
- In a patient with a history of CLL and an abnormal imaging as described, a biopsy to rule out leukemic involvement is warranted.

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Introduction

Primary breast cancer is the most common nonskin malignancy in adult women, whereas, metastases to the breast are rare, comprising only 0.4% to 1.3% of all breast malignancies.[1] Despite its rarity, metastatic disease to the breast is a significant diagnostic and clinical dilemma because its treatment differs from that of primary breast cancer.

Breast involvement by leukemia is uncommon with fewer than 200 cases reported in the literature. Myeloid leukemia and lymphocytic leukemia have been described, with acute myeloid leukemia being the most common. Chronic myelogenous leukemia and chronic lymphocytic leukemia (CLL) in the breast are exceedingly rare.[2] Studies have demonstrated an association between concurrent lymphoproliferative disorders and breast cancer, suggested by some to be due to abnormal tumor gene expression or a viral presence.[3,4]

The presence of two histologically distinct tumor types simultaneously involving the same anatomic site is known as collision tumor.[5,6] Such phenomenon occurring within the breast has been reported only a handful of times in the literature. This includes two cases of invasive ductal carcinoma (IDC) and mucosa-associated lymphoid tissue lymphoma[7,8]; one case of breast carcinoma and unspecified lymphoma[4,9]; one case of tubulolobular carcinoma and small lymphocytic lymphoma (SLL)[9,10]; one case of cribriform-type IDC and CLL[9]; and one case of medullary IDC and CLL.[3]

Ours is the third documented case of a breast collision tumor composed of no-special type IDC and CLL and the second report of magnetic resonance imaging (MRI) characteristics of this unusual collision tumor.[11,12]

Case Report

A 71-year-old Caucasian woman with a history of CLL diagnosed in December 2010 presented with an abnormal screening mammogram. Her last clinical breast exam 2 years previously was normal. The patient's breast history included right excisional biopsy more than 25 years previously for a benign lesion.

The screening mammogram showed a new area of architectural distortion in the right breast at 10 o'clock, 5 cm from the nipple and multiple enlarged axillary lymph nodes bilaterally. Ultrasound showed an irregular, taller-than-wide solid mass with angular margins measuring 9 × 7 × 9 mm at the same location (Figure 1A), and multiple bilateral axillary lymph nodes with smooth and concentrically thickened cortices (Figure 1B).

An ultrasound-guided core biopsy (US-CNB) was performed revealing IDC, no-special type, Nottingham histologic grade I. The

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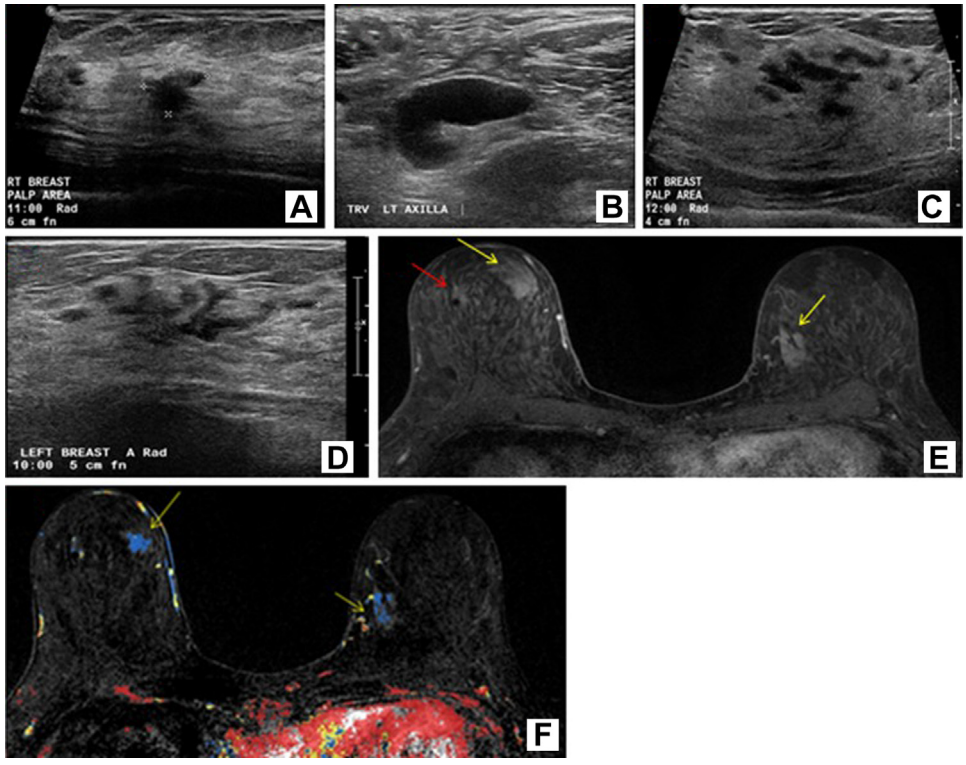
Figure 1 (A) Ultrasound Images Demonstrate an Irregular, Hypoechoic Mass in the Right Breast at 10:00 5 cm From the Nipple (FN) Believed to Correspond With Mammographic Abnormality. This Mass Underwent Ultrasound-Guided Core Needle Biopsy, Which Revealed Small Lymphocytic Lymphoma and Invasive Ductal Carcinoma (IDC). (B) Ultrasound of Left Axilla Demonstrates Multiple Enlarged Axillary Lymph Nodes With Concentrically Thickened Cortex. Similar Appearance of the Right Axilla. Fine Needle Aspiration of the Enlarged Lymph Nodes Revealed Chronic Lymphocytic Leukemia (CLL)/Small Lymphocytic Lymphoma (SLL) Bilaterally. (C) Ultrasound of the Area of Nonmass Enhancement (NME) Seen on Magnetic Resonance Imaging (MRI) Scans Correspond With an Area of Heterogenous Tissue in the Right Breast at 12:00 4 cm FN. (D) Ultrasound of the Left Breast at 10:00 5 cm FN Demonstrates an Area of Heterogeous Tissue That Corresponded to the Area of NME Seen on MRI Scans. This Area Underwent Ultrasound-Guided Biopsy, Which Demonstrated CLL/SLL. (E) Gadolinium-Enhanced MRI Images Demonstrate a 9-mm Enhancing Mass in the Right Breast at 10:00 5 cm FN With Biopsy Clip Artifact Corresponding to the Biopsy Proven IDC (Red Arrow). Two Areas of NME Were Seen in the Upper Inner Right Breast at 12:00 4 cm FN and in the Left Inner Breast at 10:00 5 cm FN (Yellow Arrows). Targeted Ultrasound of These 2 Areas Were Performed. Ultrasound Biopsy of the Left Mass Revealed CLL/SLL. (F) Dynamic Kinetics Shows a Progressive Type I Curve Demonstrated in the Areas of NME in Both Breasts (Yellow Arrows)



IDC was surrounded by a conspicuous monotonous lymphocytic infiltrate that extended beyond the carcinoma into the benign breast tissue (Figure 2A and B). The atypical lymphocytes were small and similar to mature lymphocytes, with round nuclei, dense clumped chromatin, inconspicuous nucleoli, and a narrow rim of basophilic cytoplasm. Based on the patient's clinical history of CLL, immunohistochemical stains were performed. The atypical lymphoid cells were diffusely positive for CD20 (Figure 2C), PAX-5, CD5 (Figure 2D), and CD23. Cyclin D1 stain was negative. CD3 highlighted scattered mature T-lymphocytes. Based on the histologic and immunohistochemistry results and the patient's clinical history, these findings were consistent with a composite CLL/SLL and IDC.

Subsequent right breast MRI revealed a corresponding 11-mm irregular mass consistent with the biopsy proven IDC (Figure 1E). This mass had type III washout kinetics, as would be expected for a primary breast carcinoma. Associated recent biopsy changes and a biopsy clip were present. Additionally, a regional nonmass enhancement (NME) in the upper inner quadrant extending to the subareolar region spanning 48 × 21 mm was observed (Figure 1E). A similar-appearing area of NME was seen in the contralateral breast measuring 5 × 15 mm (Figure 1E). Both areas of NME showed a progressive type I curve on dynamic kinetics, which is typically seen with benign lesions (Figure 1F). The MRI also showed prominent axillary lymph nodes.

A second ultrasound of the right breast at 12 o'clock and left breast at 10 o'clock revealed heterogeneous tissue (Figure 1C and D) that appeared to correspond to the areas of NME seen on MRI (Figure 1E). A US-CNB of this area demonstrated involvement by CLL/SLL. Fine needle aspiration biopsy (FNAB) of bilateral axillary lymph nodes only revealed CLL/SLL.

After appropriate counseling for her surgical options, the patient decided to proceed with bilateral mastectomies and right axillary