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Primary Intermammary Breast Carcinoma Presenting With Direct Sternal Invasion: A Diagnostic Pitfall of Standard Screening Mammography

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

EF Rachel Deming
DEF Michael Fei
F Harsha Choudary Pudhota
E Sonal P. Haerter
E Moustafa Hazin

Department of Internal Medicine, Creighton University School of Medicine, Phoenix, AZ, USA

Corresponding Author: Sonal P. Haerter, 500 W Thomas Rd Ste 900, Phoenix, AZ 85013, USA
Phone: 602-406-3540, e-mail: sonalhaerter@creighton.edu

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Patient: Female, 85-year-old
Final Diagnosis: Adenocarcinoma
Symptoms: Palpable breast mass
Clinical Procedure: Biopsy • PET-CT scan • resection of the tumor • sternotomy • ultrasonography
Specialty: Oncology • Radiology
Objective: Rare disease

Background: Standard screening mammogram views focus on the lateral and posterior breast tissues; the view that best visualizes the intermammary area, the 90-degree lateral or cleavage view, is not typically performed. The limited field of view of mammogram increases the importance of additional imaging with CT, ultrasound, and MRI as a tool in diagnosing neoplasm in the intermammary area. To date, intermammary primary breast carcinoma has been reported only a few times in the literature, and none of these described direct sternal invasion at presentation.

Case Report: An 85-year-old woman with a past medical history of follicular non-Hodgkin lymphoma treated with bendamustine-rituximab in 2017 (without chest radiation) and significant family history of breast cancer presented to our clinic 2 months after noticing a hard, non-tender nodule on her sternum. She had undergone a routine screening mammogram 8 months prior, which was unremarkable. Subsequent diagnostic workup including targeted ultrasound, and PET-CT identified a hypermetabolic presternal mass. Notably, diagnostic mammography 8 months after the initial screening mammogram also failed to properly visualize the lesion. Biopsy confirmed ER+/PR+, HER2- adenocarcinoma consistent with breast origin. Despite negative initial staging for distant metastasis, pathological examination after resection revealed direct invasion into the sternum, necessitating partial sternectomy.

Conclusions: This case highlights a rare intermammary presentation of breast carcinoma with direct sternal invasion, a feature not previously reported. It emphasizes the blind spot of standard screening mammography in the medial breast/cleavage area and the necessity of targeted imaging for palpable parasternal masses, even in the setting of recent negative screens.

Keywords: Adenocarcinoma • Chemotherapy, Adjuvant • Mammography • Breast Neoplasms • Mammography • Sternum • Adenocarcinoma • Aromatase Inhibitors • Case Reports

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Introduction

The most common cancer affecting women is breast cancer. In the United States, 1 in 8 women will be diagnosed with breast cancer in her lifetime [1]. Approximately 50% of breast cancers occur in the upper outer quadrant [2]. To date, intermammary primary breast carcinoma has been reported only a few times in the literature, and none of these reports described direct sternal invasion at presentation [3-5].

A palpable presternal or intermammary mass presents a complex diagnostic challenge, particularly in patients with a history of malignancy. The differential diagnosis includes recurrent lymphoma, metastatic disease from other primaries (eg, thyroid, lung), chest wall sarcomas, and benign entities such as lipomas or epidermal cysts. While breast tissue typically develops along the embryonic milk lines extending from the axilla to the groin, true midline ectopic breast tissue is exceptionally rare [6]. Consequently, a malignant lesion in this location may represent either extension from an adjacent breast quadrant arising in residual glandular tissue or, more rarely, a primary tumor arising in supernumerary ectopic tissue. Distinguishing between these origins requires rigorous exclusion of occult disease in the main breast parenchyma.

Screening mammograms are a staple of preventive medicine and can often detect cancers before they are palpable on physical examination, detecting around 87% of malignancies [7]. The typical views are the craniocaudal (CC) and mediolateral oblique (MLO) views, which best visualize the lateral, medial, and posterior breast tissue. To visualize tissue adjacent to the sternum, a third view called the cleavage view can be used, but it is not part of the standard screening mammogram [8].

Advanced age is the strongest risk factor for breast cancer. Current guidelines from the U.S. Preventive Services Task Force (USPSTF) recommend biennial screening mammography for women aged 40 to 74 years, while the American Cancer Society suggests annual screening beginning at age 45 for average-risk women [9]. However, recommendations for screening beyond age 75 remain individualized based on life expectancy and comorbidities [10]. Regardless of screening status, symptomatic evaluation supersedes preventive guidelines; any new palpable mass warrants immediate targeted investigation.

This case report describes a patient with a negative screening mammogram who noticed an abnormality on her sternum. Further workup revealed breast carcinoma with local invasion into bone. She required extensive surgery and systemic therapy. This rare presentation, characterized by direct sternal invasion, highlights the limitations of standard screening geometry and the importance of clinical vigilance for intermammary palpable findings.

Case Report

An 85-year-old woman with a past medical history of follicular non-Hodgkin lymphoma treated with 6 cycles of bendamustine and rituximab in 2017 presented to the clinic with a hard, non-tender presternal nodule. Notably, she did not receive mediastinal or chest wall radiation therapy during her lymphoma treatment. Her social history was significant for a 3 to 4 pack-year smoking history in early adulthood. Her family history was significant for breast cancer in her father (died at age 55), mother (diagnosed in her 60s), sister (in her 70s), niece (age 45), and maternal aunt (in her 40s).

At the initial visit, a physical examination revealed a solitary, round, firm nodule approximately 2 cm in diameter on the mid-sternum between the breasts. The nodule was non-mobile and non-painful to palpation. Routine screening mammography in January 2024 (8 months prior to presentation) was unremarkable (**Figure 1**).

In September 2024, a diagnostic mammogram was performed, revealing a BI-RADS 4 density in the right upper outer quadrant, but no clear correlation with the presternal mass (**Figure 2**). Targeted ultrasound of the presternal region showed a solid, hypoechoic mass (**Figure 3**). Core needle biopsy of the presternal mass yielded spindle cells and glandular structures. Immunohistochemistry was positive for GATA3, GCDFP-15, and ER/PR, confirming breast origin. The patient denied having any B symptoms.

PET-CT in November 2024 showed an intensely hypermetabolic presternal soft tissue nodule without definite cortical erosion of the sternum and with no distant metastasis, highly suggestive of malignancy, along with an incidental small right thyroid nodule (**Figures 4, 5**). Contrast-enhanced breast MRI was not performed at the time of initial workup due to clinical decision-making prioritizing rapid histologic confirmation via biopsy given the high suspicion on PET-CT. This represents a limitation in fully assessing the extent of intramammary disease versus isolated ectopic origin.

In January 2025, the patient was evaluated by oncology. Caris profiling from the biopsy showed ER/PR-positive and HER2-negative breast carcinoma. Given the palpable size (~2 cm) and suspicion of chest wall involvement, the clinical staging was revised. According to the AJCC 8th Edition criteria, invasion of the chest wall classifies the tumor as T4b. Thus, the presumptive clinical stage was cT4bN0M0 (Stage IIIB). Neoadjuvant letrozole therapy was initiated with the goal of shrinking the mass for future surgical management. Chemotherapy was deferred initially.

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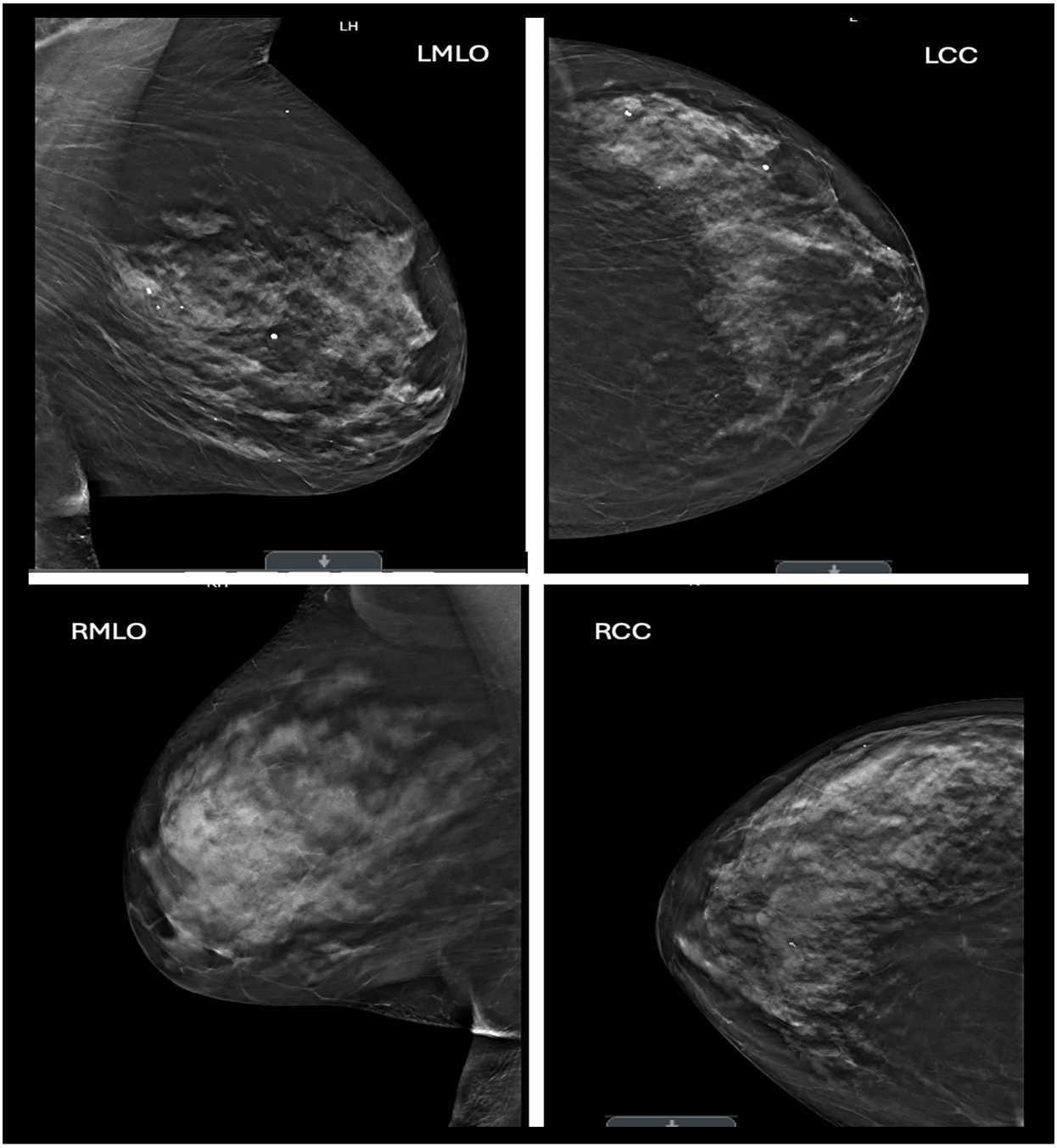

Figure 1. Standard craniocaudal (CC) and mediolateral oblique (MLO) views from the screening mammogram 8 months prior to presentation, demonstrating no evidence of malignancy in the intermammary region.

By March 2025, follow-up imaging showed interval decrease in metabolic activity. By mid-May, the presternal mass had further decreased, and the consensus across oncology, surgical oncology, and radiation oncology was to proceed with surgery in June while maintaining endocrine therapy.

In June 2025, the patient underwent wide local excision with en bloc partial sternectomy. While preoperative PET-CT suggested soft tissue involvement without definite cortical erosion, intraoperative findings and subsequent histopathology confirmed direct microscopic invasion of the sternum (**Figure 6**). Pathology demonstrated invasive ductal carcinoma with positive margins at the sternal interface, necessitating further resection. The final procedure included wider excision with partial rib resections, preservation of internal mammary vessels, and vertical rectus abdominis myocutaneous flap reconstruction (**Figure 7**).

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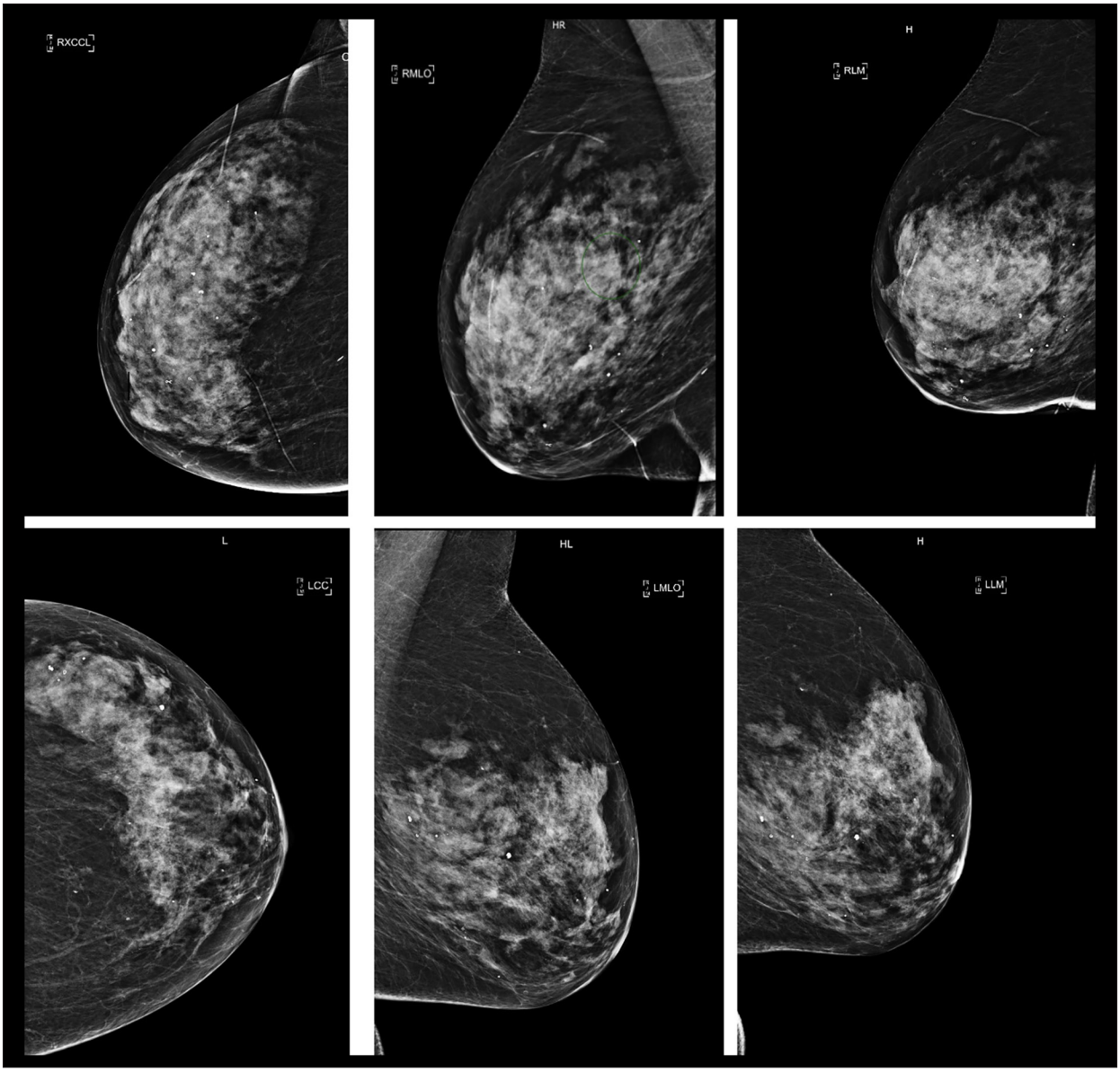

Figure 3. Targeted ultrasound of the presternal mass showing a 1.01 cm (1) × 2.97 cm (2) solid hypoechoic lesion.

Overall, the procedure was well tolerated, and all final surgical margins were negative for malignancy.

Discussion

This case report highlights a rare and clinically challenging presentation of breast cancer, due to its unique location over the mid-sternum between the breasts. While breast cancer is the most common malignancy among women, a tumor in the intermammary groove is exceedingly uncommon. We present the first reported case of intermammary breast lesion with direct sternal invasion, highlighting a mammographic diagnostic pitfall and its management implications.

One of the primary challenges in this case was the location of the tumor. Standard screening mammography utilizes craniocaudal (CC) and mediolateral oblique (MLO) views. These views optimize visualization of the lateral and posterior breast parenchyma. Tissue located in the extreme medial aspect or the intermammary cleavage often falls outside the field of view or is poorly compressed, leading to false negative results. This phenomenon results in cancers that are not truly "occult" but rather are masked by the geometric limitations of standard screening projections.

To mitigate this, specialized adjunctive views such as the cleavage view (spot compression lateral) or true lateral views can be employed when medial symptoms are present [8]. Additionally,

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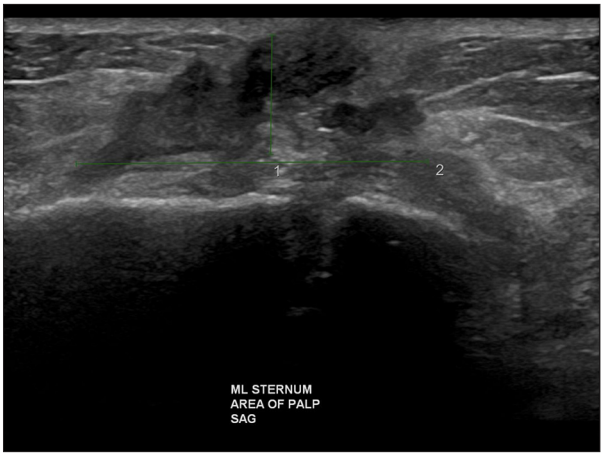

Figure 4. Chest CT axial view showing mass abutting sternum without evidence of bone erosion.

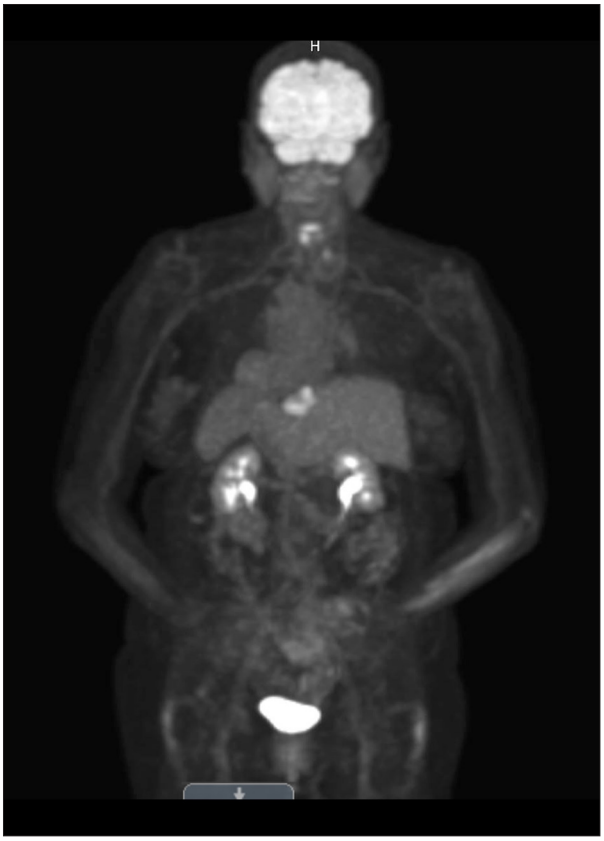

Figure 5. Maximum intensity projection PET-CT image showing hypermetabolic activity in the midline presternal soft tissue.

targeted ultrasound is highly sensitive for distinguishing solid masses in the subcutaneous and superficial glandular layers of the chest wall. In our case, the reliance on standard screening views delayed diagnosis by 8 months, potentially allowing the tumor to progress to a stage requiring sternectomy.

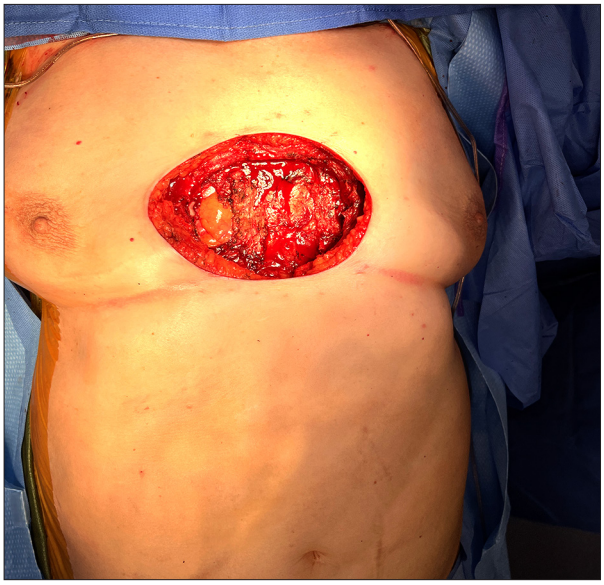

Figure 6. Photograph of the parasternal mass taken during open chest dissection in June 2025, demonstrating adherence to the sternal surface.

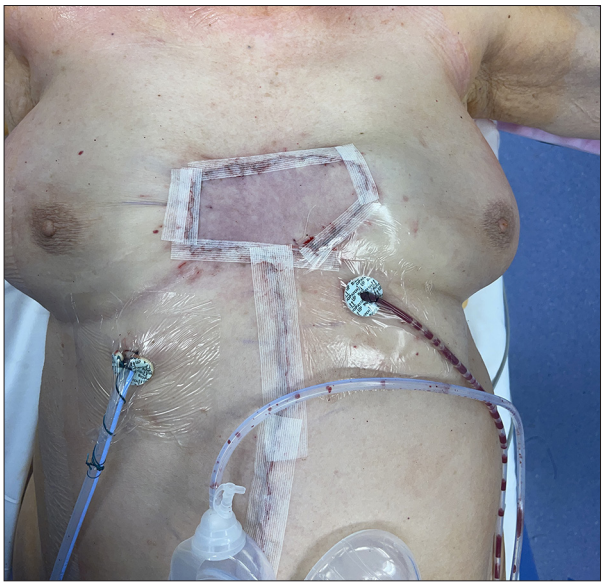

Figure 7. Photograph taken on completion of open chest dissection and flap reconstruction in June 2025.

Contrast-enhanced breast MRI is increasingly recognized as a critical tool for staging locally advanced breast cancer, particularly when chest wall invasion is suspected. MRI provides high-resolution assessment of pectoralis muscle and sternal involvement, which CT and PET may underestimate such involvement due to resolution limits or metabolic heterogeneity [11]. In this case, the absence of MRI limited our preoperative certainty regarding the depth of sternal invasion. Future management of similar cases should prioritize MRI to guide surgical planning, potentially avoiding unnecessary extensive

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resections if invasion is absent, or ensuring adequate margins if present. For survivors of prior malignancies, especially those with potential genetic predispositions, MRI surveillance may offer superior sensitivity [12].

Our case highlights a discordance between functional imaging and histopathology. The PET-CT scan described the lesion as "highly suggestive of malignancy" but noted "no definite sternal invasion." This discrepancy likely arises from the limitations of PET-CT in detecting early cortical erosion or marrow infiltration without significant osteoblastic reaction or large-volume necrosis. Histopathology remains the gold standard for determining local invasion. Clinicians should maintain a high index of suspicion for bony involvement in presternal masses, even when nuclear imaging appears equivocal, as microscopic invasion significantly alters surgical management (ie, requiring sternectomy vs simple excision).

While our patient's history of bendamustine-rituximab therapy introduces a potential iatrogenic risk for secondary malignancies via alkylating-agent-induced DNA damage [13], this factor is likely subordinate to her advanced age and profound family history of breast cancer. Family history is an independent and potent risk factor, suggesting a possible underlying germline predisposition despite negative BRCA testing [14]. Therefore, while chemotherapy exposure may have played a contributory role, it is premature to attribute the etiology primarily to treatment rather than genetic susceptibility and aging.

Conclusions

Primary intermammary breast carcinoma is an uncommon presentation of a common malignancy. A palpable parasternal mass warrants targeted imaging—even if recent screening mammograms are negative—due to the known blind spots of standard CC/MLO views. Direct sternal invasion is a rare complication that complicates surgical treatment, as evidenced by the need for sternectomy in this case. Clinicians must consider the full differential for midline chest masses and utilize advanced imaging modalities like MRI when chest wall invasion is suspected.

Department and Institution Where Work Was Done

St Josephs Hospital and Medical Center, Phoenix, AZ, USA.

Patient Consent

The patient gave written consent for the use of their medical information for publication and education.

Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

References:

1. Puckett Y, Sule AA. Disparity in early detection of breast cancer. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 [cited 2026 Feb 7]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK564311/
2. Lee AHS. Why is carcinoma of the breast more frequent in the upper outer quadrant? A case series based on needle core biopsy diagnoses. Breast. 2005;14(2):151-52
3. Salih AM, Hammood ZD, Pshtiwan LRA, et al. Intermammary breast cancer; The first reported case. Int J Surg Case Rep. 2021;86(C):106223
4. Aghajanzadeh M, Torabi H, Najafi B, et al. Intermammary breast cancer: A rare case of cancer with origin of breast cells in an unusual location. SAGE Open Med Case Rep. 2023;11:2050313X231154996
5. Constantino RC, Almeida S, Junqueira B, et al. Looking beyond the obvious: An uncommon intermammary Groove-Adjacent breast cancer found on screening mammography. Cureus. 2025;17(1):77367
6. Clement PB. Ectopic breast tissue. Pathology Oncology Research. 2018;24(2):345-52
7. Lee CI, Abraham L, Miglioretti DL, et al. National performance benchmarks for screening digital breast tomosynthesis: Update from the breast cancer surveillance consortium. Radiology. 2023;307(4):e222499
8. Kreager JA, Kornguth PJ. Mammography for screening high-risk patients for cancer: Value of including a lateral projection. Am J Roentgenol. 1994;162(2):295-97
9. Moyer VA. US Preventive Services Task Force. Screening for breast cancer: USPTF recommendation statement. JAMA. 2024;331(12):1047-58
10. American Cancer Society. Breast Cancer Screening Guidelines. 2024. Available from: https://www.cancer.org/cancer/types/breast-cancer/screening-tests-and-early-detection/american-cancer-society-guidelines-for-the-early-detection-of-breast-cancer.html
11. Kuhl CK. The current status of breast MR imaging. Part I. Choice of technique, image interpretation, diagnostic accuracy, and transfer to clinical practice. Radiology. 2007;244(2):356-78
12. Gao Y, Perez CA, Chhor C, Heller SL. Breast cancer screening in survivors of childhood cancer. Radiographics. 2023;43(4):e220155
13. Penne M, Sarraf Yazdy M, Nair KS, Cheson BD. Extended follow-up of patients treated with bendamustine for lymphoid malignancies. Clin Lymphoma Myeloma Leuk. 2017;17(10):637-44
14. Braithwaite D, Miglioretti DL, Zhu W, et al. Family history and breast cancer risk among older women in the breast cancer surveillance consortium cohort. JAMA Intern Med. 2018;178(4):494-501

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