

Diffuse Breast Infiltration: A Diagnostic Pitfall Between Tuberculosis and Invasive Carcinoma

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Abstract

Background: Diffuse breast infiltration may mimic both benign granulomatous conditions (idiopathic granulomatous mastitis or breast tuberculosis) and malignant invasive carcinoma. Imaging overlap is significant, and presentation may exceptionally be bilateral.

Case: We present a woman with bilateral diffuse breast induration. Ultrasound showed bilateral parenchymal infiltration with ductal ectasia; MRI demonstrated bilateral cutaneous thickening and diffuse edema with ductal dilatation, and a right subcutaneous rim-enhancing collection compatible with an abscess. Final histology confirmed invasive ductal carcinoma with clinical-radiologic consideration of bilateral involvement.

Conclusion: This case underscores the diagnostic pitfall of mastitis-like presentations—including bilateral ones—where imaging alone is insufficient; biopsy is indispensable [1-9].

Keywords: Breast Infiltration; Granulomatous Mastitis; Breast Tuberculosis; Invasive Ductal Carcinoma; Diagnostic Pitfalls; MRI

Introduction

Granulomatous mastitis, including tuberculous mastitis, is an uncommon entity that may closely mimic malignant breast disease. Imaging findings can overlap significantly with carcinoma, with diffuse infiltration, ductal ectasia, and non-mass enhancement reported in both conditions [1-3]. In regions with high tuberculosis prevalence, breast tuberculosis should always be considered in the differential, yet tissue confirmation is essential. This report describes a case of diffuse breast infiltration initially suspected to be granulomatous or tuberculous mastitis but ultimately diagnosed as invasive ductal carcinoma.

Case Presentation

A female patient in her forties presented with progressive, painful induration of both breasts evolving over several weeks. Clinical examination found diffuse swelling and erythema bilaterally, with peau-d'orange-like changes. No systemic symptoms were reported, and there was no history of pulmonary tuberculosis or prior breast disease.

Targeted ultrasound (second-look) demonstrated bilateral dilatation of galactophoric ducts—more marked in the right outer-inferior quadrant—containing heterogeneous echogenic material with mobile echoes and no Doppler vascularization. No significant axillary adenopathy was detected.

Breast MRI was performed using T2, T2-SPAIR, diffusion-weighted, and pre-/post-contrast T1 dynamic sequences with subtraction. It showed diffuse bilateral parenchymal edema/infiltration with cutaneous thickening (approximately 10 mm on the right and 8 mm on the left) and ductal dilatation. On post-contrast subtracted images, there was a right subcutaneous oval lesion (approximately 22×18 mm) with peripheral rim enhancement, compatible with an abscess; no suspicious non-mass enhancement was seen bilaterally. Diffusion sequences showed peripheral hyperintensity of the right collection with low ADC along the wall, in keeping with restricted diffusion at the abscess wall.

Given the persistent mastitis-like presentation with diffuse bilateral infiltration and the non-specific imaging overlap with granulomatous etiologies, an ultrasound-guided core biopsy was performed on the most suspicious area. Histopathology confirmed invasive ductal carcinoma. Based on concordant clinical and imaging features, the multidisciplinary assessment considered bilateral disease and staged the patient accordingly.

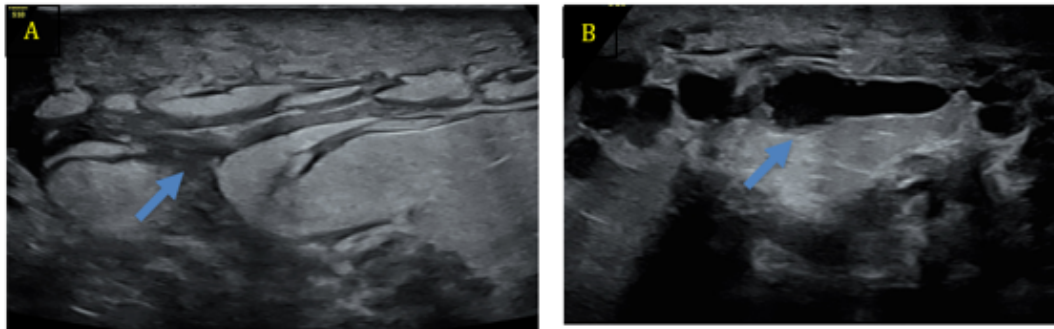


Figure 1: Ultrasound.

A) Ultrasound showing diffuse parenchymal infiltration of the mammary gland with altered echotexture.

B) Ultrasound showing bilateral ductal dilatation more marked in the right outer-inferior quadrant, with heterogeneous intraluminal echogenic content and mobile echoes. No Doppler vascularization. Maximum duct diameter ≈ 10 mm.

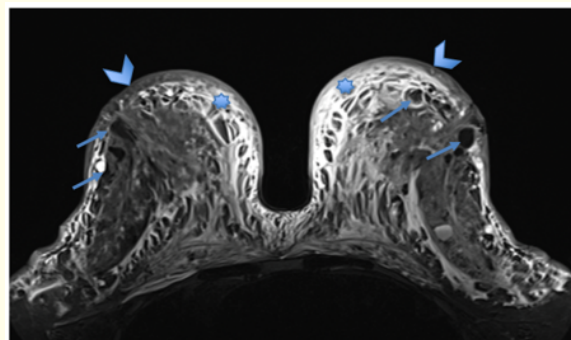


Figure 2: Breast MRI - T2 SPAIR.

Axial T2-SPAIR image showing diffuse bilateral parenchymal infiltration with cutaneous thickening (≈ 10 mm on the right, 8 mm on the left). Arrows indicate dilated ducts bilaterally; arrowheads highlight skin thickening and edema (Asterix).

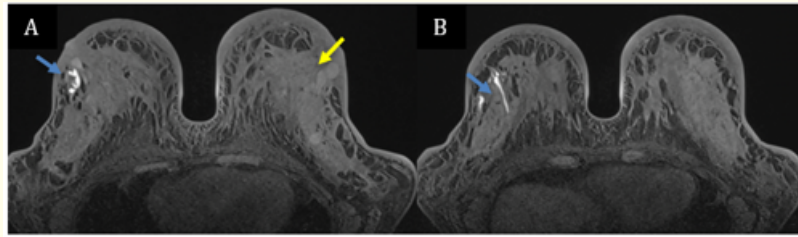


Figure 3: Breast MRI - post-contrast dynamic sequence with subtraction.

A. Axial post-contrast subtracted image demonstrating a right subcutaneous oval lesion ($\approx 22 \times 18$ mm) with rim enhancement Blue arrow.

B. The left breast shows a well-circumscribed retro-areolar oval formation ($\approx 30 \times 20$ mm) without enhancement. No non-mass enhancement was observed bilaterally. Yellow arrow.

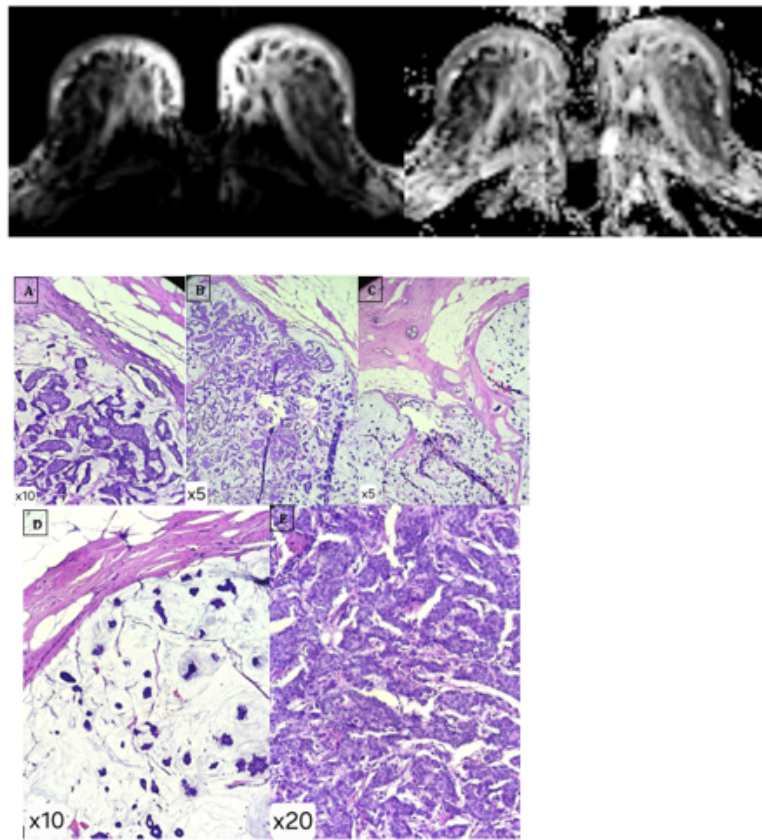


Figure 4: Breast MRI - diffusion-weighted imaging and ADC map.

Diffusion-weighted sequence ($b=800-1000$ s/mm²) with corresponding ADC map. No definite abnormal restricted diffusion was identified beyond the described lesions.

Discussion

Diffuse breast infiltration without a discrete mass is uncommon and represents a diagnostic challenge. It can arise from benign inflammatory conditions such as idiopathic granulomatous mastitis (IGM) or breast tuberculosis (BTB), but also from infiltrating carcinoma, including inflammatory breast cancer. Clinical and radiologic overlap is considerable, often leading to diagnostic delay [1-6].

IGM typically occurs in young, parous women and is thought to result from autoimmune or hormonal mechanisms. Imaging findings are variable, but MRI may reveal non-mass enhancement, abscess cavities, and ductal ectasia. However, these features remain non-specific and may mimic carcinoma [2,3]. Similarly, BTB is a rare entity, with a higher prevalence in tuberculosis-endemic regions. Radiologically, it may manifest as a nodular, diffuse, or sclerosing pattern, often indistinguishable from malignancy [1,4,6].

Several authors have reported cases where breast tuberculosis was initially mistaken for carcinoma, and vice versa. An., *et al.* emphasized in a series of diffuse infiltrative lesions that imaging characteristics often overlap and that histopathology is mandatory to establish the correct diagnosis [5]. Pluguez-Turull, *et al.* also highlighted that IGM can simulate malignancy across ultrasound, mammography, and MRI [3].

Bilateral diffuse or inflammatory-pattern presentation of carcinoma is uncommon. Synchronous bilateral breast cancers account for roughly 1-3% of all breast cancers in many series and up to 2-11% across broader cohorts, with increasing detection owing to improved imaging [7]. Bilateral inflammatory breast cancer has been reported with MRI showing bilateral skin thickening/edema and variable non-mass enhancement [8], and classic MRI patterns of inflammatory carcinoma include innumerable tiny enhancing foci interconnected by non-mass-like enhancement and marked skin thickening [9]. In practice, however, bilateral mastitis-like changes may coexist with carcinoma or be entirely non-specific, reinforcing that tissue sampling is indispensable when imaging is equivocal [5,9].

Conclusion

Diffuse breast infiltration should not be presumed benign—even when bilateral—in the absence of a discrete mass. While granulomatous mastitis and breast tuberculosis are recognized mimics, the radiologist must remain vigilant to avoid misdiagnosis. Imaging—particularly MRI and diffusion—provides crucial clues and often drives the decision to biopsy, but cannot substitute for histopathology. This case illustrates the diagnostic pitfall of mastitis-like presentations and highlights the indispensable role of radiologists in recognizing suspicious patterns and recommending timely tissue confirmation.

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