

BEYOND MASTITIS: MULTICENTRIC BREAST ABSCESS OF THE RIGHT BREAST DIAGNOSED BY MULTIMODAL IMAGING

Nikolova S.^{1,2}

¹University Institute of Radiology, Skopje, Republic of North Macedonia

²Faculty of Medicine, "Ss Cyril and Methodius" University, Skopje, Republic of North Macedonia

Abstract

Introduction: Breast abscess is a known complication of mastitis, however multicentric involvement in non-lactating patients is uncommon and may closely mimic malignancy, creating a diagnostic challenge and often necessitating advanced imaging.

Case Presentation: We report the case of a 28-year-old patient who was referred with a clinical diagnosis of right-sided mastitis following initial surgical evaluation. Ultrasound examination demonstrated a well-defined hypoechoic collection containing dense fluid, associated with a fistulous tract extending toward the para-mammary region, as well as findings suggestive of abscess formation. Given the complexity of the presentation, further evaluation with breast magnetic resonance imaging was performed. MRI revealed multiple multicentric lesions within the right breast, characterized by low signal intensity on T1-weighted images, high signal intensity on T2-weighted images, and peripheral rim enhancement following contrast administration, findings that are consistent with multicentric breast abscesses. No suspicious solid enhancing components were identified.

Conclusion: This case highlights the importance of a multimodal imaging approach in the assessment of atypical or extensive breast infections. While ultrasound remains the first-line modality for detection and guidance of intervention, MRI provides superior delineation of disease extent, identification of multicentric involvement, and improved differentiation from malignancy. Accurate imaging interpretation is essential for appropriate clinical management, avoiding unnecessary invasive procedures, and ensuring timely and targeted treatment.

Keywords: breast abscess; breast infection; magnetic resonance imaging; mastitis; ultrasound.

Introduction

Breast infections represent a heterogeneous group of inflammatory conditions ranging from simple mastitis to complex abscess formation and, in some cases, conditions associated with underlying malignancy. Breast abscess is defined as a localized collection of purulent material, most commonly arising as a complication of infectious mastitis, and occurs in approximately 5–11% of affected patients, particularly in lactating women, although non-lactational cases are increasingly recognized and clinically significant (1,2). In non-puerperal patients, breast abscesses often present with atypical clinical features and may be associated with risk factors such

as smoking, diabetes, or chronic inflammatory conditions, further complicating diagnosis and management (1,3).

Inflammatory breast diseases encompass a wide spectrum of entities, including infectious mastitis, granulomatous mastitis, and inflammation secondary to malignancy, all of which may demonstrate overlapping clinical and imaging features (3,4). This overlap creates a well-recognized diagnostic dilemma, as breast abscesses may mimic inflammatory breast carcinoma both clinically and radiologically, necessitating careful evaluation and, in some cases, histopathological confirmation (4,5). Failure to accurately differentiate these entities may lead to delayed diagnosis or inappropriate treatment.

Imaging plays a pivotal role in the evaluation of suspected breast infection. Due to its accessibility and ability to identify fluid collections, ultrasound (US) is the first-line modality, typically demonstrating hypoechoic or complex cystic lesions with internal echoes and posterior acoustic enhancement (2,6). However, in complex, recurrent, or atypical presentations, magnetic resonance imaging (MRI) provides superior soft-tissue contrast and enables more accurate assessment of lesion extent, multicentricity, and internal features, including rim enhancement patterns and surrounding inflammatory changes (7). These traits are essential in distinguishing abscesses from malignancies, which may present with similar enhancement characteristics.

Multicentric breast abscesses are relatively uncommon and often associated with prolonged disease course, delayed diagnosis, or systemic predisposition, and their imaging appearance may closely resemble malignant processes, requiring a high level of diagnostic suspicion and multimodal correlation (7,8). In this context, accurate interpretation of imaging findings is essential for appropriate clinical management and avoidance of unnecessary invasive procedures.

We present a case of a multicentric breast abscess of the right breast, initially referred as mastitis, in which multimodal imaging—ultrasound and MRI—played a decisive role in establishing the diagnosis and excluding malignancy.

Case presentation

A 28-year-old female patient was referred from the Department of Thoracic Surgery with a clinical diagnosis of right-sided mastitis (ICD-10: N61) despite ongoing antibiotic therapy.

The patient reported persistent localized breast discomfort and swelling, with only partial clinical improvement following intravenous antibiotic treatment, raising suspicion for a complicated or atypical inflammatory process. She had no known history of diabetes mellitus, prior breast disease, smoking, or other chronic inflammatory conditions. The patient was non-lactating and at presentation denied significant systemic symptoms, including fever or generalized malaise. Given the persistence of symptoms and the incomplete response to initial therapy, a multimodal imaging assessment was undertaken to further delineate the extent of disease and exclude an underlying malignant or extensive inflammatory process.

Ultrasound Findings - Breast ultrasound examination demonstrated:

- A well-defined hypoechoic collection located in the outer and lower quadrants of the right breast, Figure 1(b);

- Heterogeneous internal echoes, consistent with dense purulent content;
- Posterior acoustic enhancement, supporting fluid nature of the lesion;
- A fistulous tract extending laterally toward the para-mammary region, indicating a chronic or complicated abscess;
- Surrounding breast parenchyma without marked hyperemia on Doppler evaluation, suggesting subacute or partially treated inflammation, Figure 1(a);

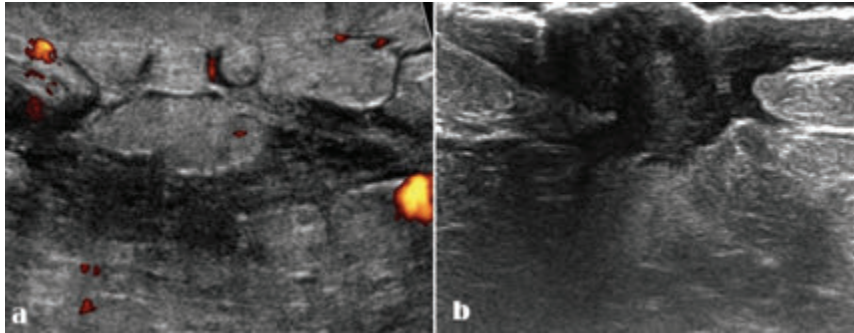


Figure 1. Ultrasound findings of right breast abscess.

(a) Ultrasound image demonstrating altered echogenicity of the right breast parenchyma with areas of increased echogenicity consistent with surrounding inflammatory changes and subcutaneous edema. (b) Non-lactational abscess in the right breast showing a well-defined hypoechoic collection with heterogeneous internal echoes, posterior acoustic enhancement, and a fistulous tract extending through the parenchymal planes, corresponding to abscess tracking within the breast tissue.

These findings were consistent with a localized breast abscess with fistulization. However, the full extent of disease and potential multifocal involvement could not be adequately assessed by ultrasound alone, prompting further evaluation with MRI.

MRI Findings

Breast MRI provided a comprehensive assessment of the disease extent and demonstrated:

- Multiple multicentric lesions involving the right breast, extending beyond the area identified on ultrasound;
- Lesions of variable size distributed across different quadrants, confirming multifocal and multicentric involvement;
- T1-weighted images: lesions appeared predominantly hypointense, consistent with fluid content, Figure 2(a);
- T2-weighted images: lesions were markedly hyperintense, reflecting fluid-rich collections with inflammatory components, Figure 2(b, c);
- Areas of intermediate signal intensity within some lesions, suggestive of proteinaceous or debris-containing material;
- Peripheral rim enhancement of the lesions following contrast administration, consistent with abscess cavities, Figure 3(a-f);

- No internal solid enhancing components, reducing suspicion for malignancy;
- Surrounding parenchymal enhancement, consistent with inflammatory changes;
- Mild associated parenchymal edema and inflammatory infiltration;
- No suspicious axillary lymph nodes or features suggestive of metastatic involvement, Figure 2(d).

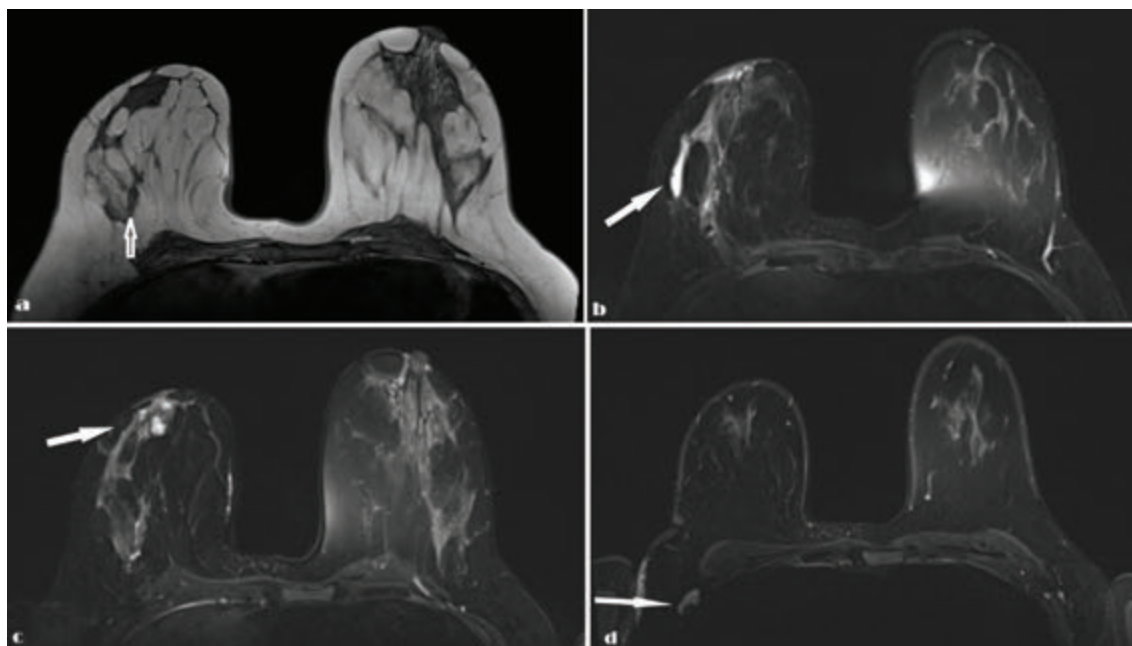


Figure 2. Breast MRI findings in multicentric right breast abscess.

(a) Axial T1-weighted image demonstrating a predominantly hypointense lesion in the right breast (arrow), consistent with a fluid-containing collection. **(b, c)** Axial T2-weighted SPAIR images showing multiple hyperintense multicentric lesions with heterogeneous internal signal, corresponding to proteinaceous or purulent fluid content, with surrounding parenchymal edema. **(d)** Axial T2-weighted SPAIR image demonstrating a reactive lymph node in the right axilla, with preserved morphology and signal characteristics.

MRI provided a significantly broader perspective than ultrasound, enabling accurate delineation of multicentric disease distribution, superior characterization of lesion composition, and confident exclusion of malignancy. These findings were consistent with multicentric breast abscesses, supporting a diagnosis of complicated infectious mastitis with multifocal involvement and guiding appropriate clinical management.

Based on imaging findings, the patient underwent targeted drainage and continued antibiotic therapy, with gradual clinical improvement during follow-up.

Given the atypical multicentric presentation and the need to document the complete therapeutic response, a follow-up breast MRI examination has been scheduled one month after completion of treatment. The purpose of the follow-up imaging is to assess the resolution of the inflammatory changes, confirm regression of the abscess cavities, and exclude any residual suspicious enhancing components.

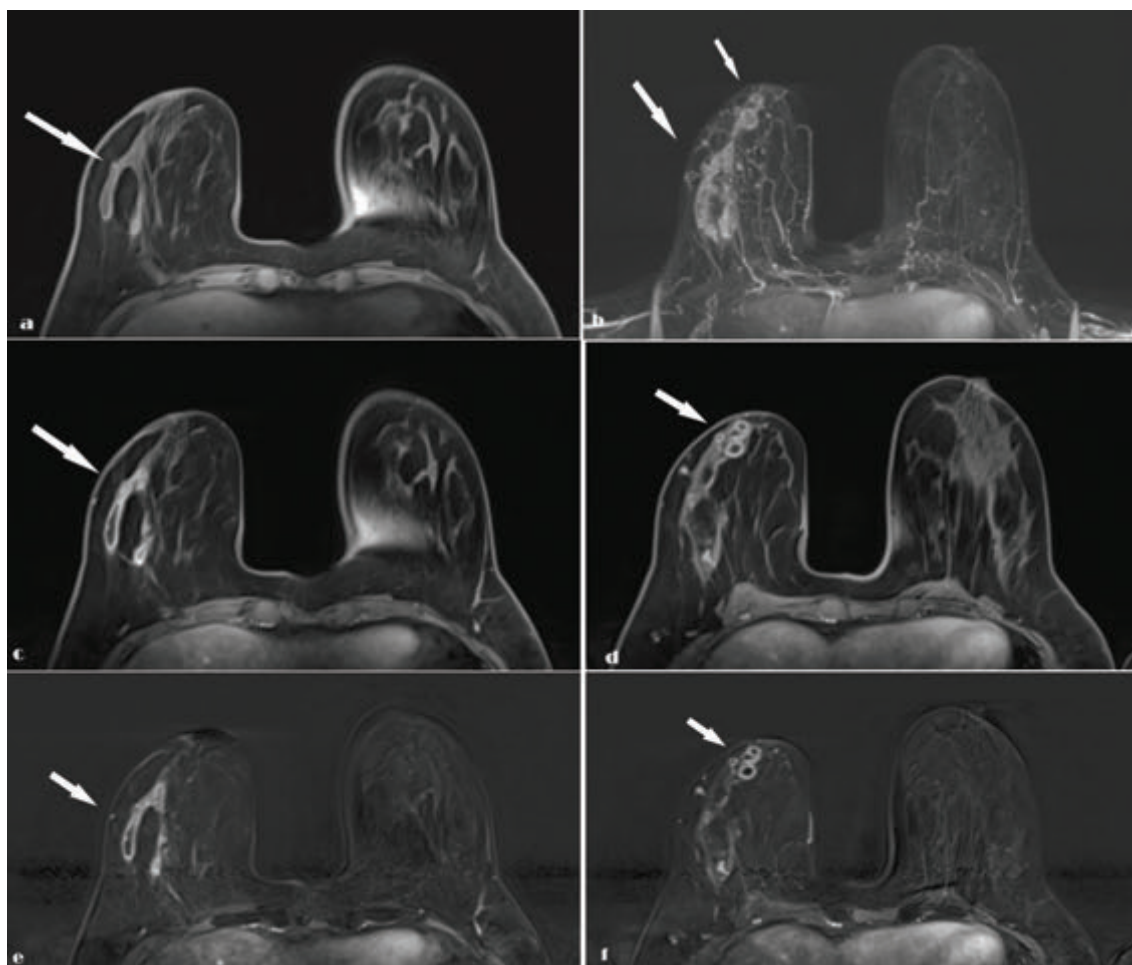


Figure 3. Contrast-enhanced breast MRI demonstrating multicentric abscesses in the right breast.

(a) Axial T1-weighted native image showing predominantly hypointense lesions corresponding to fluid-containing collections. (b) Maximum intensity projection (MIP) from post-contrast T1-weighted imaging demonstrating multifocal areas of enhancement in the right breast. (c, d) Axial dynamic post-contrast T1-weighted images showing multiple lesions with characteristic peripheral rim enhancement and absence of internal solid enhancing components. (e, f) Subtracted dynamic post-contrast T1-weighted images highlighting the rim-enhancing pattern of the lesions, with improved visualization of lesion margins and multicentric distribution.

Discussion

Breast abscess represents a well-recognized complication of infectious mastitis, most frequently encountered in lactating women, but increasingly reported in non-lactational settings where the clinical course may be more complex and prolonged (1,3). In such cases, imaging plays a central role not only in confirming the diagnosis but also in excluding malignancy, particularly inflammatory breast carcinoma, which may present with overlapping clinical and radiological features (3,4).

Ultrasound remains the initial modality of choice, allowing identification of fluid collections and guiding intervention. Typical findings include hypoechoic or complex cystic lesions with

internal echoes and posterior acoustic enhancement (2,6,9). In the present case, ultrasound detected a localized abscess and an associated fistulous tract; however, it underestimated the true extent of the disease. This limitation is well described, particularly in cases of multifocal or deep parenchymal involvement.

MRI provided a decisive diagnostic advantage by demonstrating the multicentric distribution of lesions, which were not fully visualized on ultrasound. The observed signal characteristics—T1 hypointensity, T2 hyperintensity, and peripheral rim enhancement—are consistent with previously reported MRI features of breast abscesses (7,9,10). Importantly, the absence of internal solid enhancement and the presence of a typical rim-enhancing pattern supported a benign inflammatory process rather than malignancy. Similar MRI findings have been described in rare reports of multiple breast abscesses in non-lactating patients, where imaging played a key role in avoiding unnecessary biopsy or surgical intervention (7,8,10).

Multicentric breast abscesses remain relatively uncommon and are often associated with delayed diagnosis or incomplete response to therapy (8). Compared to single abscesses, they may present with less pronounced inflammatory signs, as seen in this case, further complicating clinical assessment. This highlights the importance of considering advanced imaging when clinical evolution is atypical or when initial imaging findings do not fully explain the patient's symptoms.

Overall, this case reinforces the complementary role of ultrasound and MRI. While ultrasound is indispensable for initial detection and procedural guidance, MRI offers superior evaluation of disease extent and distribution, enabling confident differentiation from malignancy and more precise treatment planning.

Conclusion

This case highlights the importance of a multimodal imaging approach in the evaluation of breast infections. Ultrasound remains the first-line diagnostic tool, enabling rapid identification of fluid collections and guiding intervention. However, in complex or atypical presentations, particularly when multicentric involvement is suspected, MRI provides essential additional information by accurately delineating disease extent and characterizing lesion morphology. Careful interpretation of imaging findings is crucial for differentiating abscess from malignancy, especially in non-lactating patients, where diagnostic uncertainty is higher. Early recognition combined with appropriate imaging-guided management plays a key role in preventing complications and ensuring optimal clinical outcomes.

Declarations

Ethics approval and consent to participate: Not applicable.

Informed consent: Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Conflict of interest: The author declares no conflict of interest.

Funding: This research received no external funding.

Availability of data and materials: The data supporting the findings of this case report are available from the corresponding author upon reasonable request.

Authors' contributions: S.N. contributed to the conception and design of the study, data acquisition, image interpretation, drafting of the manuscript, and final approval of the version to be published.

Acknowledgements: The author would like to acknowledge the staff of the University Institute of Radiology, Skopje, for their support in the imaging procedures.

Artificial Intelligence (AI) statement: AI-assisted language support tools were used exclusively for linguistic refinement and grammar improvement during manuscript preparation. The author takes full responsibility for the scientific content, interpretation, and final version of the manuscript.

References:

1. Toomey AE, Le JK. Breast abscess. In: StatPearls (Internet). Treasure Island (FL): StatPearls Publishing; 2026 Updated 2023 Jun 26. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK459122/>
2. Patel M, Radswiki T. Breast abscess (Internet). Radiopaedia.org; (cited 2026 May 1). Available from: <https://doi.org/10.53347/rID-14818>
3. Rashid T, Sae-Kho TM, Heuvelhorst KL, Glazebrook KN. Breast imaging of infectious disease. Br J Radiol. 2023;96(1143):20220649.
4. Leong PW, Chotai NC, Kulkarni S. Imaging features of inflammatory breast disorders: a pictorial essay. Korean J Radiol. 2018;19(1):5-14.
5. Faguy K. Infectious and inflammatory breast disease. Radiol Technol. 2018;89(3):279 M-295M.
6. Trop I, Dugas A, David J, El Khoury M, Boileau JF, Larouche N, Lalonde L. Breast abscesses: evidence-based algorithms for diagnosis, management, and follow-up. Radiographics. 2011;31(6):1683-1699.
7. Anik Y, Inan N, Sarisoy HT, Arslan AS, Demirci A. MR imaging and MR spectroscopy findings of multiple breast abscess in the nonlactating case. Breast J. 2007;13(5):527-528.
8. Ding ST, Gao YJ, Zhang Y, He XP. Analysis of risk factors leading to multiple breast abscesses during lactation. Medicine (Baltimore). 2024;103(9):e37367
9. Trop I, Dugas A, David J, El Khoury M, Boileau JF, Larouche N, Lalonde L. Breast abscesses: evidence-based algorithms for diagnosis, management, and follow-up. Radiographics. 2011;31(6):1683-1699.
10. Güven F, Yener MH. Susceptibility-weighted breast MRI differentiates abscesses from necrotic tumors: a prospective evaluation. Diagnostics (Basel). 2025;15(17):2260.