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Journal of Clinical Imaging Science

Case Report *Breast Imaging*

Mammary Rosai-Dorfman disease: Rare benign mimic of breast malignant neoplasm

Troy Nguyen[1], Malem Gutema[2], Jiquing Ye[3], Martine Susan Backenstoss[2]

[1]College of Medicine, Lake Erie College of Osteopathic Medicine, Erie, Departments of [2]Radiology and [3]Pathology, Rochester General Hospital, Rochester, New York, United States.

***Corresponding author:**
Troy Nguyen,
College of Medicine, Lake Erie College of Osteopathic Medicine, Erie, United States.

tnguyen42732@med.lecom.edu

Received : 19 April 2023
Accepted : 21 July 2023
Published : 22 August 2023

DOI
10.25259/JCIS_40_2023

Quick Response Code:

ABSTRACT

Rosai-Dorfman disease (RDD), also known as sinus histiocytosis with massive lymphadenopathy, is an uncommon benign disorder characterized by the accumulation of activated histiocytes in affected tissues. While RDD typically involves lymph nodes, it may manifest as extranodal involvement. Breast involvement is an exceedingly rare presentation of this condition with <100 reported cases worldwide. This report presents a case of RDD in a 58-year-old male patient who presented with a palpable breast mass. Mammography and ultrasound imaging studies raised concerns for malignancy, prompting a breast biopsy. Histopathological examination revealed S100-positive pale histiocytes exhibiting emperipolesis, consistent with RDD. The management of extranodal RDD is individualized, as no standardized guidelines are currently available. However, surgical excision is recommended for unicentric breast lesions, which was performed in our case, resulting in complete remission. The patient has remained disease-free under surveillance with computed tomography scans. Our case underscores the importance of considering RDD in the differential diagnoses of breast masses and highlights the utility of surgical excision as an effective treatment option, especially for unicentric breast lesions of RDD.

Keywords: Breast, Rosai-Dorfman, Sinus histiocytosis with massive lymphadenopathy, Benign breast lesion

INTRODUCTION

Rosai-Dorfman disease (RDD), also known as sinus histiocytosis with massive lymphadenopathy, is a rare benign disorder of non-Langerhans cell histiocytes with an unclear etiopathogenesis. While RDD commonly presents as lymphadenopathy in its classic nodal form, extranodal involvement occurs in over 40% of cases.[1] Mammary tissue involvement is particularly rare. Clinical and radiologic manifestations of RDD in the breast are often inconclusive and can mimic malignant neoplasms, highlighting the importance of pathological analysis in the diagnostic workup. Although there are no standardized guidelines for managing RDD, various options have been proposed, ranging from close observation to surgical excision.[2] Our case report describes a patient with typical clinical features of mammary RDD, the subsequent radiopathological evaluation, and the management strategy that led to remission.

CASE REPORT

A 58-year-old male presented with a painless mass in the left lateral breast that appeared smaller than when it was first noticed during breast self-examination 6 months prior. He denied other breast

masses, nipple discharge, skin changes, or significant breast pain. There was no history of trauma and the patient had no significant medical or surgical history. His family history was significant for breast cancer in his sister and bone cancer in his father. The patient had never undergone breast imaging.

During the comprehensive breast examination in seated and supine positions, a firm, non-tender mass measuring 5 × 3 cm was detected in the left lateral breast at the 5 o'clock position, 9 cm from the nipple. The breast skin exhibited no erythema, edema, or other lesion and no palpable mass was detected within the right breast. Diagnostic mammogram and left breast ultrasound were performed to evaluate the palpable mass. The mammogram of the right breast was negative, while that of the left breast demonstrated predominantly fatty replaced breast tissue with an ill-defined oval region of increased density in the lower outer quadrant, deep within the breast tissue, corresponding to the area of palpable concern [Figure 1].

To selectively evaluate the area of mammographic concern in the left breast, an ultrasound with Doppler was performed which revealed an irregular micro-lobulated hypoechoic mass with mild internal and peripheral vascularity, measuring 3.4 × 1.8 × 3.3 cm [Figure 2]. This finding raised concern for malignancy prompting an ultrasound-guided core biopsy of the lesion, with subsequent placement of a biopsy clip. The sample was then sent for pathological analysis. Histopathological analysis of the biopsy revealed a haphazardly arranged fibrotic lesion with proliferating bland spindle cells, abundant plasma cells, and pale histiocytes [Figure 3]. The negative results of p63, AE1/AE3, and HMWCK stains ruled out metaplastic carcinoma. The plasma cells are predominantly positive for immunoglobulin G4 (IgG4) and only a few are positive for IgG4; arguing against IgG4- related sclerosis. The bland spindle cells were positive for smooth muscle actin, while negative for ALK and CD34, consistent with reactive myofibroblasts. The pale histiocytes were positive for S-100 immunostaining, with the presence of intracytoplasmic lymphocytes, also known as emperipolesis, on close investigation [Figure 4], which was characteristic of RDD. Of note, the histocytes are usually CD68+ and CD1a− (not performed for this case).

Staging computed tomography (CT) scans of the head and neck, thorax, abdomen, and pelvis were performed and were negative. The patient was referred to a surgical oncologist, who recommended surgical excision of the unicentric breast lesion, which was performed without complications. The patient has undergone CT surveillance which has been negative for recurrence for the past 2 years.

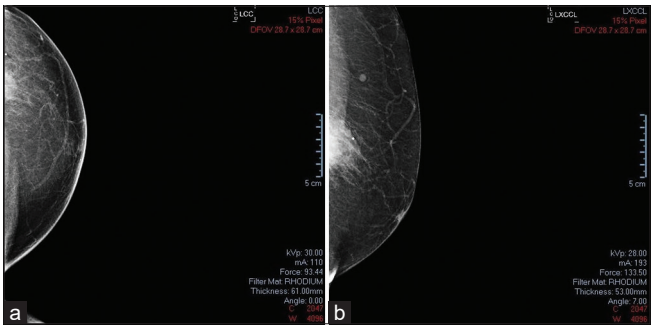

Figure 1: A 58-year-old male with a painless palpable mass in the left lateral breast, subsequently diagnosed with mammary Rosai-Dorfman disease. (a) The mammogram of the left breast in a CC view shows an ill-defined isodense region with anterior spiculations in the outer quadrant of the deep breast tissue, corresponding to the area of palpable concern, suggesting a possible tumor or malignancy. (b) The mammogram of the left breast in an XCCL view shows an ill-defined isodense region with anterior spiculations in the lower quadrant of the deep breast tissue, corresponding to the area of palpable concern, suggesting a possible tumor or malignancy.

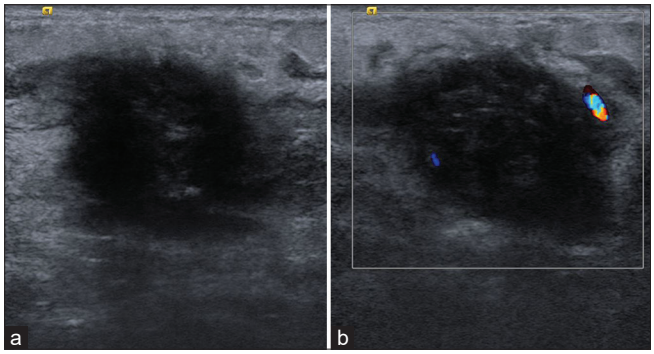

Figure 2: A 58-year-old male with a painless palpable mass in the left lateral breast, subsequently diagnosed with mammary Rosai-Dorfman disease. (a) The ultrasound without Doppler of the lower outer quadrant of the left breast reveals an irregular micro-lobulated hypoechoic mass measuring 3.4 × 1.8 × 3.3 cm, located at the 4:00 position and approximately 6 cm from the nipple. (b) The ultrasound with Doppler of the lower outer quadrant of the left breast shows mild internal and peripheral vascularity associated with an irregular microlobulated hypoechoic mass, suggesting a possible malignancy or tumor.

DISCUSSION

The Histiocyte Society classifies RDD into three forms: Sporadic, familial, and cutaneous, with the sporadic form being the most common.[3] The sporadic form is further classified into classic nodal, extranodal, neoplasia-associated, and immune-associated RDD. Classic nodal RDD often presents as bilateral massive painless cervical lymphadenopathy in children and young adults, although inguinal, retroperitoneal, and mediastinal lymph nodes may also be involved.[1,3,4] The extranodal form is identified in over 40% of RDD cases, usually in older populations.[4] The common sites of extranodal involvement include skin, nasal cavity, bone, orbital tissue, and central nervous system.[5]

RDD confined to the breast is an extremely rare entity. There have been fewer than 100 reported cases of mammary

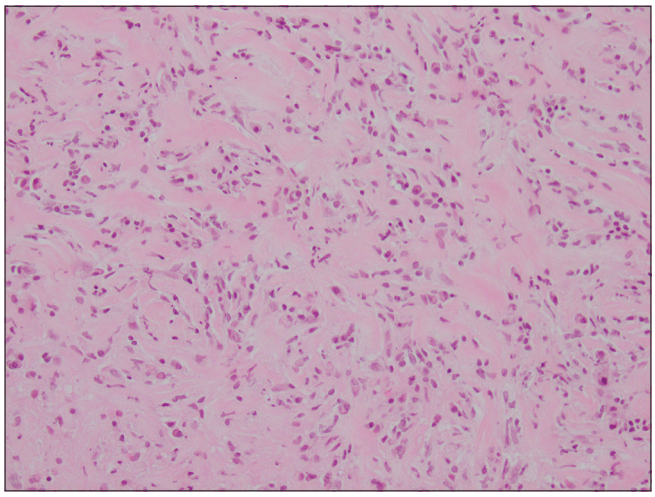

Figure 3: A 58-year-old male with a painless palpable mass in the left lateral breast, subsequently diagnosed with mammary Rosai-Dorfman disease. The H&E stain (×20) demonstrates a fibrotic lesion characterized by haphazardly arranged bundles of collagen, some bland spindle cell proliferation, mixed inflammatory infiltrates including abundant plasma cells, and pale-stained histiocytes.

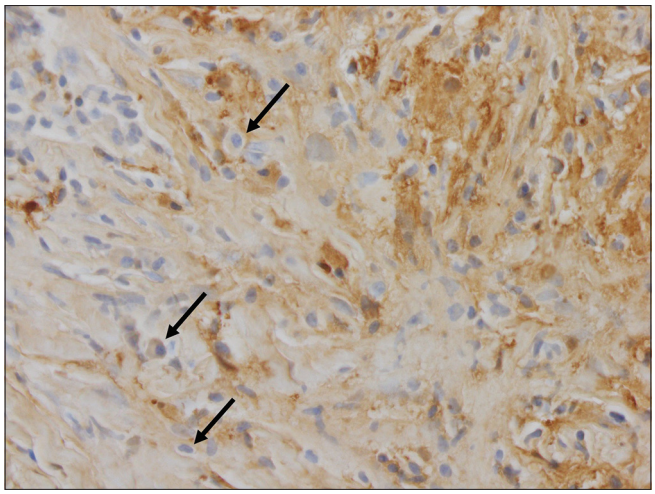

Figure 4: A 58-year-old male with a painless palpable mass in the left lateral breast, subsequently diagnosed with mammary Rosai-Dorfman disease (RDD). The S100 stain (×40) highlights the presence of S100-positive pale histiocytes with intracytoplasmic lymphocytes, also known as emperipolesis (arrows), a hallmark feature of RDD.

RDD documented in English literature worldwide.[6] Clinically, mammary RDD typically manifests as a unilateral palpable mass, which may be tender or painless. However, approximately 6% of cases have reported bilateral involvement.[6,7] In general, there are no noticeable changes on the skin or surface associated with the lesion. The median age of onset is about 55 years (ranging from 15 to 84), and the condition is predominantly observed in females (with a male-to-female ratio of 10:82).[6] Radiographically, mammary RDD appears indistinguishable from malignant neoplasms, categorized as BI-RADS 4. Mammography often reveals one or multiple ill-defined masses without calcification. On selective ultrasound with Doppler, a hypoechoic mass with indistinct or angulated margins and internal vascularity is commonly observed.[7] In more than 5% of cases, axillary lymph nodes are affected, further heightening concerns of malignancy.[6] Therefore, a core biopsy with pathologic analysis is warranted for a definitive diagnosis.

A diagnosis of RDD can be made by the presence of characteristic S100-positive histiocytes with emperipolesis in a proliferating fibrotic lesion. Although emperipolesis is commonly appreciated in RDD, it is not specific and, therefore, not a requirement for diagnosis. Emperipolesis may appear less pronounced in extranodal disease than in nodal disease.[2] It is also important to exclude relevant differential diagnoses depending on the site of involvement. In this presented case, the ruled-out differential diagnoses are metaplastic carcinoma and IgG4-related sclerosing mastitis. The Histiocyte Society recommends quantifying IgG4-positive plasma cells, although the results should be interpreted cautiously. Any increase in IgG4-positive plasma cells should be specified as an auxiliary finding that requires an appropriate clinical, serological, and radiological context.[8] Following confirmation of RDD, full-body CT scans are recommended for staging purposes.

Sporadic RDD has a good prognosis. It is usually self-limited, with spontaneous remission reported in up to 50% of cases, although up to 10% of cases report death due to direct complications.[9] Observation is recommended for uncomplicated nodal and asymptomatic cutaneous disease.[2] Core needle biopsy followed by surgical excision is recommended in symptomatic disease, a breast mass measuring up to 5 cm, or unifocal extranodal disease as in our presented case. A systemic approach with corticosteroids, chemotherapy, or radiotherapy may be required for multifocal unresectable extranodal disease, refractory/relapsed disease, or symptomatic disease.[2] Nevertheless, no standardized approach has been delineated. Positron emission tomography (PET) or CT is often recommended for follow-up surveillance of RDD.[10]

CONCLUSION

Extranodal RDD in the breast is a benign entity that can mimic neoplastic lesions due to its clinical-radiological features. Accurate diagnosis relies on histopathological and immunohistochemical assessment. The diagnostic features are large S-100 positive, CD1a negative histocytes with cytoplasmic emperipolesis, and plasma cell rich inflammatory infiltrate. Due to the rarity of this condition and the lack of standardization in follow-up management, each case should be evaluated individually with a range of

options including close observation, staging/surveillance scans, and surgical excision. Further research is necessary to establish a consensus on optimal management strategies for extranodal RDD in the breast.

Acknowledgment

We extend our sincere thanks to Rebecca T. Le, MD, for her invaluable guidance and insightful feedback, which greatly enhanced the quality of this paper.

Declaration of patient consent

Patient's consent not required as patient's identity is not disclosed or compromised.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Foucar E, Rosai J, Dorfman R. Sinus histiocytosis with massive lymphadenopathy (Rosai-Dorfman disease): Review of the entity. Semin Diagn Pathol 1990;7:19-73.
2. Abla O, Jacobsen E, Picarsic J, Krenova Z, Jaffe R, Emile JF, *et al*. Consensus recommendations for the diagnosis and clinical management of Rosai-Dorfman-Destombes disease. Blood 2018;131:2877-90.
3. Emile JF, Abla O, Fraitag S, Horne A, Haroche J, Donadieu J, *et al*. Revised classification of histiocytoses and neoplasms of the macrophage-dendritic cell lineages. Blood 2016;127:2672-81.
4. Rosai J, Dorfman RF. Sinus histiocytosis with massive lymphadenopathy. A newly recognized benign clinicopathological entity. Arch Pathol 1969;87:63-70.
5. Bruce-Brand C, Schneider JW, Schubert P. Rosai-Dorfman disease: An overview. J Clin Pathol 2020;73:697-705.
6. Iancu G, Gica N, Mustata LM, Panaitescu AM, Vasile D, Peltecu G. Rosai-Dorfman disease: Breast involvement-case report and literature review. Medicina (Kaunas) 2021;57:1167.
7. Sumner C, Salem K, Abunimer L, Ewaz A, Zhang L, Monsrud A, *et al*. Bilateral breast Rosai-Dorfman disease screen detected by mammography. Clin Case Rep 2023;11:e6983.
8. Deshpande V, Zen Y, Chan JK, Yi EE, Sato Y, Yoshino T, *et al*. Consensus statement on the pathology of IgG4-related disease. Mod Pathol 2012;25:1181-92.
9. Pulsoni A, Anghel G, Falcucci P, Matera R, Pescarmona E, Ribersani M, *et al*. Treatment of sinus histiocytosis with massive lymphadenopathy (Rosai-Dorfman disease): Report of a case and literature review. Am J Hematol 2002;69:67-71.
10. Albano D, Bosio G, Bertagna F. 18F-FDG PET/CT follow-up of Rosai-Dorfman disease. Clin Nucl Med 2015;40:e420-2.

How to cite this article: Nguyen T, Gutema M, Ye J, Backenstoss MS. Mammary Rosai-Dorfman disease: Rare benign mimic of breast malignant neoplasm. J Clin Imaging Sci 2023;13:24.