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Case Report

Primary breast diffuse large B-cell lymphoma presenting as a breast lump: a case report of a rare mimicker of breast carcinoma

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ABSTRACT

Primary breast lymphoma (PBL) is a rare extranodal form of non-Hodgkin lymphoma that accounts for a small proportion of breast malignancies. It often mimics primary breast carcinoma clinically and radiologically, making diagnosis challenging. A 70-year-old female presented with a painless lump in the right breast of one-week duration. Clinical examination revealed a firm, non-tender mass in the lower outer quadrant of the right breast, along with cervical lymphadenopathy. Ultrasonography demonstrated a suspicious BIRADS 4 lesion. PET-CT showed a hypermetabolic lesion in the right breast with ipsilateral axillary lymph node involvement. Tru-cut biopsy initially suggested an undifferentiated malignant neoplasm. Immunohistochemistry revealed CD10 and BCL6 positivity with MUM1 negativity, confirming diffuse large B-cell lymphoma (DLBCL), germinal center B-cell (GCB) subtype. The patient was treated with R-CHOP chemotherapy. The patient responded well to treatment and remains clinically stable with no complications during a six-month follow-up period. PBL should be considered in the differential diagnosis of breast masses, especially when imaging findings are inconclusive. Histopathology with immunohistochemistry is essential for diagnosis. Early initiation of chemotherapy can result in favourable outcomes, avoiding unnecessary surgical intervention.

Keywords: Primary breast lymphoma, Diffuse large B-cell lymphoma, Extranodal lymphoma, Breast malignancy

INTRODUCTION

Primary breast lymphoma (PBL) is a rare extranodal manifestation of non-Hodgkin lymphoma, first described by Dobrotina in 1959. It is defined as a lymphoma arising primarily within the breast tissue, with no prior or concurrent evidence of systemic lymphoma at the time of diagnosis.[1] PBL is an uncommon entity, comprising approximately 1-2% of all non-Hodgkin lymphomas and less than 0.5% of all malignant breast neoplasms.[2]

The majority of cases are of B-cell origin, most commonly DLBCL.[3,4] Clinically, PBL typically presents as a painless, palpable breast lump. Imaging findings are often nonspecific and may mimic benign breast lesions, posing a diagnostic challenge. Definitive diagnosis is established by histopathological examination, usually via core needle biopsy.

Unlike primary breast carcinoma, the management of PBL is predominantly non-surgical and involves systemic chemotherapy, frequently in combination with radiotherapy. Early and accurate diagnosis is essential to ensure appropriate treatment and to improve patient outcomes.[4-6]

This case report and review of the literature aim to increase awareness of PBL and to summarize current knowledge regarding its clinical presentation, histopathological features, treatment options, and prognosis.

CASE REPORT

Patient information

A 70-year-old female presented with a history of a painless lump in the right breast of one week duration. There were no associated local symptoms such as pain, skin discoloration, nipple discharge, nipple retraction, skin changes, or swelling elsewhere in the body. Systemic review was unremarkable. She is a known case of chronic kidney disease for the past 12 years and hypothyroidism, for which she is on regular medication. Her past medical, drug, social, and gynaecological histories were otherwise non-contributory. There was a family history of malignancy, with her mother having had an abdominal cancer, though further details were not available.

Clinical examination

On general examination, multiple cervical lymph nodes were palpable bilaterally in the posterior triangle. Breast examination revealed a 2×2 cm non-tender lump in the lower outer quadrant of the right breast, located approximately 3 cm from the nipple–areola complex. The lump had an irregular surface, well-defined margins, and was hard in consistency. The left breast and bilateral axillary regions were clinically unremarkable.

Ultrasonography of the breast revealed a well-circumscribed lesion with irregular margins in the right breast at the 8-9 o'clock position, categorized as BIRADS 4, suggestive of a suspicious abnormality requiring further evaluation.

Tru-cut biopsy of the breast lump revealed an infiltrating neoplasm arranged in diffuse sheets with a vague nested pattern. The tumour cells were round to oval with scant to focally vacuolated cytoplasm. Based on histopathological examination, an initial diagnosis of an undifferentiated malignant neoplasm was made, with differential diagnoses including lymphoma, neuroendocrine tumour, and carcinoma (Figure 1).

Further evaluation with immunohistochemistry showed positivity for CD10, BCL6, and CD3, with negativity for MUM1 (Figure 2). Based on the immunophenotypic profile, a final diagnosis of DLBCL, GCB type, was established based on the Hans algorithm (Figure 3).

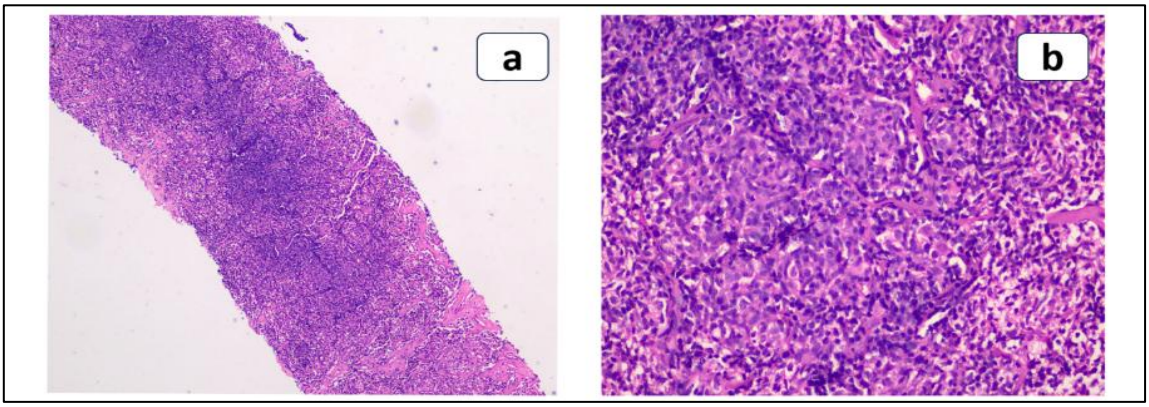

Figure 1: Histopathological examination of Tru-cut biopsy of the breast lump revealed (a) Infiltrating neoplasm seen in diffuse sheets and vague nested pattern (b) Round to oval cells with scant to vacuolated cytoplasm.

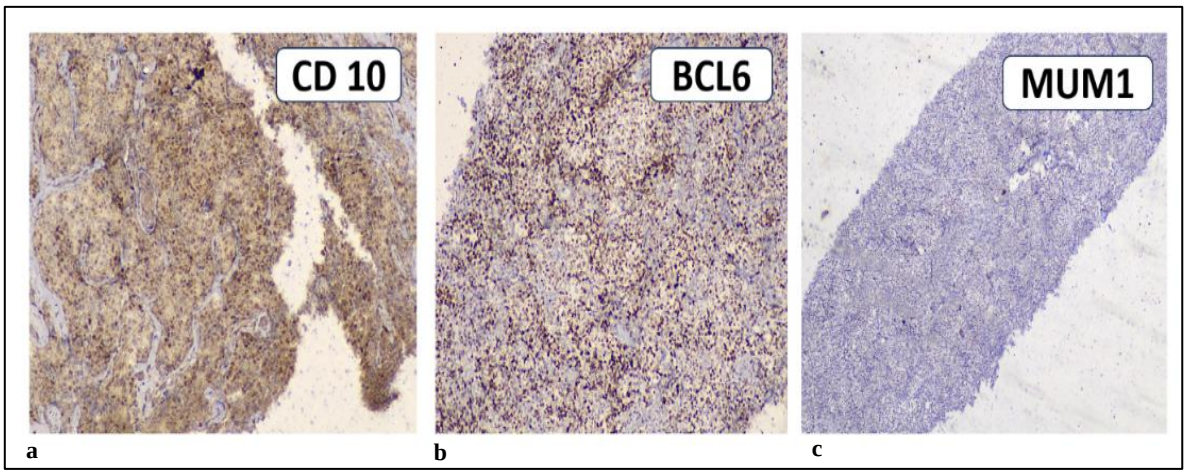

Figure 2 (a-c): Immunohistochemistry showed positivity for CD10, BCL6 and with negativity for MUM1.

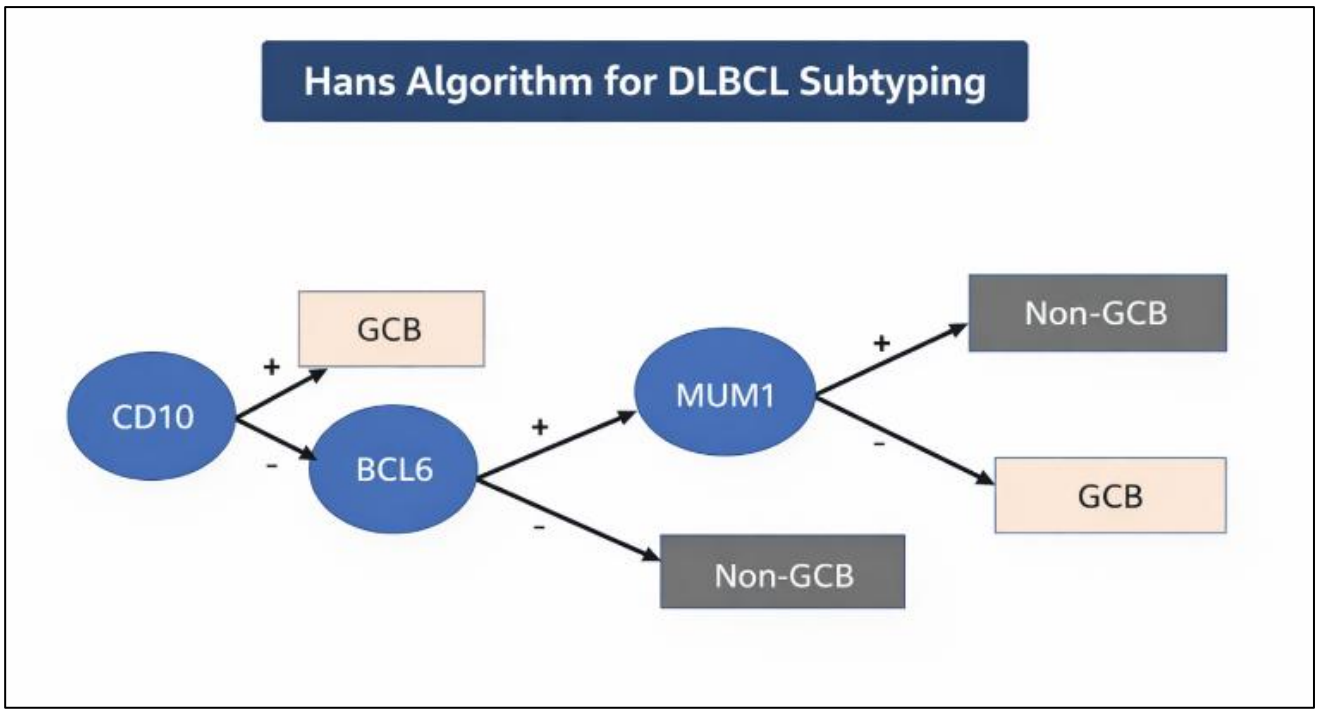

Figure 3: Hans algorithm for DLBCL subtyping.

Also, positron emission tomography–computed tomography (PET-CT) demonstrated a hypermetabolic lesion in the right breast, suggestive of a primary breast neoplasm. Additionally, hypermetabolic lymph nodes were noted in the right axillary region involving levels I and II, consistent with nodal involvement.

Management and follow-up

The patient was initiated on systemic chemotherapy with the R-CHOP regimen, comprising rituximab, cyclophosphamide, doxorubicin, vincristine, and prednisone. She has been on regular follow-up, and over a period of six months, no complications or disease-related adverse events have been observed.

DISCUSSION

PBL is a rare extranodal manifestation of non-Hodgkin lymphoma, accounting for less than 1-2% of all non-Hodgkin lymphomas and less than 0.5% of all malignant breast neoplasms. It predominantly affects females and typically presents as a painless breast mass. While many reported cases involve adolescents and young adults, the present case occurred in an elderly female, thereby emphasizing the wide age distribution of this entity.[7-12]

Clinically, most patients present with a palpable breast lump, occasionally associated with pain, erythema, or inflammatory features that may mimic mastitis.[7,9] In the present case, the patient presented with a short duration, painless breast lump without associated inflammatory signs, consistent with classical descriptions. The presence of cervical lymphadenopathy in our case suggests locoregional spread, which has also been documented in previous reports.[10,11]

Radiological evaluation in PBL is often nonspecific. Ultrasonography commonly demonstrates hypoechoic or heterogeneous lesions with variable vascularity.[7,9,12] In this case, ultrasonography revealed a suspicious BIRADS 4 lesion. PET-CT further demonstrated a hypermetabolic lesion in the right breast with ipsilateral axillary lymph node involvement (levels I and II), highlighting its role in staging and disease assessment. Similar imaging patterns have been described in the literature, though none are pathognomonic.

Histopathological examination with immunohistochemistry is essential for definitive diagnosis. In the present case, initial biopsy suggested an undifferentiated malignant neoplasm, with differential diagnoses including lymphoma, carcinoma, and neuroendocrine tumour. Immunohistochemistry revealed CD10 and BCL6 positivity with MUM1 negativity, confirming DLBCL, GCB subtype based on the Hans algorithm. DLBCL is the most commonly reported histological subtype of PBL, although variants such as ALK-positive anaplastic large cell lymphoma and Burkitt lymphoma have also been described.[7-10,12-14]

Management of PBL differs significantly from that of primary breast carcinoma, with systemic therapy forming the cornerstone of treatment. The patient in the present case was treated with the R-CHOP regimen (Rituximab, Cyclophosphamide, Doxorubicin, Vincristine, and Prednisone), which remains the standard of care for DLBCL. Several studies have demonstrated favourable

outcomes with R-CHOP–based chemotherapy, with or without radiotherapy.[7,12,13] Surgical intervention is generally limited to diagnostic biopsy rather than therapeutic resection.

On follow-up, our patient has remained clinically stable with no treatment-related complications over a period of six months. Comparable outcomes have been reported in the literature, with several cases achieving complete remission following chemotherapy, although aggressive subtypes and advanced presentations may be associated with poorer prognosis and mortality.[7,9-12] The GCB subtype identified in this case is generally associated with a better prognosis compared to the non-GCB subtype.

Overall, this case highlights the importance of considering PBL as differential diagnosis of breast masses, particularly when clinical and imaging findings are atypical. Early diagnosis through biopsy and immunohistochemistry, appropriate staging with PET-CT, and prompt initiation of systemic chemotherapy are critical for optimal outcomes.

CONCLUSION

PBL is a rare entity that can clinically and radiologically mimic primary breast carcinoma, posing a diagnostic challenge. This case highlights the importance of maintaining a high index of suspicion, especially in elderly patients presenting with a painless breast lump and atypical features. Definitive diagnosis relies on histopathological examination and immunohistochemistry, which are essential to differentiate it from other breast malignancies.

Early staging with PET-CT and prompt initiation of appropriate systemic chemotherapy, particularly the R-CHOP regimen, are crucial for optimal management. As demonstrated in this case, timely diagnosis and treatment can result in favourable short-term outcomes. Recognition of this uncommon presentation is important to avoid unnecessary surgical intervention and to guide appropriate oncological management.

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