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Diagnostic Challenge Of Hematolymphoid Neoplasm Mimicking Advanced Breast Cancer In A Young Woman: A Case Report

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Abstrak

Hematolymphoid neoplasms involving the breast are extremely rare and may closely mimic advanced breast carcinoma in both clinical presentation and radiological findings. This overlap poses a significant diagnostic challenge, particularly in young patients, and may lead to misdiagnosis and inappropriate management. We report the case of a 29-year-old woman who presented with a right breast mass, progressive back pain, paraparesis, and extranodal involvement including a palatal mass and extensive skeletal lesions. Initial clinical evaluation, elevated CA 15-3 levels, and imaging findings suggested advanced breast carcinoma with widespread metastases. Radiological assessment using ultrasonography and magnetic resonance imaging demonstrated a suspicious breast mass (BIRADS 4B), diffuse bone marrow infiltration, skull base involvement, and multiple lymphadenopathies. Fine-needle aspiration biopsy (FNAB) of the breast, palate, and cervical lymph nodes revealed features of a malignant round cell tumor consistent with a hematolymphoid neoplasm. Immunohistochemical analysis showed negative cytokeratin expression and diffuse CD4 positivity, supporting a lymphoid origin and excluding epithelial breast carcinoma. These findings shifted the diagnosis from metastatic breast cancer to a systemic hematolymphoid malignancy. Hematolymphoid neoplasms should be considered in the differential diagnosis of young patients presenting with breast masses and extensive systemic involvement. Histopathological confirmation supported by immunohistochemistry is essential to establish an accurate diagnosis and guide appropriate therapy. Early recognition is crucial, as prognosis and treatment strategies for lymphoma differ substantially from those of advanced breast carcinoma.

Keywords: breast mass; hematolymphoid neoplasm; breast lymphoma; diagnostic challenge; case report

Introduction

Breast cancer is the most prevalent malignancy among women worldwide and remains a leading cause of cancer-related mortality, accounting for nearly one in four cancer cases in females[1]. The vast majority of breast tumors arise from epithelial tissue, with invasive ductal carcinoma being the most common histological subtype. In contrast, hematolymphoid neoplasms involving the breast are exceedingly rare, representing less than 0.5% of all breast malignancies and less than 2% of extranodal non-Hodgkin lymphomas[2]. Despite their rarity, lymphomas of the breast are of particular clinical importance because they may closely mimic the presentation of more common breast carcinomas, thereby creating substantial diagnostic and therapeutic challenges.

The clinical presentation of breast lymphoma often overlaps with that of breast carcinoma. Patients typically present with a rapidly enlarging, painless breast mass, occasionally associated with axillary or supraclavicular lymphadenopathy. Constitutional "B-symptoms," such as fever, night sweats, and weight loss, may also be present, though not consistently[3]. On imaging, breast lymphomas often manifest as hypoechoic solid lesions with suspicious margins on ultrasonography, or as BIRADS 4–5 lesions, which are conventionally interpreted as highly suggestive of carcinoma[4]. Furthermore, serum tumor markers such as CA 15-3, widely employed in breast cancer diagnosis and monitoring, lack specificity and may be elevated in both benign conditions and hematological malignancies, adding further diagnostic complexity[5].

Histopathological analysis with immunohistochemistry (IHC) is therefore indispensable for establishing a definitive diagnosis. While invasive breast carcinoma is characterized by epithelial markers (e.g., cytokeratin), breast lymphoma typically expresses lymphoid markers such as CD20 or CD3 depending on the subtype. This distinction is not only of academic interest but also of crucial therapeutic relevance, as management strategies differ profoundly. Breast carcinoma is primarily managed with surgical resection followed by systemic chemotherapy, radiotherapy, or hormonal therapy, whereas lymphoma is treated with systemic chemotherapy and immunotherapy, with surgery playing virtually no therapeutic role. Hence, misdiagnosis may lead to unnecessary mastectomy, delay in appropriate systemic therapy, and ultimately worse patient outcomes[6].

The diagnostic dilemma is further magnified in young patients, where breast carcinoma itself is less common, and alternative diagnoses such as sarcoma or lymphoma should be considered. Extranodal presentation of hematolymphoid neoplasms in sites such as the palatum or bone marrow, as in the present case, may provide important diagnostic clues but may also be overlooked in the initial evaluation. Advanced radiological findings, including widespread skeletal and intracranial involvement, can reinforce the impression of metastatic carcinoma, leading to potential diagnostic momentum towards an incorrect diagnosis.

Here, we present the case of a 29-years-old woman with a breast mass, extensive bone lesions, and extranodal involvement, initially suspected to represent advanced

breast carcinoma with metastases. Subsequent tissue diagnosis revealed a hematolymphoid neoplasm, underscoring the importance of maintaining a broad differential diagnosis in young patients with atypical features. This report highlights the diagnostic pitfalls, discusses the clinical overlap between breast carcinoma and breast lymphoma, and emphasizes the necessity of histopathological confirmation before establishing a final diagnosis.

Materials and Methods

This study was designed as a descriptive case report focusing on the diagnostic process and pathological evaluation of a rare hematolymphoid neoplasm involving the breast that clinically and radiologically mimicked advanced breast carcinoma. The subject of this report was a 29-year-old woman who presented to a tertiary referral hospital with a progressively enlarging right breast mass accompanied by systemic and neurological manifestations. Clinical data were collected retrospectively from the patient's medical records, including demographic information, presenting

symptoms, laboratory findings, radiological examinations, pathological results, and diagnostic procedures. All assessments were conducted as part of routine clinical care, and the case was analyzed to highlight diagnostic challenges and methodological considerations in differentiating breast carcinoma from hematolymphoid malignancies.

A comprehensive clinical evaluation was performed upon admission, including detailed history taking and physical examination. Particular attention was given to the characteristics of the breast mass, neurological complaints such as back pain and paraparesis, and the presence of extranodal manifestations, including palatal swelling and generalized lymphadenopathy. Laboratory investigations included complete blood count, biochemical profile, and tumor marker analysis, with serum CA 15-3 levels measured to assess the possibility of breast carcinoma. These laboratory data were used to support the initial clinical impression and guide further diagnostic workup.

Radiological assessment constituted a major component of the diagnostic methodology. Breast ultrasonography was performed to evaluate the morphology, margins, echogenicity, and vascularity of the breast lesion, and findings were categorized according to the Breast Imaging Reporting and Data System (BIRADS). Magnetic resonance imaging (MRI) was subsequently conducted to assess the extent of local breast involvement, spinal pathology related to neurological symptoms, and possible metastatic spread. MRI evaluation included assessment of bone marrow signal intensity, vertebral involvement, skull base infiltration, and soft tissue extension. Additional imaging studies were used to identify extranodal disease and lymphadenopathy, providing a comprehensive overview of systemic involvement and contributing to the initial suspicion of advanced-stage breast carcinoma with widespread metastases.

Tissue diagnosis was obtained through fine-needle aspiration biopsy (FNAB) as a minimally invasive yet informative diagnostic technique. FNAB specimens were collected from multiple sites, including the breast mass, palatal lesion, and enlarged cervical lymph nodes, in order to assess the possibility of a primary breast malignancy versus a systemic disease process. Aspirated samples were processed for cytological examination using standard staining techniques, and microscopic evaluation was performed by experienced pathologists. Cytomorphological features such as cell size, nuclear contour, chromatin pattern, nucleoli prominence, and cytoplasmic characteristics were carefully analyzed, with particular emphasis on identifying features consistent with malignant round cell tumors.

To further characterize the nature of the neoplastic cells and establish the lineage of the malignancy, immunohistochemical (IHC) analysis was performed on cytology cell blocks. A panel of immunohistochemical markers was selected to differentiate between epithelial and hematolymphoid origins. Cytokeratin staining was used to evaluate epithelial differentiation and exclude primary breast carcinoma, while lymphoid markers, including CD4, were applied to assess lymphoid lineage. Immunoreactivity patterns were interpreted according to established diagnostic criteria, and the combination of negative cytokeratin expression with diffuse CD4 positivity was considered diagnostic of a hematolymphoid neoplasm. These immunohistochemical findings were correlated with cytomorphology and clinical presentation to reach a definitive diagnosis.

All diagnostic data, including clinical, radiological, cytological, and immunohistochemical findings, were integrated through a multidisciplinary discussion involving clinicians, radiologists, and pathologists. This integrative approach was essential to reassess the initial diagnosis and avoid misclassification of the disease as metastatic breast carcinoma. The methodological focus of this case report was to emphasize the importance of histopathological confirmation and immunophenotyping in young patients with atypical breast masses and extensive systemic involvement. Ethical considerations were observed throughout the study, with patient anonymity preserved, and the report was prepared in accordance with established guidelines for medical case reporting.

Result and Discussion

A 29-years-old woman, previously healthy, was referred to our institution with complaints of progressive back pain and inability to ambulate. The symptoms began three weeks prior to admission, following a history of minor trauma from slipping in the bathroom. Initially, the patient remained ambulatory but reported worsening bilateral lower limb weakness accompanied by severe lumbar pain, which subsequently limited her mobility. At presentation, she also noted the presence of a lump inside her oral cavity causing dysarthria, and a right breast mass detected incidentally during hospitalization. There were no constitutional "B-symptoms" such as weight loss, fever, or night sweats. The patient denied a personal or family history of malignancy, diabetes, or hypertension. Obstetric history revealed menarche at age 12, regular menstruation, two full-term pregnancies with breastfeeding for two years each, and a history of contraceptive injection use for nine years.

On physical examination, the patient was alert (GCS 15), with stable vital signs. General examination showed no pallor or jaundice. Local examination revealed a firm, irregular 3 × 3 cm mass on the soft palate, fixed to the underlying tissue. Breast examination demonstrated a solid, non-tender, mobile mass at the 12 o'clock position of the right breast, measuring 6 × 5 cm, with no skin changes, nipple retraction, or ulceration. No axillary lymphadenopathy was identified, but supraclavicular lymph nodes were palpable bilaterally. Neurological examination revealed paraparesis associated with tenderness over the lumbar spine.

Laboratory findings showed leukocytosis (14,600/μL), normocytic anemia (Hb 7.4 g/dL), and elevated lactate dehydrogenase (LDH 531 U/L). Tumor markers revealed elevated CA 15-3 (115 U/mL; reference < 26.2 U/mL), while CEA and AFP were within normal ranges. Serum electrolytes and renal function were unremarkable. Chest radiography was normal. X-rays of the lumbosacral spine revealed severe compression fracture at L2, while pelvic imaging demonstrated osteolytic lesions of the right inferior pubic ramus. Whole-body bone survey confirmed multiple osteolytic lesions suggestive of metastatic disease.

Magnetic resonance imaging (MRI) of the head and orbit demonstrated marrow infiltration with a mass involving the sphenoid wing, clivus, and nasopharynx extending into the palatum, with mass effect on the optic chiasm. MRI of the pelvis revealed destructive lesions in the sacrum, iliac bones, and femoral head, consistent with a malignant infiltrative process. MRI of the whole spine showed extensive marrow replacement at L1–L3 with severe L2 collapse, associated with paraspinal soft tissue extension, as well as a right breast mass and left renal lesion suspicious for metastasis.

Ultrasonography of the breast categorized the right breast lesion as BIRADS 4B (moderately suspicious for malignancy). Neck ultrasonography demonstrated multiple malignant-appearing lymphadenopathies in submandibular, submental, and perijugular regions. Abdominal ultrasonography excluded visceral metastasis, aside from mild left hydronephrosis.

Fine-needle aspiration biopsy (FNAB) was performed on the breast, palate, and cervical lymph node masses. Cytological evaluation revealed features consistent with a hematolymphoid neoplasm, with differential diagnoses including non-Hodgkin lymphoma, most likely anaplastic large cell lymphoma, versus epithelioid sarcoma. Immunohistochemical studies were pending at the time of reporting.

The initial working diagnosis was advanced right breast carcinoma (T3N3cM1) with extensive bone and cranial involvement. However, FNAB raised suspicion for hematolymphoid malignancy, shifting the diagnostic approach. The patient was managed with multimodal supportive care, including intravenous fluids, analgesics (tramadol and paracetamol-codeine), gabapentin, nutritional supplementation, and physical rehabilitation. Orthopedic consultation recommended transpedicular biopsy and thoracolumbosacral orthosis for spinal stabilization. Multidisciplinary input from neurology, ENT, ophthalmology, and internal medicine was sought to address multisystem involvement.

At the time of manuscript preparation, the patient remained hospitalized, awaiting open biopsy of the breast and palate for definitive histopathological confirmation. The diagnostic ambiguity between advanced breast carcinoma and hematolymphoid neoplasm posed a significant challenge in establishing optimal treatment strategy.

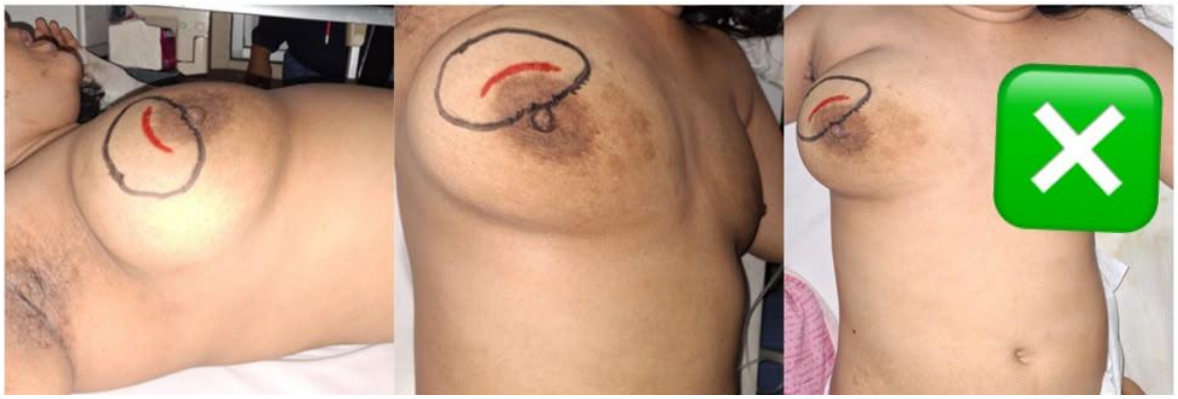

Figure 1*.Clinical examination of the right breast showing a palpable solid mass without skin retraction or ulceration*

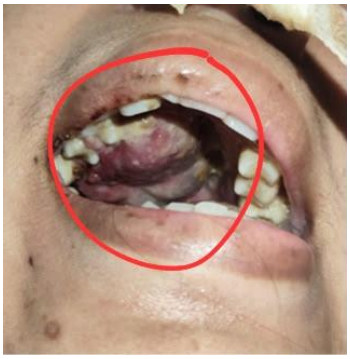

Figure 1*. Intraoral examination showing an irregular, firm mass on the soft palate.*

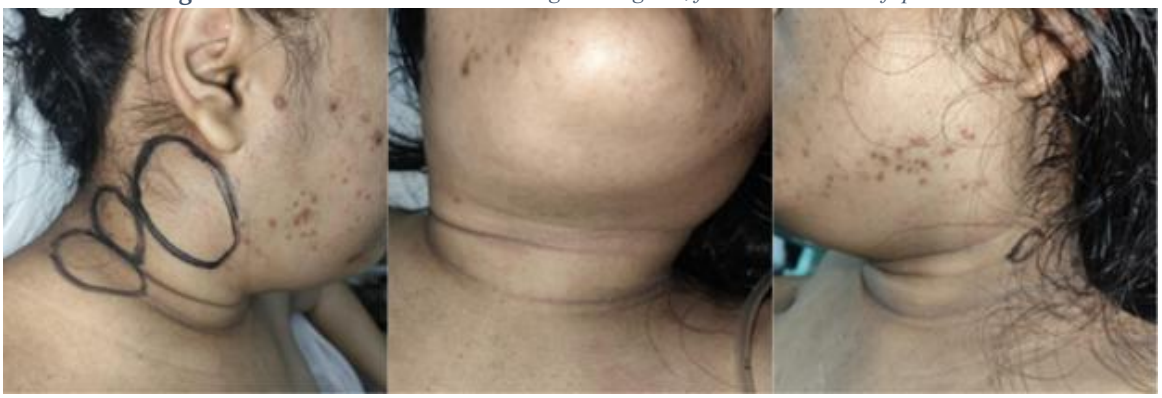

Figure 3*. Clinical photograph of the cervical region demonstrating enlarged right supraclavicular lymphadenopathy.*

On July 28, 2025, she experienced seizures and decreased consciousness, requiring intubation with an endotracheal tube (ETT). Since then, she remained ventilator-dependent. Clinical examination revealed a weak general condition, GCS under sedation, tachycardia (145/min), tachypnea (41/min), fever (39°C), and oxygen saturation of 99% on ventilator support. The palatal mass was firm, irregular, and fixed, while the right breast mass was solid, mobile, with irregular surface but no skin ulceration or nipple retraction.

Advanced imaging was performed to evaluate the extent of disease. A bone survey revealed compression fracture of the L2 vertebra and multiple osteolytic lesions in the pelvic bones. MRI of the pelvis showed cortical destruction involving the right inferior pubic ramus, sacrum, iliac wings, and femoral head, suspicious for metastatic disease. Whole-spine MRI confirmed malignant infiltration of L1–L3 with severe L2 collapse, associated paraspinal soft tissue masses, and compression of the spinal canal. MRI of the brain and nasopharynx demonstrated malignant lesions involving the sphenoid wings, clivus, ethmoid and sphenoid sinuses, extending into the nasopharynx, palate, and sella turcica, causing posterior displacement of the pons. Additional findings included pulmonary nodules at the left lung apex, renal involvement, and malignant lymphadenopathy in the cervical region.

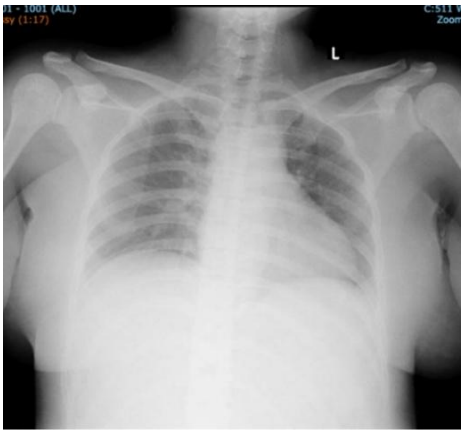

Figure 2. *Chest radiograph (PA view) demonstrating normal cardiac and pulmonary silhouettes.*

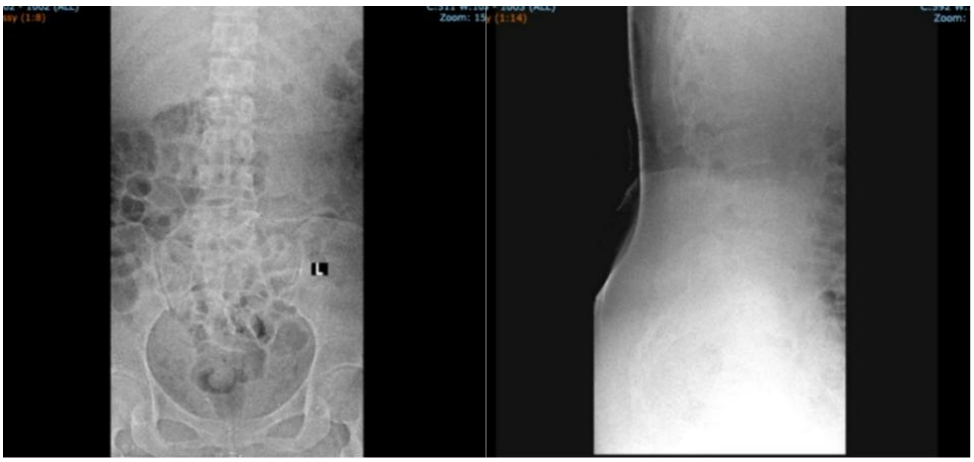

Figure 3*. Lumbar spine radiograph (AP/lateral views) showing severe compression of L2 vertebral body with narrowing of the L1–L2 intervertebral space.*

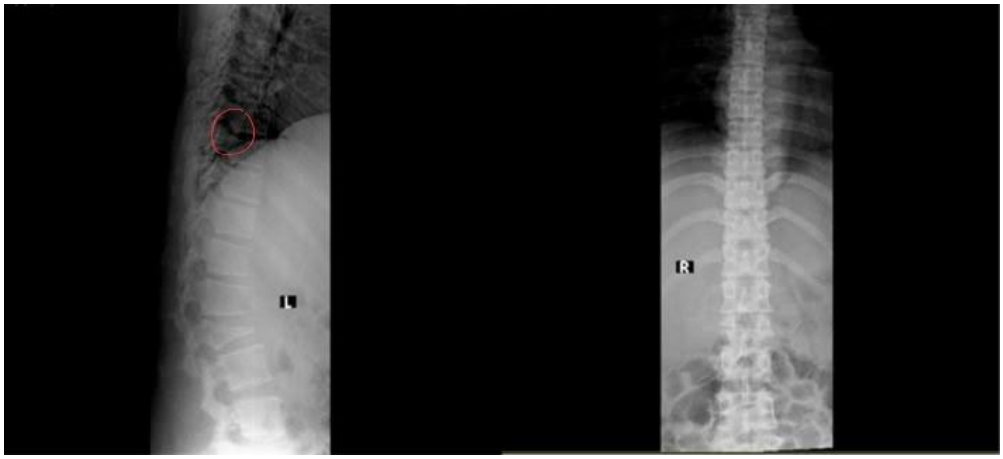

***Figure 4**. Thoracic spine radiograph (AP/lateral views) demonstrating vertebral compression deformity and straightened thoracic alignment.*

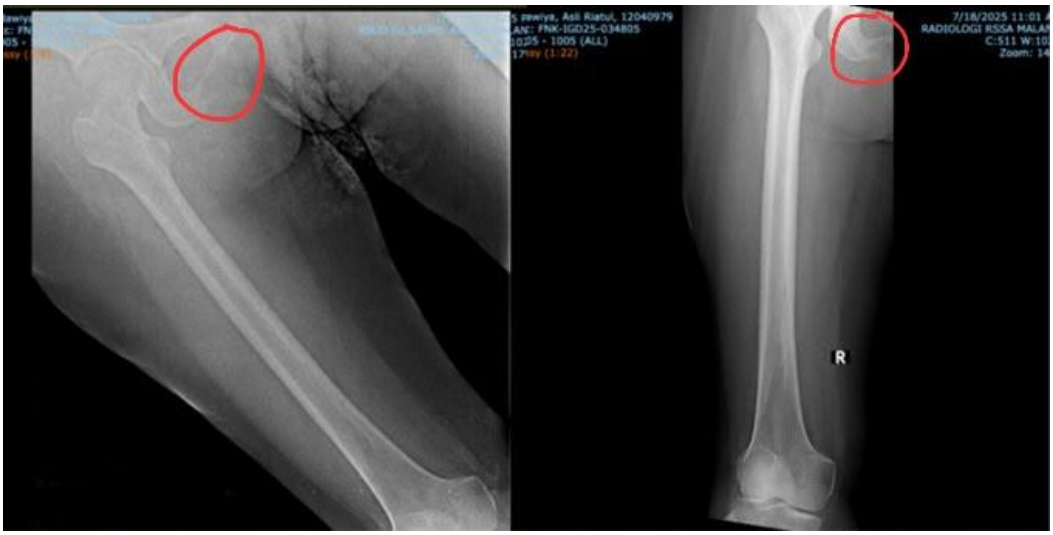

***Figure 5**. Femur radiograph (AP/lateral views) showing osteolytic lesion at the inferior pubic ramus on the right side.*

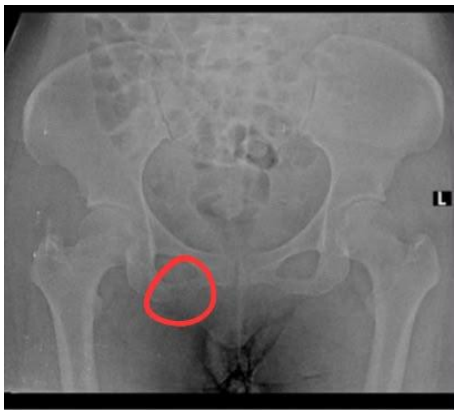

***Figure 6**. Pelvic radiograph demonstrating osteolytic lesions at the right inferior pubic ramus.*

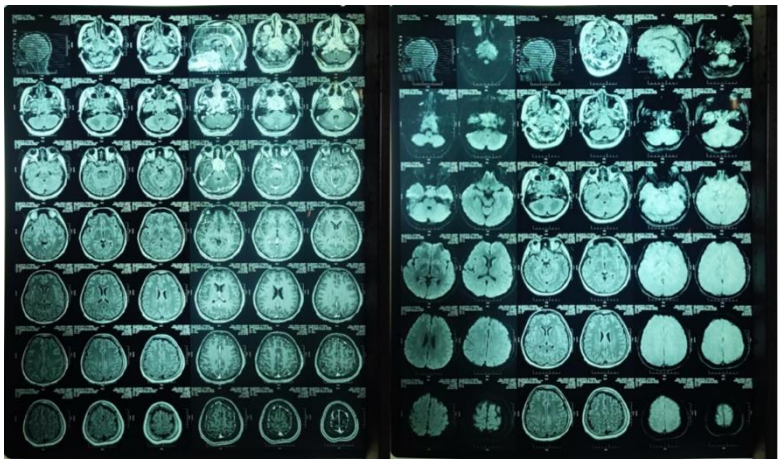

Figure 7. *MRI of the head and orbits demonstrating bone marrow changes with a bulging mass involving the sphenoid wings, clivus, atlas, and sphenoid sinus walls, extending into the nasopharynx and palate, suggestive of metastatic disease.*

Magnetic resonance imaging (MRI) of the brain and orbit with contrast revealed extensive bone marrow changes, characterized by a hypointense signal on T1-weighted imaging, hyperintense signal on T2WI/FLAIR, diffusion restriction on DWI, and blooming on SWI sequences. A bulging infiltrative mass was identified involving the right sphenoid wing, clivus, atlas, and bilateral walls of the sphenoid sinus, with extension into the nasopharyngeal region and both the soft and hard palate, resulting in compression of the optic chiasm. Orbital extension was also noted, with enlargement of the extraocular muscles (particularly the inferior, medial, and superior rectus muscles) although the optic nerve itself appeared uninvolved.

The lesion demonstrated an aggressive infiltrative nature highly suspicious for metastatic process, correlating with the patient's clinical presentation of multiple cranial nerve palsies (III, IV, VI) and an intraoral palatal mass. No evidence of midline shift was observed, and the ventricular system, cisterns, mesencephalon, pons, and cerebellum remained unremarkable. An additional finding of hyperintense T2WI/FLAIR signal within the left mastoid air cells was consistent with left-sided mastoiditis.

Taken together, the MRI findings strongly supported the presence of an infiltrative malignant lesion with metastatic characteristics at the skull base, extending to the nasopharynx, palate, and orbital structures, consistent with the clinical suspicion of hematolymphoid neoplasm in this patient.

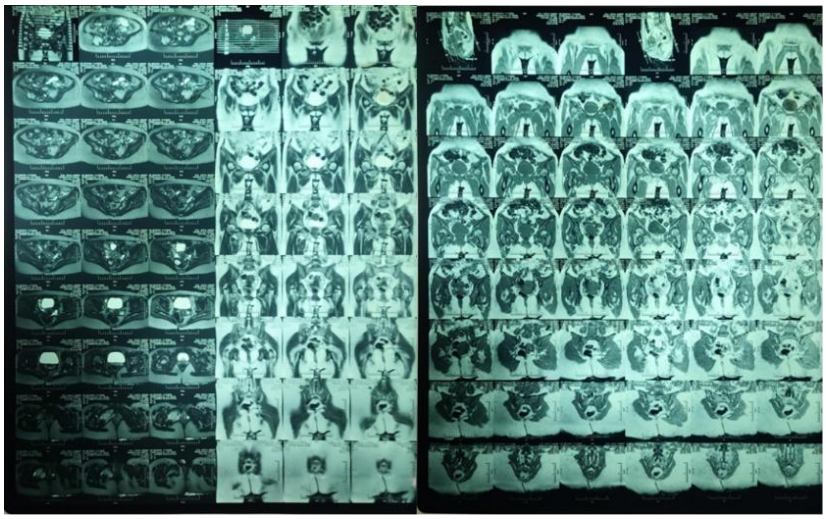

***Figure 8**. Pelvic MRI demonstrating bulging masses with cortical destruction of the inferior right pubic ramus, sacral ala, iliac wing, and bilateral ilium involving the sacroiliac joints, consistent with metastatic lesions.*

Magnetic resonance imaging (MRI) of the pelvis, performed with axial, sagittal, and coronal sections using T1WI, T2WI, STIR, and contrast-enhanced sequences, revealed the presence of a bulging mass with cortical destruction. The lesion demonstrated iso-intense signals on T1WI/T2WI/FS, diffusion restriction on DWI, and significant post-contrast enhancement, indicating an aggressive infiltrative nature. The mass involved the inferior aspect of the right pubic bone, bilateral sacrum (S1–S3), right and left iliac wings, as well as the sacroiliac joint (predominantly on the right side), and extended to the neck and head of the right femur, suggestive of a metastatic process.

The uterus was within normal limits, with no evidence of abnormal endometrial or vaginal extension. Both ovaries were visualized: the right ovary measured 2.7 × 2.2 cm, and the left ovary 3.2 × 3.0 cm; neither demonstrated suspicious pathological masses, though multiple ovarian cystic lesions of normal size were noted bilaterally. The urinary bladder was adequately distended with smooth walls and without evidence of stones or focal masses.

Taken together, the imaging findings demonstrated a destructive, infiltrative pelvic lesion with multifocal skeletal involvement and high suspicion for metastasis, while pelvic visceral organs, including the uterus and ovaries, remained structurally preserved.

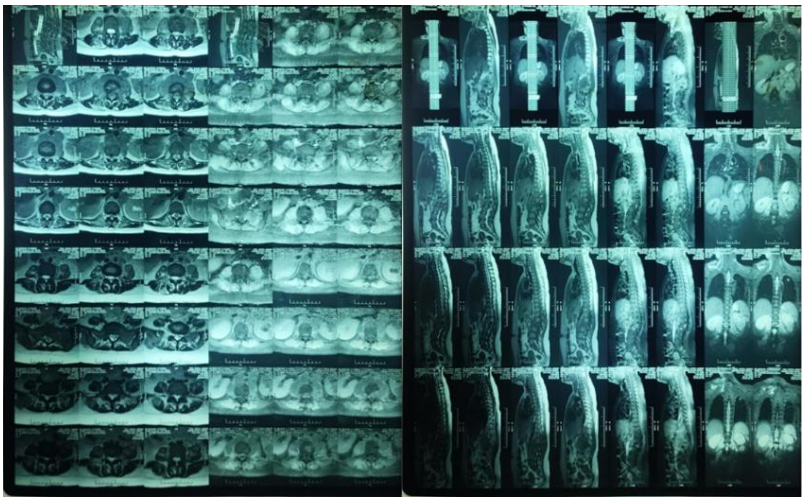

Figure 9*. Whole-spine MRI demonstrating malignant nasopharyngeal mass with extension into the skull base and palate, multiple malignant-appearing spinal lesions with severe L2 compression fracture, paraspinal soft tissue involvement, and no additional metastatic*

Magnetic resonance imaging (MRI) of the whole spine (cervical, thoracic, and lumbosacral regions) with contrast demonstrated widespread pathological findings. There was evidence of multiple lymphadenopathies, some conglomerated, with iso- to hypointense signals on T1WI/T2WI, restricted diffusion on DWI, and heterogeneous enhancement after contrast administration, most prominently at levels L1–L2, L2–L3, and L4–L5, extending into the paravertebral region.

A large infiltrative mass was identified involving the nasopharyngeal region, extending to the hard palate, clivus, ethmoid sinus, and bilateral sphenoid sinus, with further infiltration into the sella turcica causing compression of the optic chiasm. In the vertebral column, a destructive lesion was noted at corpus vertebrae L2, accompanied by cortical destruction and a bulging component infiltrating the right psoas muscle and bilateral erector spinae musculature, highly suggestive of malignant infiltration.

Cervical evaluation showed mild kyphotic alignment with degenerative changes at the C4–C5, C5–C6, and C6–C7 levels, associated with bulging discs but without cord compression. The thoracic spine demonstrated preserved alignment and height of vertebral bodies, with small osteophytes noted along the anterior corpus vertebrae. In the lumbar region, degenerative changes were also present at L4–L5 and L5–S1, with horizontal bulging discs extending to the epidural space, consistent with Pfirrmann grade II degeneration. The conus medullaris terminated at the T12 level without evidence of abnormal intramedullary signal changes.

Taken together, the MRI findings indicated an aggressive malignant process with diffuse infiltration, including the skull base, nasopharynx, and vertebral column, accompanied by widespread bone marrow involvement and secondary muscular extension. Additional degenerative disc disease in the cervical and lumbar spine was identified as incidental findings.

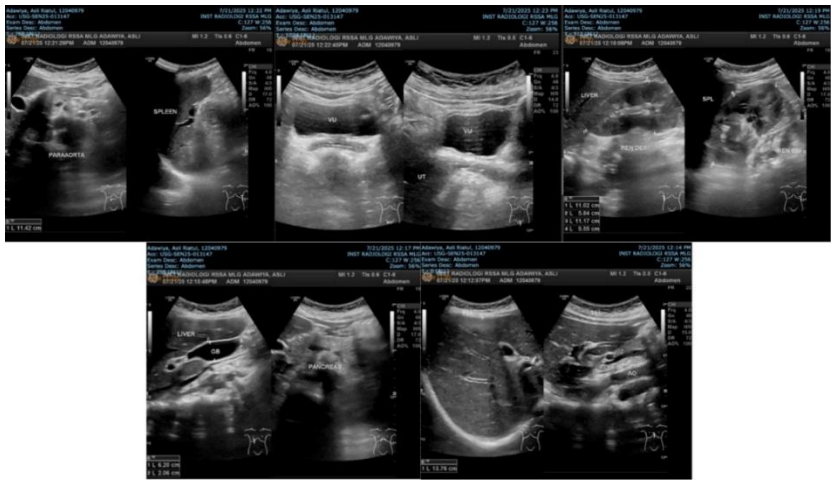

***Figure 10**. Abdominal ultrasonography showing no evidence of intra-abdominal metastasis, with mild left renal hydronephrosis likely secondary to post-renal obstruction.*

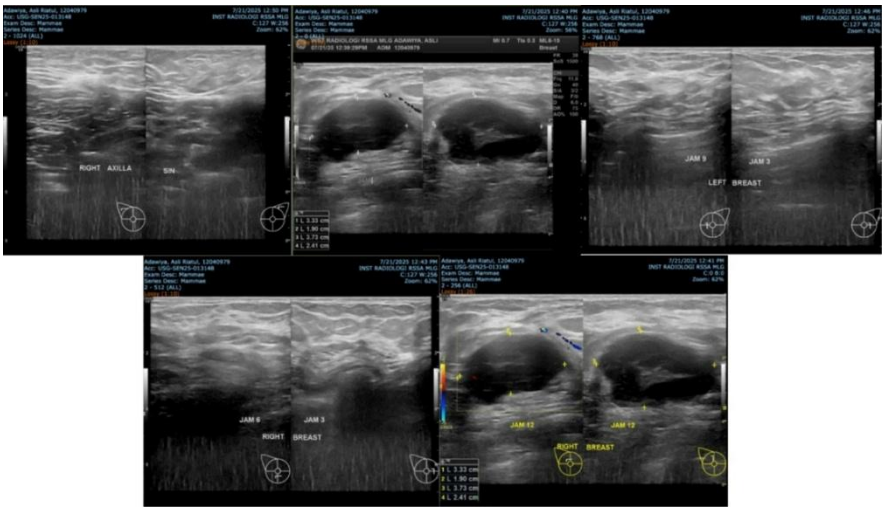

***Figure 11**. Breast ultrasonography showing a solid right breast mass, categorized as BI-RADS 4b, moderately suspicious for malignancy.*

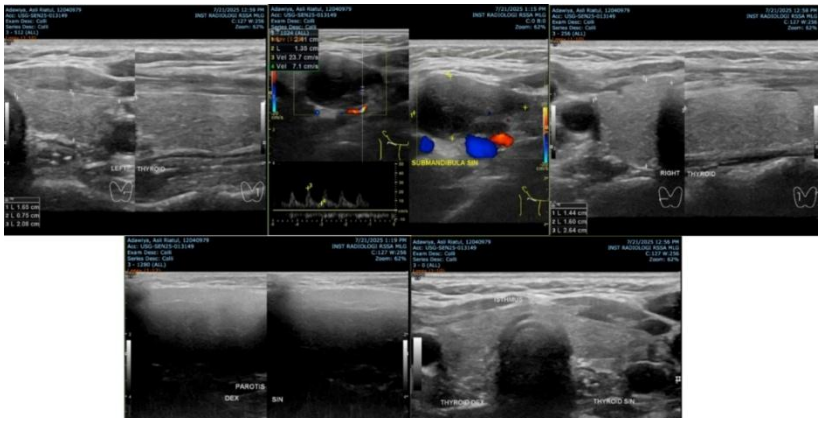

***Figure 12**. Cervical ultrasonography showing multiple malignant-appearing lymphadenopathies in the bilateral submandibular, right perijugular, and submental regions.*

Ultrasonography (USG) of the right breast performed on July 21, 2025, revealed the presence of a solid mass in the right mammary gland. The lesion was categorized as BIRADS 4b, indicating a moderate suspicion for malignancy and warranting histopathological confirmation. Abdominal ultrasonography on the same date did not demonstrate evidence of metastatic deposits within the solid intra-abdominal organs, para-aortic, or para-iliac regions bilaterally. However, a finding of mild left renal hydronephrosis was observed, consistent with a post-renal obstructive process, without signs of parenchymal destruction or additional intra-abdominal abnormalities.
Ultrasonography of the neck (colli) demonstrated multiple lymphadenopathies involving the bilateral submandibular regions, right perijugular chain, and submental nodes. The lymph nodes exhibited features highly suspicious for malignancy, including altered architecture, rounded morphology, and loss of fatty hilum, further supporting the presence of disseminated disease. Taken together, the ultrasonographic findings suggested a right breast primary mass suspicious for malignancy, with regional lymph node involvement in the cervical region but no definite evidence of intra-abdominal solid organ metastasis. These imaging results, in combination with MRI findings, supported the working diagnosis of a systemic hematolymphoid neoplasm mimicking advanced breast cancer.

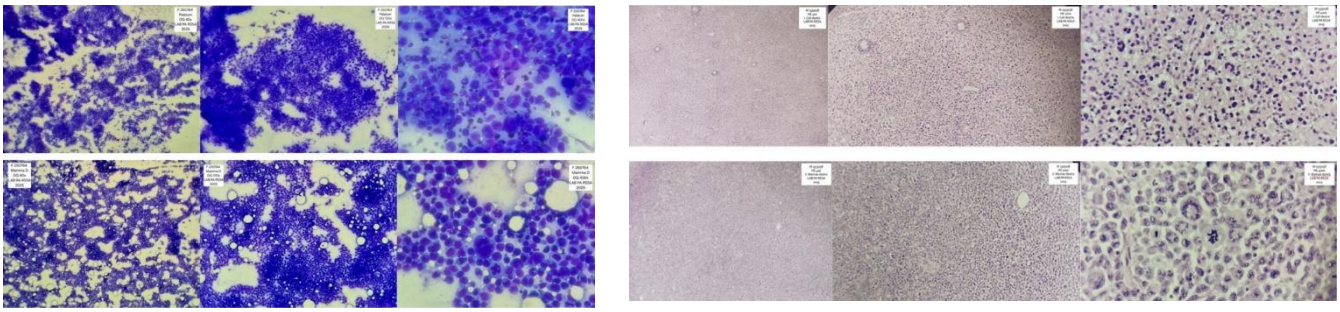

Figure 13. *Fine-needle aspiration biopsy (FNAB) of the right breast mass and right cervical lymph node performed on August 4, 2025, showing malignant round cell proliferation with pleomorphic, hyperchromatic nuclei arranged in solid sheets, suggestive of hematolympoid neoplasm..*

Histopathological examination from fine needle aspiration biopsy (FNAB) of the breast, palate, and cervical lymph nodes showed features of a hematolymphoid neoplasm, with differential diagnoses including non-Hodgkin lymphoma (particularly anaplastic large cell lymphoma) versus epithelioid sarcoma. Further immunohistochemistry was planned to establish definitive diagnosis.
Histopathological evaluation was performed on two biopsy specimens obtained from the right cervical lymph node and the right breast mass. On gross examination, the specimen from the right cervical lymph node consisted of a whitish-gray tissue fragment measuring approximately 1.5 × 1.0 × 0.7 cm, with a firm consistency but partially friable texture, suggesting degenerative changes within the nodal architecture. The breast specimen, in contrast, appeared larger, measuring 4.2 × 5.1 cm, whitish-yellow in color, and firm in consistency, resembling a solid mass lesion.
Microscopically, the cervical lymph node tissue demonstrated almost complete effacement of the normal nodal architecture, replaced by areas of extensive necrosis interspersed with sheets of atypical neoplastic cells. The tumor cells were arranged in a solid sheet-like pattern, composed

predominantly of round-to-oval cells with marked pleomorphism. The nuclei appeared hyperchromatic with irregular nuclear membranes and coarse chromatin, and mitotic figures were frequently observed, indicating a high proliferative index. In the surrounding stroma, an admixture of inflammatory infiltrates was present, consisting of lymphocytes, histiocytes, and scattered neutrophils, further reflecting the aggressive biological behavior of the lesion.

Similarly, the biopsy from the right breast revealed diffuse replacement of the normal mammary architecture by a densely cellular neoplasm arranged in solid sheets. The tumor cells closely resembled those seen in the cervical lymph node, with round-to-oval morphology, pleomorphic and hyperchromatic nuclei, irregular nuclear contours, and coarse chromatin distribution. The cytoplasm was scant, and nuclear-cytoplasmic ratio appeared high. Multifocal areas demonstrated infiltration of small lymphocytes within the tumor stroma, suggesting a host immune response. The overall histomorphological picture of both specimens was highly suggestive of a malignant round cell tumor.

From a diagnostic perspective, the cervical lymph node lesion was interpreted as a malignant round cell tumor with extensive necrosis, in which the possibility of a primary lesion versus metastatic involvement remained to be clarified. The breast lesion, on the other hand, showed features consistent with a malignant round cell tumor, with the differential diagnosis including lymphoma versus poorly differentiated carcinoma. Given the overlapping histological appearances, the case highlights the difficulty in establishing a precise diagnosis based solely on morphology.

Immunohistochemical (IHC) staining was performed to further characterize the tumor. Cytokeratin (CK) expression was found to be negative in the cytoplasm of the tumor cells, suggesting the absence of epithelial differentiation. In contrast, CD4 showed diffuse positivity on the membranes of the tumor cells, indicating a lymphoid origin consistent with T-cell lineage. These findings support the diagnosis of a neoplastic process derived from CD4-positive lymphoid cells rather than an epithelial tumor.

Discussion

Breast masses in young women are frequently suspected as primary breast carcinoma, particularly when associated with extensive metastases. However, hematolymphoid neoplasms such as non-Hodgkin lymphoma (NHL) may rarely present with breast involvement, either as a primary extranodal lymphoma of the breast or secondary to systemic disease. These conditions often mimic advanced breast carcinoma both clinically and radiologically, thus posing significant diagnostic challenges.

In this patient, the initial impression was advanced breast carcinoma (cT3N3cM1) due to the presence of a large palpable breast mass, supraclavicular lymphadenopathy, and multiple osteolytic lesions on radiological evaluation. The markedly elevated CA 15-3 level further strengthened the suspicion of metastatic breast carcinoma. Nevertheless, fine-needle aspiration biopsy (FNAB) from the breast and palatal mass suggested a hematolymphoid neoplasm, with differential diagnoses including anaplastic large cell lymphoma (ALCL) and epithelioid sarcoma. Lymphoma involving the breast accounts for less than 0.5% of all breast malignancies and approximately 2% of extranodal lymphomas[3]. Secondary breast lymphoma is more common than primary breast lymphoma and typically occurs in the setting of disseminated disease[7]. Clinically, both entities often present as painless, mobile breast masses, indistinguishable from breast carcinoma[8]. Radiologically, ultrasonography and mammography may demonstrate a solid mass

classified as BIRADS 4–5, but these findings are nonspecific[9]. Therefore, tissue biopsy with immunohistochemistry (IHC) remains essential for definitive diagnosis.

In this case, the extensive involvement of bone marrow, cranial base, vertebrae, and pelvic bones is consistent with disseminated hematolymphoid malignancy. The presence of a palatal mass and multiple cervical lymphadenopathies further supports lymphoma rather than primary breast carcinoma, as extranodal involvement in the head and neck region is a well-recognized feature of NHL[10].

Anaplastic large cell lymphoma (ALCL), particularly the ALK-positive subtype, frequently affects young patients and can present with extranodal disease, including breast and bone involvement[11]. Immunophenotypic markers such as CD30 positivity and ALK expression are crucial in distinguishing ALCL from other hematolymphoid or sarcomatous neoplasms. Conversely, epithelioid sarcoma remains a less likely diagnosis given the pattern of disseminated lymphadenopathy and bone marrow changes, although it must still be excluded histopathologically.

This case underscores the importance of considering hematolymphoid neoplasms in the differential diagnosis of young patients presenting with breast masses and widespread systemic lesions. Misdiagnosis as breast carcinoma could lead to unnecessary surgical intervention and delayed initiation of systemic chemotherapy, which remains the mainstay of treatment for lymphoma[12].

The diagnostic challenge in this case lies in the overlapping clinical and radiological characteristics between advanced breast carcinoma and hematolymphoid neoplasms. Breast carcinoma with bone metastasis typically presents with osteolytic lesions, pathological fractures, and supraclavicular lymphadenopathy, all of which were evident in this patient. Furthermore, the elevated serum CA 15-3 initially reinforced the suspicion of metastatic breast cancer. However, it is important to note that tumor markers lack specificity; CA 15-3 may also be elevated in non-breast malignancies and certain benign conditions[5]. Similarly, radiological findings such as a solid breast mass categorized as BIRADS 4B are not pathognomonic for carcinoma, as lymphomas may present with comparable imaging features[2].

The presence of extranodal disease in atypical sites—such as the palatum, clivus, and extensive bone marrow involvement—raises suspicion of a systemic hematolymphoid malignancy rather than primary breast cancer. Nevertheless, in routine clinical practice, the diagnostic momentum often favors the more common entity, i.e., carcinoma of the breast. This emphasizes the critical role of histopathological confirmation with immunohistochemistry in distinguishing between epithelial and lymphoid neoplasms. Delay in accurate diagnosis could result in inappropriate management, such as unnecessary mastectomy or delay in chemotherapy initiation, both of which negatively impact prognosis. Therefore, clinicians must maintain a high index of suspicion and pursue tissue confirmation in all suspected cases of breast malignancy with atypical clinical features.

Prognosis in breast lymphoma differs substantially from that of primary breast carcinoma. While metastatic breast cancer with widespread skeletal and extranodal involvement usually carries a poor outcome with limited survival, systemic lymphoma, even with disseminated disease, may still achieve long-term remission with appropriate systemic therapy[6]. In diffuse large B-cell lymphoma (DLBCL), the most common subtype of breast lymphoma, standard immunochemotherapy with rituximab-CHOP has led to 5-year overall survival rates of approximately 70% in localized disease, but outcomes decline significantly in advanced stages[12].

Anaplastic large cell lymphoma (ALCL), particularly ALK-positive, generally confers a more favorable prognosis compared to ALK-negative cases, with reported 5-year survival rates ranging from 60–80%[11]. However, extranodal involvement of the central nervous system and extensive skeletal disease, as observed in this patient, are adverse prognostic factors associated with higher relapse risk and reduced survival[13].

Importantly, early and accurate diagnosis directly impacts prognosis. Misclassification as breast carcinoma may result in unnecessary surgical procedures and delayed initiation of systemic chemotherapy, thereby worsening outcomes[14]. This case highlights that, despite extensive disease burden mimicking advanced breast carcinoma, lymphoma remains a potentially more treatable malignancy if correctly identified and promptly managed.

Breast imaging findings in this case highlight one of the central diagnostic pitfalls: the inability to reliably differentiate lymphoma from carcinoma on conventional modalities. On ultrasonography, breast lymphomas often appear as oval or irregular hypoechoic solid masses with indistinct margins and variable vascularity, features that substantially overlap with invasive carcinoma. Consequently, a BIRADS 4B classification, as seen in this patient, can mislead the clinical team toward a diagnosis of primary breast carcinoma unless histopathological confirmation is pursued promptly[15].

Magnetic resonance imaging, particularly whole-body MRI, has emerged as a valuable tool for the evaluation of systemic disease burden. In recent years, WB-MRI has demonstrated superior sensitivity compared to conventional skeletal surveys and CT in detecting marrow infiltration and multifocal skeletal disease, making it highly suitable for the assessment of lymphomas and hematologic malignancies. In this patient, the demonstration of widespread osseous infiltration across the skull base, spine, pelvis, and long bones more closely paralleled the disseminated infiltration typical of hematolymphoid neoplasms rather than the focal skeletal metastases usually associated with advanced breast carcinoma[16].

Interpreting marrow changes on MRI, however, requires a nuanced understanding of marrow physiology. Differentiating malignant infiltration from normal red marrow or red marrow reconversion is essential, as both can mimic neoplastic involvement. Pathological infiltration is generally characterized by diffuse T1 hypointensity, STIR hyperintensity, restricted diffusion, and avid contrast enhancement, whereas physiologic marrow tends to maintain more heterogeneous signal characteristics. Advanced techniques such as chemical-shift imaging and diffusion-weighted imaging further improve specificity. In this case, the diffuse marrow replacement pattern and accompanying cortical destruction were consistent with a malignant process, in alignment with published imaging criteria for bone marrow lymphoma[17].

The involvement of the skull base and central nervous system further reinforced the suspicion of hematolymphoid neoplasm. Secondary CNS involvement is more characteristic of aggressive lymphomas than of breast carcinoma metastases, and imaging often reveals patterns of diffuse infiltration affecting the cranial base, paranasal sinuses, and cranial nerves. This correlates with the clinical presentation of cranial neuropathies such as diplopia and ptosis in our patient. Recent neuroradiological studies emphasize that recognition of these characteristic infiltration patterns is vital for differentiating lymphoma from carcinoma and ensuring timely workup with histopathology and immunohistochemistry[18].

Ultimately, the role of immunophenotyping is pivotal in resolving the diagnostic dilemma. Morphology alone cannot reliably distinguish poorly differentiated carcinoma from high-grade lymphoma, as both may present as malignant round cell tumors with pleomorphic nuclei, high nuclear-to-cytoplasmic ratio, and necrosis. The use of immunohistochemical markers such as

CD45 for lymphoid lineage and cytokeratin for epithelial origin is essential. Recent reviews of breast lymphoma cases highlight how rapid immunohistochemical characterization not only secures diagnostic accuracy but also drastically alters the therapeutic pathway—shifting management from surgery and breast-directed interventions toward systemic chemotherapy regimens like R-CHOP, which are highly effective in lymphoma. Failure to promptly establish this distinction may lead to inappropriate surgical management and delayed initiation of curative chemotherapy[19].

Conclusion

This case highlights the significant diagnostic challenges posed by hematolymphoid neoplasms when they mimic advanced breast carcinoma in both clinical presentation and imaging characteristics. Conventional imaging modalities, including ultrasonography and MRI, revealed features highly suspicious for carcinoma, while histopathological examination demonstrated malignant round cell tumors indistinguishable from poorly differentiated carcinoma without further immunophenotypic studies. The widespread skeletal, skull base, and nodal involvement, however, was more compatible with a systemic hematolymphoid malignancy. This underscores the critical importance of integrating multimodal imaging with timely histopathological and immunohistochemical analysis to establish an accurate diagnosis. Prompt recognition of lymphoma is essential, as the prognosis, therapeutic approach, and overall patient outcome differ substantially from that of metastatic breast carcinoma. Early multidisciplinary collaboration between radiologists, pathologists, and oncologists remains pivotal in guiding appropriate management and improving patient care.

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