

Plasma Cell Neoplasm of the Breast: A Rare Presentation of Systemic Plasma Cell Disease

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Abstract: Multiple myeloma may present with extramedullary involvement; however, breast involvement is a rare manifestation and is often indistinguishable from primary breast carcinoma or metastatic disease from a solid tumor. We report the case of a 68-year-old woman admitted with compressive neurological deficits whose diagnostic workup revealed multiple lytic lesions, bilateral breast masses, and an IgG lambda monoclonal paraproteinemia. Given the initial suspicion of metastatic breast cancer, a breast biopsy was performed, and histopathological examination demonstrated a plasma cell neoplasm. Integration of the clinical, laboratory, imaging, and histopathological findings established the diagnosis of multiple myeloma with breast involvement. This case illustrates a rare initial presentation of multiple myeloma and highlights the importance of considering plasma cell neoplasms in the differential diagnosis of breast masses associated with lytic bone lesions, thereby avoiding diagnostic delays in atypical clinical presentations.

Keywords: Multiple Myeloma; Plasma Cell Neoplasm; Breast Neoplasms; Extramedullary Disease; Case Report.

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1. Introduction

Plasma cell neoplasms comprise a spectrum of disorders that includes solitary plasmacytoma and multiple myeloma, the latter of which may present with extramedullary manifestations. Multiple myeloma is characterized by clonal proliferation of plasma cells associated with bone marrow involvement, monoclonal paraproteinemia, and frequently osteolytic bone lesions. In some cases, soft tissue infiltration may occur, resulting in extramedullary disease [1].

Breast involvement by plasma cell neoplasms is rare, whether occurring as a solitary plasmacytoma or as a manifestation of systemic disease. Clinical and imaging findings are usually nonspecific and may mimic primary breast carcinoma, making the differential diagnosis challenging [2,3]. Definitive diagnosis relies on histopathological evaluation demonstrating monoclonal plasma cell proliferation, together with appropriate integration of the clinical, laboratory, and imaging findings [4].

We report a case of breast involvement by a plasma cell neoplasm in a clinical setting suggestive of multiple myeloma, which was initially interpreted as disseminated breast malignancy.

2. Case Report

A 68-year-old woman, previously independent in her activities of daily living, with a medical history of dyslipidemia and left total knee arthroplasty, was receiving rosuvastatin and ezetimibe and had no known drug allergies. She presented to the emergency

department with a 6-week history of pain involving the left lower limb, cervical region, and right upper limb, associated with progressively worsening muscle weakness, predominantly affecting the upper extremities. She also reported the progressive enlargement of bilateral breast masses. On physical examination, her Glasgow Coma Scale score was 15. Muscle strength was graded as 1/5 in the upper limbs and 3/5 in the lower limbs.

Computed tomography, followed by magnetic resonance imaging (MRI) of the brain and cervical spine, revealed expansive lesions with imaging characteristics suggestive of meningiomas involving the left cavernous sinus and the C3–C4 cervical spine, the latter associated with spinal cord compression, prompting neurosurgical evaluation. Additional computed tomography of the spine, chest, abdomen, and pelvis demonstrated multiple lytic lesions involving the vertebral bodies, with associated soft tissue masses and intracanal and foraminal extension at the L3–L5 levels. Multiple lytic lesions were also identified in the pelvis and right humeral head, raising suspicion for secondary bone lesions. Bilateral breast masses were also documented, while no abnormalities were identified in the solid abdominal organs.

During hospitalization, the patient developed acute respiratory failure and hemodynamic instability, with echocardiographic findings consistent with acute right ventricular dysfunction. Systemic thrombolysis was administered because of suspected massive pulmonary embolism. Computed tomography pulmonary angiography subsequently confirmed thrombus within the left pulmonary artery, with lobar and subsegmental extension, and therapeutic anticoagulation was initiated. The patient remained with proximal-predominant tetraparesis affecting the upper limbs, urinary retention, and severe bone pain that was difficult to control.

Laboratory investigation revealed an increased gamma-globulin fraction on serum protein electrophoresis. Serum immunofixation identified an IgG lambda monoclonal protein. Serum free light chain analysis demonstrated a marked elevation of lambda free light chains with a decreased κ/λ ratio. Urine immunofixation likewise confirmed the presence of an IgG lambda monoclonal protein (Table 1).

Table 1. Main hematological, biochemical, and immunological parameters obtained during the diagnostic workup.

Parameter	Result
Hemoglobin	10.0 g/dL
Platelet count	$983 \times 10^9/L$
Creatinine	0.5 mg/dL
Calcium	2.37 mmol/L
Albumin	2.7 g/dL
$\beta 2$ -Microglobulin	3.9 mg/L
Lactate dehydrogenase (LDH)	391 IU/L
Immunoglobulin G (IgG)	34.83 g/L
Immunoglobulin A (IgA)	0.81 g/L
Immunoglobulin M (IgM)	0.27 g/L
Free kappa light chains	0.66 g/L
Free lambda light chains	14.94 g/L
κ/λ free light chain ratio	0.044
Serum immunofixation	IgG lambda monoclonal protein
Urine immunofixation	IgG lambda monoclonal protein

Given the presence of suspicious breast masses, a breast biopsy was performed. The patient's clinical course was unfavorable, culminating in death before completion of the diagnostic workup. Histopathological examination revealed infiltration by monoclonal plasma cells consistent with a plasma cell neoplasm (Figure 1). Immunohistochemical analysis demonstrated diffuse CD138 expression (Figure 2) and lambda light chain restriction (Figure 3), confirming plasma cell differentiation and monoclonality. There was no expression of AE1/AE3 or CD45, excluding epithelial differentiation and supporting the diagnosis of a plasma cell neoplasm. Clinical deterioration precluded bone marrow examination and further hematological characterization during life.

Figure 1. Hematoxylin and eosin (H&E)-stained section of the breast biopsy demonstrating diffuse infiltration by atypical plasma cells, consistent with a plasma cell neoplasm.

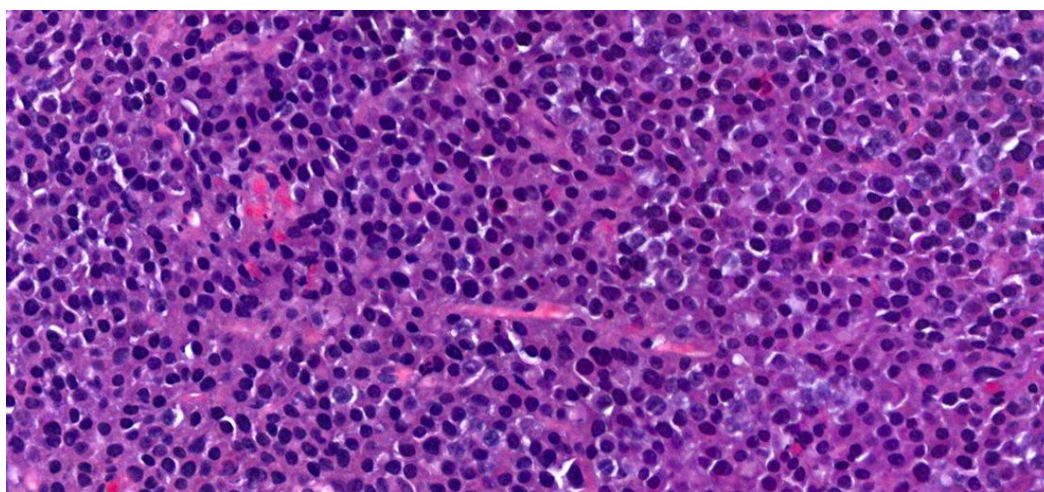
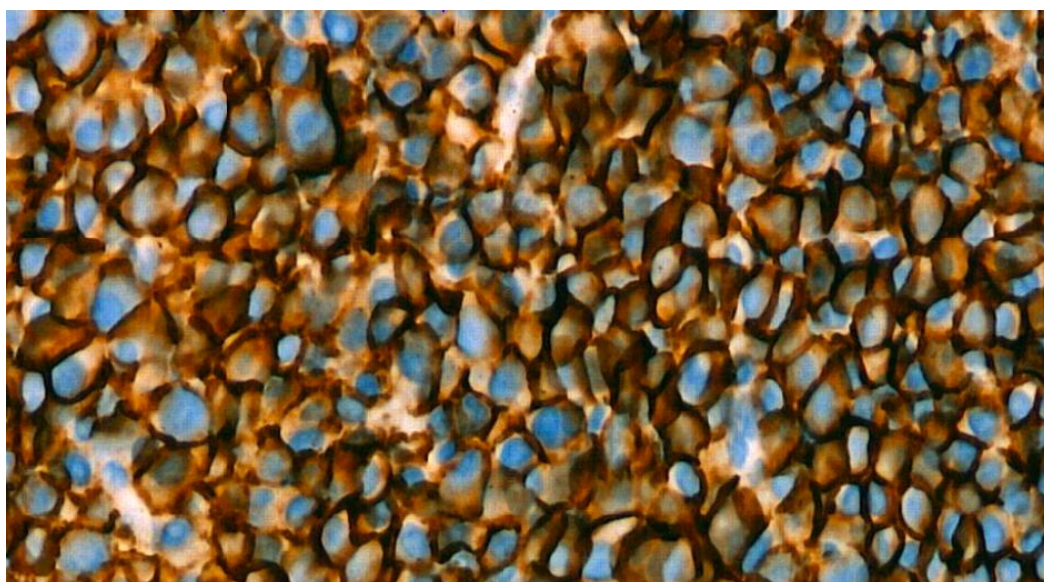
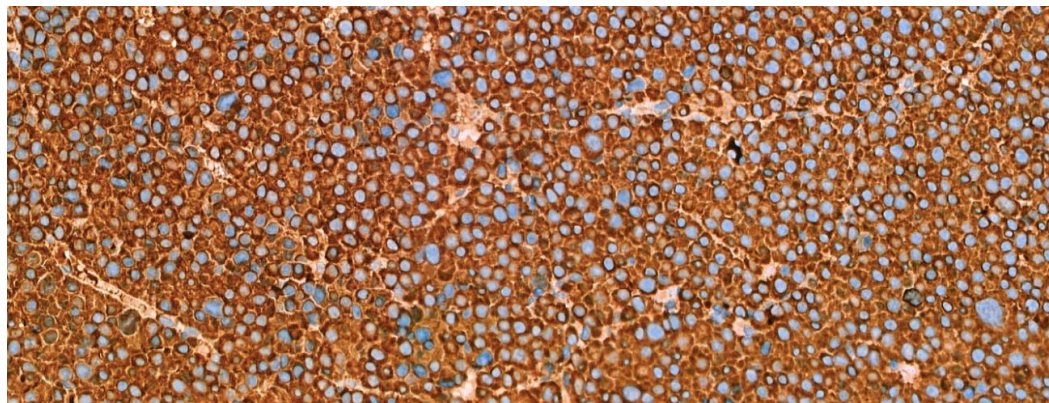


Figure 2. Immunohistochemical staining demonstrating diffuse CD138 expression by the neoplastic plasma cells.



No clinical autopsy was performed; therefore, postmortem bone marrow evaluation was not possible. Based on the clinical, laboratory, imaging, and histopathological findings obtained during hospitalization, the diagnostic integration of this case and the main challenges inherent to its interpretation merit further discussion.

Figure 3. Immunohistochemical staining demonstrating lambda light chain restriction, confirming the monoclonality of the neoplastic plasma cells.



3. Discussion

This case presents several findings suggestive of multiple myeloma with breast involvement, including multiple lytic bone lesions, IgG lambda monoclonal paraproteinemia, and bilateral breast masses. During the diagnostic workup, the rarity of breast involvement initially favored the diagnosis of metastatic primary breast carcinoma. However, integration of the clinical, laboratory, imaging, and histopathological findings led to reinterpretation of the case as multiple myeloma with extramedullary breast involvement. Histopathological examination confirmed breast infiltration by a plasma cell neoplasm. According to the International Myeloma Working Group diagnostic criteria, the combination of a histologically confirmed plasmacytoma, multiple lytic bone lesions, and IgG lambda monoclonal paraproteinemia fulfills the diagnostic criteria for multiple myeloma, with breast involvement representing an extramedullary manifestation of the disease [1]. The patient's rapidly progressive clinical course precluded bone marrow examination, cytogenetic studies, and further hematological characterization, preventing complete prognostic stratification.

The exact nature of the intracranial and cervical lesions initially interpreted on imaging as meningiomas remains uncertain. Although the coexistence of multiple myeloma raises the possibility of dural or epidural plasma cell involvement, the absence of histopathological confirmation precludes establishing this association definitively. Consequently, it was not possible to determine whether the compressive neurological deficits resulted from synchronous meningiomas or from extramedullary plasma cell infiltration related to the underlying disease.

Breast involvement by plasma cell neoplasms is rare, whether occurring as a solitary plasmacytoma or as a manifestation of systemic disease [2–4]. Most reported cases present as a palpable breast mass without specific imaging characteristics and may mimic primary breast carcinoma or metastatic solid tumors [2,3]. The diagnosis relies on histopathological demonstration of monoclonal plasma cell proliferation together with exclusion of an epithelial origin [4].

From a pathophysiological perspective, dissemination to extramedullary sites reflects the ability of neoplastic plasma cells to overcome their dependence on the bone marrow microenvironment, acquiring the capacity to infiltrate soft tissues [5,6]. When occurring in the setting of multiple myeloma, extramedullary disease is associated with more aggressive biological behavior and poorer prognosis [6,7]. The literature indicates that breast involvement occurs predominantly in patients with previously diagnosed multiple myeloma or during disease relapse and is less commonly observed as the initial manifestation [2,3]. The presence of multiple intramuscular lesions is likewise an uncommon finding and may represent extramedullary muscular involvement, a manifestation that has been associated with particularly aggressive plasma cell neoplasms.

In the present case, the clinical course was marked by severe compressive neurological deficits and an episode of massive pulmonary embolism, both of which contributed to rapid functional deterioration and limited further diagnostic investigation and comprehensive disease characterization. The pulmonary embolism may also be interpreted within the context of plasma cell dyscrasia, as multiple myeloma is associated with a multifactorial prothrombotic state related to systemic inflammation, activation of the coagulation cascade, endothelial dysfunction, and additional clinical risk factors, particularly prolonged immobilization. In this patient, tetraparesis with subsequent immobilization, together with the underlying malignancy, likely contributed to the development of this thromboembolic event.

4. Conclusion

The coexistence of breast masses disseminated lytic bone lesions, and monoclonal paraproteinemia strongly suggested multiple myeloma with breast involvement. This case highlights the importance of integrating clinical, laboratory, imaging, and histopathological findings when evaluating atypical breast lesions. Early recognition of plasma cell neoplasms in the differential diagnosis of breast masses is essential to avoid diagnostic delays and to ensure appropriate management of this rare extramedullary manifestation.

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Research Ethics Committee Approval: This case report was conducted in accordance with the ethical principles of the Declaration of Helsinki and applicable institutional and national regulations. According to local regulations, formal approval by a Research Ethics Committee was not required for the publication of a single anonymized case report. Written informed consent for publication was obtained from the patient, including consent for the publication of clinical information and accompanying images. All potentially identifiable information has been removed to protect the patient's privacy and confidentiality.

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Conflicts of Interest: All other authors declare no conflicts of interest.

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