Scholars Journal of Medical Case Reports
Abbreviated Key Title: Sch J Med Case Rep
ISSN 2347-9507 (Print) | ISSN 2347-6559 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Radiology

Ewing Sarcoma of the Humeral Head with Involvement of the Glenohumeral Joint and Adjacent Neurovascular Bundle: A Case Report

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DOI: https://doi.org/10.36347/sjmcr.2025.v13i10.084 | **Received:** 15.08.2025 | **Accepted:** 22.10.2025 | **Published:** 25.10.2025

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Abstract | **Case Report**

Ewing sarcoma is a rare, aggressive primary bone tumor, most commonly affecting children and young adults. Its occurrence in the proximal humerus with extension to the glenohumeral joint and adjacent neurovascular structures is exceptionally uncommon and presents significant diagnostic and therapeutic challenges. We report the case of a 27-year-old male presenting with progressive shoulder pain, swelling, and limited range of motion. Imaging studies, including plain radiograph, MRI and CT, revealed a lytic lesion of the humeral head with intra-articular extension and close proximity to the axillary neurovascular bundle. Histopathological analysis confirmed the diagnosis of Ewing sarcoma. The patient underwent neoadjuvant chemotherapy followed by surgical resection, with careful preservation of neurovascular structures. This case highlights the importance of early recognition and multidisciplinary management in proximal humeral Ewing sarcomas involving the joint and neurovascular bundle. Optimal outcomes rely on prompt diagnosis, precise surgical planning, and a combination of chemotherapy and, when indicated, radiotherapy to achieve oncologic control while preserving shoulder function.

Keywords: Ewing Sarcoma, Humeral Head, Glenohumeral Joint, Neurovascular Bundle, Bone Tumor, Case Report.

INTRODUCTION

Ewing sarcoma is a highly aggressive primary bone tumor that predominantly affects children and young adults. It accounts for approximately 10–15% of all primary bone malignancies and most commonly involves the diaphysis of long bones, the pelvis, and the ribs. Involvement of the proximal humerus is relatively rare, and extension into the glenohumeral joint or adjacent neurovascular structures is exceptionally uncommon, posing significant diagnostic and therapeutic challenges.

Early clinical presentation is often nonspecific, including pain, swelling, and decreased range of motion, which can delay diagnosis. Imaging modalities, particularly plain radiographs, computed tomography (CT), and magnetic resonance imaging (MRI), play a crucial role in identifying tumor extent, joint involvement, and proximity to critical neurovascular bundles.

Histopathological confirmation remains essential for definitive diagnosis. Management typically requires a multimodal approach, combining chemotherapy, surgical resection, and, in selected cases, radiotherapy, with careful consideration to preserve joint function and protect neurovascular structures.

This report presents a rare case of Ewing sarcoma of the humeral head with invasion of the glenohumeral joint and the adjacent neurovascular bundle, highlighting the diagnostic workup, treatment strategy, and challenges associated with such cases.

CASE REPORT

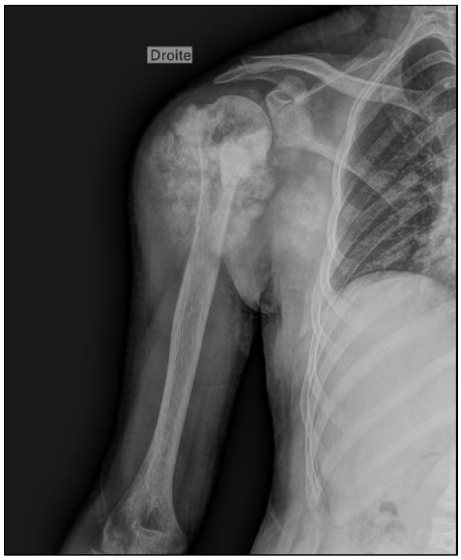
A 27-year-old male presented with no history presented, a progressive pain in the right shoulder with an on growing mass, associated with decreased range of motion and general condition deterioration progressing for 1 year. There was no history of trauma, fever, or systemic symptoms.

Imaging Findings

Plain Radiograph:

Standard radiographs of the shoulder demonstrated an epimetaphyseal-diaphyseal osteosclerotic lesion with a cloudy appearance, poorly

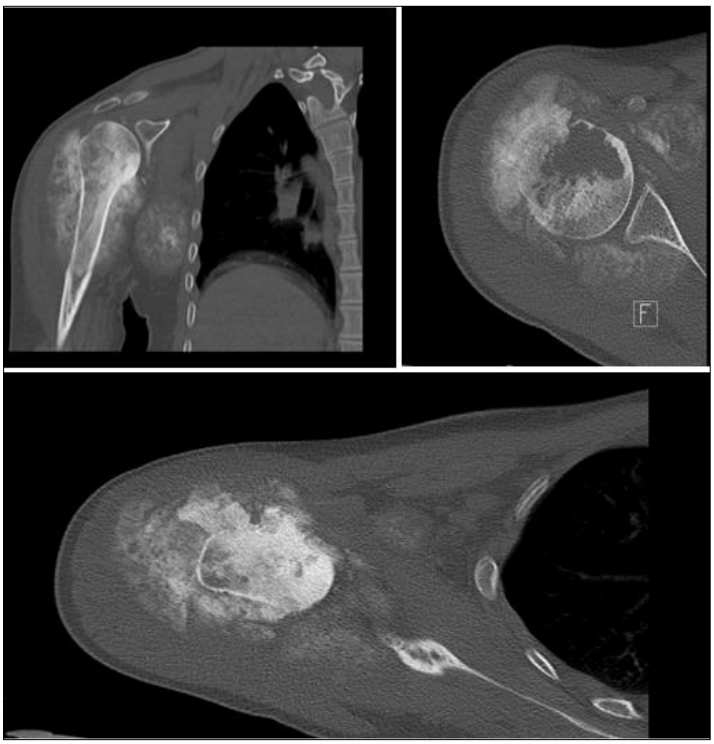
defined irregular margins, and areas of cortical breakthrough.



"Figure 1: Plain radiograph of the right shoulder showed an epimetaphyseal-diaphyseal osteosclerotic lesion with a cloudy appearance, poorly defined irregular margins, and areas of cortical breakthrough"

Computed Tomography (CT):

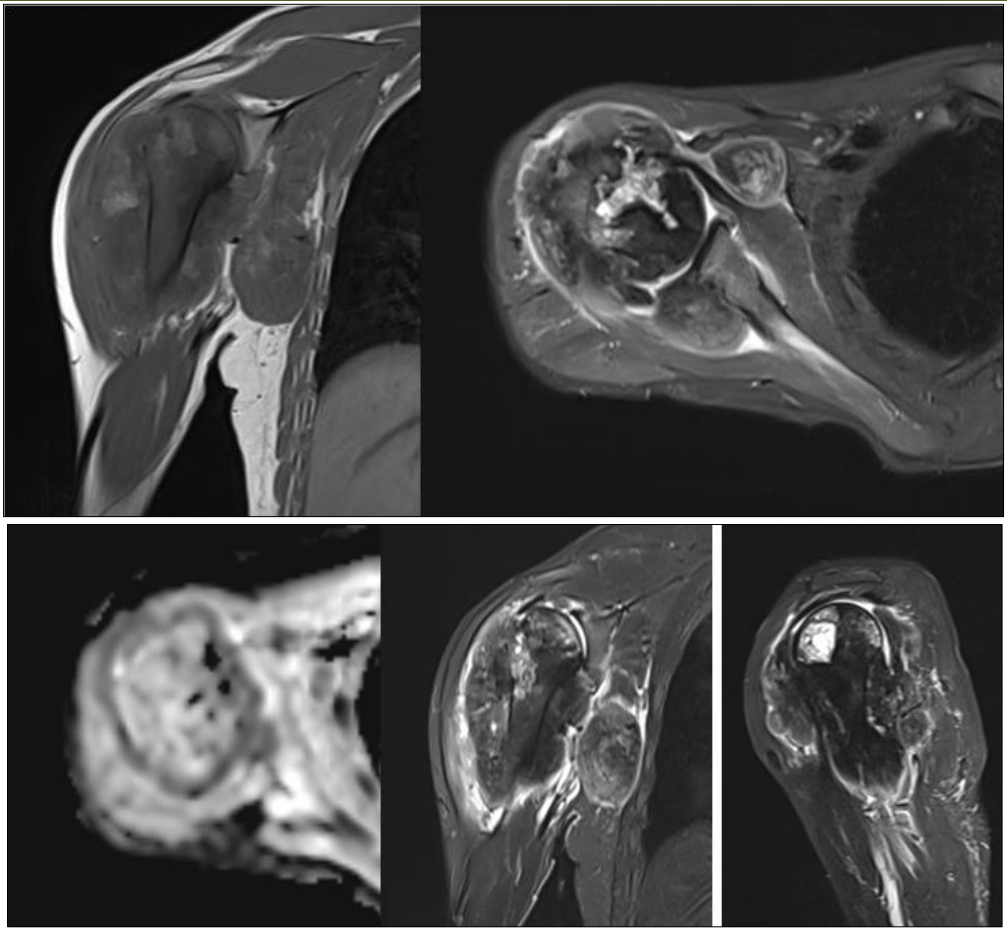
CT scan revealed a mixed osteolytic-osteosclerotic lesion of the humeral head with focal cortical breakthrough, infiltrating the adjacent soft tissues through cloudy and sclerotic lesions.



"Figure 2: CT scan in axial and coronal views show the identification of a mixed osteolytic-osteosclerotic lesion of the humeral head with focal cortical breakthrough, infiltrating the adjacent soft tissues through cloudy and sclerotic lesions, associated with identifiable ipsilateral axillary lymphadenopathy."

Magnetic Resonance Imaging (MRI):

MRI confirmed a Lesional process centered on the right humeral head, involving epiphysis, metaphysis, and diaphysis, with lobulated, poorly defined margins, cortical expansion and focal breakthrough.



"Figure 3: Lesional process centered on the right humeral head, involving the epiphysis, metaphysis, and diaphysis, with lobulated, poorly defined margins, cortical expansion and focal breakthrough. The lesion is isointense on T1, hypointense on T2, heterogeneous on STIR, and shows contrast enhancement after gadolinium. It infiltrates the rotator cuff with loss of the fat plane, extends to the posterior glenoid rim, partially involves the glenohumeral joint, and lies in intimate contact with the vessels of the upper limb, causing slight compression of the axillary artery and encasement of the axillary nerve, with involvement of the humeral, ulnar, and radial nerves"

Histopathology: A biopsy of the lesion showed describe: small round blue cells, CD99 positivity, confirming the diagnosis of Ewing sarcoma.

Management: The patient underwent neoadjuvant chemotherapy followed by wide excision, Intraoperatively, care was taken to preserve the untouched neurovascular structures, The patient continued adjuvant therapy if applicable and is been currently followed up.

DISCUSSION

Ewing sarcoma is a highly aggressive primary bone malignancy that predominantly affects children and young adults. Although it most commonly involves the diaphysis of long bones, pelvic bones, and ribs, its occurrence in the proximal humerus is relatively rare. Even more uncommon is the extension of the tumor into the glenohumeral joint and adjacent neurovascular structures, as illustrated by this case.

The clinical presentation is often nonspecific, including pain, swelling, and limitation of joint mobility. Systemic symptoms such as general condition deterioration or weight loss may also be present in advanced cases. Imaging plays a crucial role in assessing tumor extent, joint involvement, cortical destruction, and proximity to critical neurovascular structures. Plain radiographs often reveal a mixed lytic and sclerotic lesion with poorly defined margins and cortical breach. CT allows precise evaluation of cortical involvement and bony architecture, while MRI provides superior delineation of soft tissue extension, joint infiltration, and neurovascular involvement.

Histopathology remains the gold standard for diagnosis, with immunohistochemistry and molecular studies confirming Ewing sarcoma. Multimodal treatment, including neoadjuvant chemotherapy followed by surgical resection and, when indicated, radiotherapy, is essential to achieve local control and prevent metastasis. Surgical planning in cases with joint and neurovascular involvement is particularly

challenging, requiring a careful balance between oncologic safety and preservation of shoulder function.

Proximal humeral Ewing sarcomas with neurovascular invasion are associated with increased risk of local recurrence and functional impairment. Early diagnosis, multidisciplinary management, and individualized treatment strategies are key to optimizing outcomes. This case highlights the importance of thorough imaging assessment and careful surgical planning in managing complex presentations of Ewing sarcoma.

CONCLUSION

Ewing sarcoma of the humeral head with involvement of the glenohumeral joint and adjacent neurovascular structures is an exceptionally rare and aggressive presentation. Early recognition through clinical assessment and multimodal imaging is crucial for accurate diagnosis and treatment planning. Histopathological confirmation remains essential. Management requires a multidisciplinary approach combining chemotherapy, precise surgical resection, and, when indicated, radiotherapy, with careful consideration to preserve shoulder function and protect neurovascular structures.

This case underscores the importance of individualized treatment strategies in complex presentations of Ewing sarcoma to optimize oncologic control and functional outcomes.

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