

Surgical Management of Pathological Humeral Fracture Revealing Bone Metastasis from Poorly Differentiated Papillary Thyroid Carcinoma: A Case Report

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Abstract

Case Report

Background: Bone metastases from poorly differentiated papillary thyroid carcinoma are rare and may present as pathological fractures with severe functional impairment. **Case Presentation:** A 67-year-old man presented with a pathological fracture of the proximal humerus caused by an osteolytic metastatic lesion. Histopathological examination confirmed metastatic poorly differentiated papillary thyroid carcinoma. The patient underwent palliative intramedullary nailing, achieving successful fracture stabilization, uneventful recovery, and satisfactory functional restoration. He subsequently declined thyroidectomy and radioactive iodine therapy. **Conclusion:** This case highlights the importance of prompt histological diagnosis and surgical stabilization in managing pathological fractures secondary to metastatic poorly differentiated papillary thyroid carcinoma. Intramedullary nailing provided effective pain relief and functional recovery, emphasizing its value in improving quality of life in patients with advanced disease.

Keywords: Pathological humeral fracture; Bone metastasis; Poorly differentiated papillary thyroid carcinoma; Intramedullary nailing.

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INTRODUCTION

Differentiated thyroid carcinoma frequently metastasizes to the lungs and skeleton, the latter being the second most common site of distant spread. Skeletal metastases are usually osteolytic, leading to pain, functional impairment, and pathological fractures. [1,2]. We report a 67-year-old patient presenting with sudden left arm pain and functional loss. Initial biopsy of the humeral lesion confirmed metastasis from poorly differentiated papillary thyroid carcinoma. The patient was successfully treated with palliative intramedullary nailing, achieving fracture stabilization and functional recovery. This case highlights the importance of prompt histological diagnosis and appropriate surgical intervention in managing pathological fractures from thyroid cancer metastases.

CASE PRESENTATION

A 67-year-old male, with a history of hypertension and a left thyroid lobectomy 35 years

earlier (documentation unavailable regarding the indication), presented with sudden onset of left arm pain associated with complete functional impairment of the left upper limb. Standard radiography of the left humerus revealed a pathological fracture in the proximal third over a lytic lesion. (Figure 1)



Figure 1: Anteroposterior radiograph of the left humerus demonstrating a pathological fracture of the proximal third through an osteolytic lesion

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MRI of the left arm demonstrated a tumoral process in the proximal diaphysis measuring $44 \times 31 \times 24$ mm, with cortical disruption, heterogeneous T1 and

T2 signal, and marked enhancement after gadolinium injection. Adjacent muscles were also infiltrated and enhanced, indicating local invasion. (Figure 2)

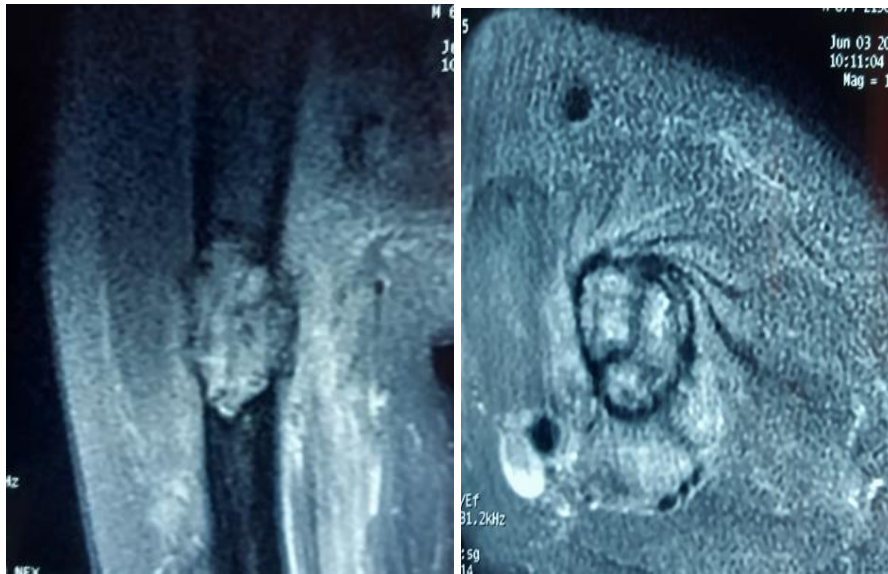


Figure 2: MRI of the left humerus showing a proximal diaphyseal tumor with cortical destruction, heterogeneous signal intensity, gadolinium enhancement, and adjacent muscle invasion

Cervical ultrasound revealed right thyroid nodules, with the inferior-posterior nodule classified as TIRADS 5. Thoracoabdominopelvic CT scan showed pulmonary lesions suggestive of secondary metastases. Bone scintigraphy demonstrated intense uptake in the

left humeral diaphysis, correlating with the pathological lesion. PET scan confirmed intense hypermetabolism in the proximal left humeral diaphysis, associated with pulmonary micronodules and mild hypermetabolism in the right thyroid lobe. (Figure 3)

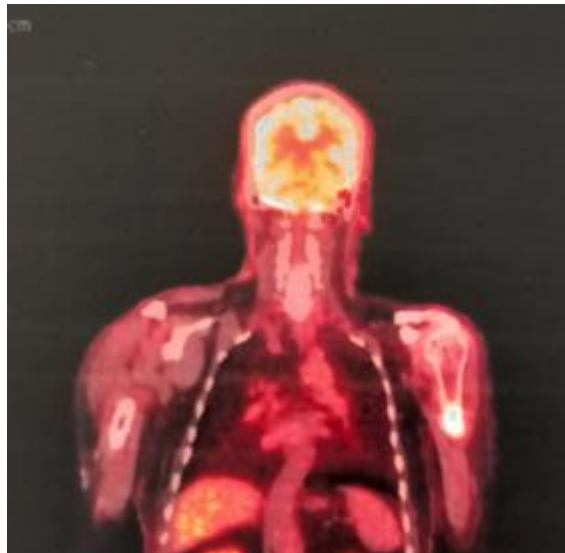


Figure 3: PET/CT demonstrating intense hypermetabolism of the proximal left humeral lesion, associated with pulmonary micronodules and mild hypermetabolism in the right thyroid lobe

A biopsy of the humeral lesion revealed poorly differentiated thyroid carcinoma with papillary architecture. (Figure 4) The patient underwent palliative intramedullary nailing of the left humerus. Postoperative

recovery was uneventful, (Figure 5) and radiographic consolidation was observed at three months, with restoration of function. (Figure 6,7).

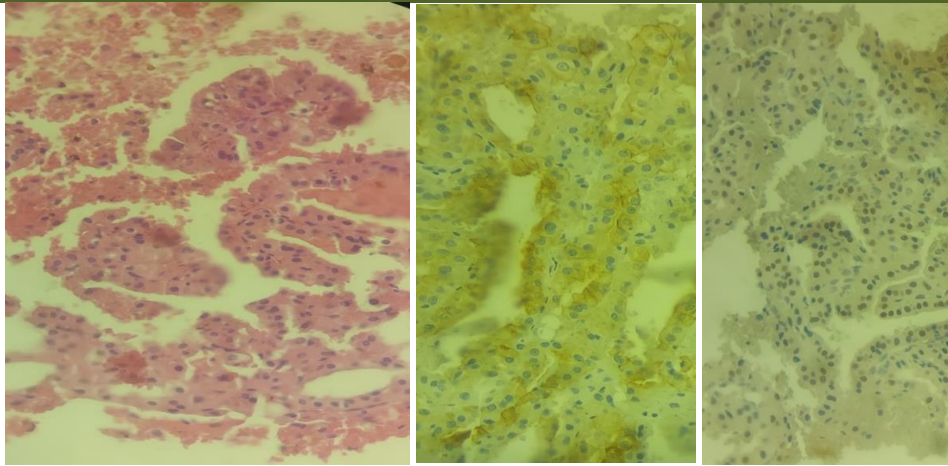


Figure 4: Histopathological and immunohistochemical findings of the humeral biopsy. From left to right: microscopic examination showing bone localization of a poorly differentiated tumor with papillary architecture (hematoxylin stain, original magnification $\times 400$); cytokeratin 7 (CK7) immunostaining (original magnification $\times 400$); thyroid transcription factor-1 (TTF-1) immunostaining (original magnification $\times 400$)



Figure 5: Postoperative anteroposterior radiograph of the left humerus demonstrating intramedullary nail fixation performed for palliative stabilization of the pathological fracture

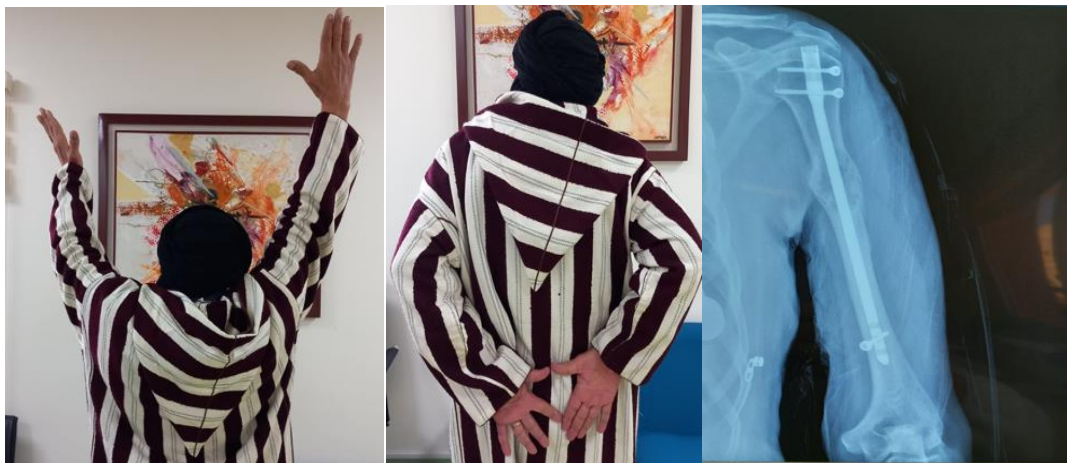


Figure 6 and 7: Three-month postoperative radiograph and clinical photographs showing satisfactory fracture healing following intramedullary nailing, with restoration of left upper limb function

DISCUSSION

Pathological humeral fracture secondary to metastasis from poorly differentiated papillary thyroid carcinoma presents a dual challenge: achieving durable local control of a destructive lesion while considering the systemic aggressiveness of the disease. [3,4]. Bone metastases from differentiated or poorly differentiated thyroid cancers are highly osteolytic, causing pain, fractures, and functional loss, yet survival is often longer than for metastases from other primary tumors. [5,6]. This supports surgical reconstructions beyond purely palliative intent, especially in solitary or oligometastatic lesions. [7]

The humerus and other long bones are typically managed with procedures ensuring immediate stability and durable function, allowing early mobilization. [8] Surgical options range from wide metastasectomy with reconstruction to palliative stabilization using intramedullary nails or plates with cement. [9] In our patient, biopsy confirmed poorly differentiated papillary thyroid carcinoma metastasis, and he underwent intramedullary nailing. He subsequently refused further treatment, including thyroidectomy or radioactive iodine therapy (RAI).

Surgical decision-making should integrate tumor differentiation, radioactive iodine avidity, metastatic burden, patient age, and functional status. While metastasectomy can reduce local recurrence and potentially improve survival in solitary bone metastases, palliative stabilization remains appropriate in diffuse or iodine-refractory disease. [10]

Our case highlights the importance of solid surgical fixation to restore limb function in poorly differentiated papillary thyroid carcinoma, even when systemic therapy is declined. Literature supports aggressive local management of humeral metastases, ideally complemented by thyroidectomy, RAI, radiotherapy, or tyrosine kinase inhibitors when feasible, to optimize local control, function, and overall survival. [11]

Conflict of Interest: No conflicts of interest.

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