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Case Report

Bilateral neck of femur fracture induced by osteomalacia secondary to phosphaturic mesenchymal tumor of paranasal sinus: a case report

Shamseer K. V.*, Radhesh Nambiar

Department of Orthopaedic Surgery, Aster, MIMS Calicut, Kerala, India

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***Correspondence:**
Dr. Shamseer K. V.,
E-mail: shamseerz@gmail.com

ABSTRACT

Phosphaturic mesenchymal tumors (PMTs) are rare, often occult neoplasms that cause tumor-induced osteomalacia (TIO) due to excessive fibroblast growth factor 23 (FGF23) secretion, leading to phosphate wasting, hypophosphatemia, and impaired bone mineralization. This results in progressive skeletal fragility and increased fracture risk. We present a 53-year-old male with bilateral femoral neck fractures following a trivial fall, accompanied by generalized myalgia. MRI of the hip and pelvis revealed bilateral femoral neck fractures with sclerotic changes in the superior and inferior pubic rami, sacral ala, and bilateral iliac wings. Laboratory investigations confirmed severe hypophosphatemia and osteomalacia. Further imaging and biopsy identified a phosphaturic mesenchymal tumor in the right anterior ethmoidal sinus as the underlying cause. The patient underwent bilateral femoral neck fracture fixation with cannulated cancellous (CC) screws, along with vitamin D and phosphate supplementation. The PMT was surgically resected to correct the metabolic disorder. Postoperatively, the patient demonstrated significant clinical and biochemical improvement. This case highlights the critical need to consider PMT in patients presenting with unexplained fractures and persistent hypophosphatemia. Early detection, surgical resection of the tumor, and appropriate metabolic correction are essential for optimal recovery and fracture healing.

Keywords: Phosphaturic mesenchymal tumor, Tumor-induced osteomalacia, Hypophosphatemia, Fragility fractures, FGF23, Femoral neck fracture, Metabolic bone disease

INTRODUCTION

Phosphaturic mesenchymal tumors (PMTs) are rare, slow-growing neoplasms that cause tumor-induced osteomalacia (TIO) by overproducing fibroblast growth factor 23 (FGF23), leading to renal phosphate wasting, hypophosphatemia, and impaired bone mineralization.[2,7] Osteomalacia caused by PMTs often results in bone pain, muscle weakness, and an increased risk of fragility fractures, which may occur even with minimal trauma.[3,6] Bilateral neck of femur fractures, though uncommon, have been reported in patients with severe TIO due to prolonged hypophosphatemia and compromised bone strength.[11] The paranasal sinuses, while an unusual site for PMTs, have been documented in literature as a potential primary location for these tumors.[6,15] Early diagnosis is often challenging due to the tumor's occult nature, leading to delayed recognition and progressive skeletal deterioration. Several studies have shown that diagnostic delays can range from months to years, contributing to significant morbidity.[12,13]

Clinically reported studies emphasize the importance of a multidisciplinary approach involving endocrinologists, radiologists, orthopedic surgeons, and pathologists for accurate diagnosis and optimal management.[13] The standard treatment for PMT-induced osteomalacia involves complete surgical resection of the tumor, which often results in rapid biochemical and clinical recovery, along with fracture fixation when necessary.[2,6]

This case emphasizes the critical need for early recognition of PMTs in patients with unexplained fractures and persistent hypophosphatemia to prevent long-term skeletal complications.

CASE REPORT

A 53-year-old male presented with bilateral hip pain and an inability to bear weight following a trivial fall. He also reported a history of generalized myalgia, fatigue, and progressive difficulty in ambulation over the past year. Clinical examination revealed tenderness in both hips and reduced range of motion, but no significant deformity. Neurological examination was unremarkable.

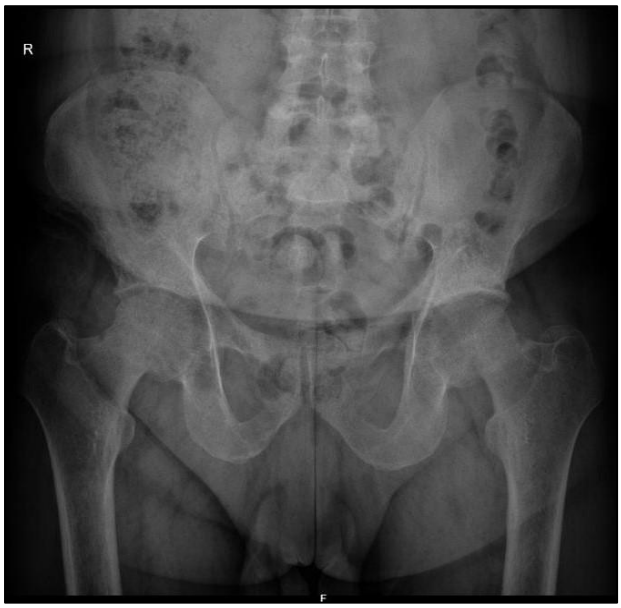

Figure 1: Preoperative X-ray of bilateral neck of femur fracture.

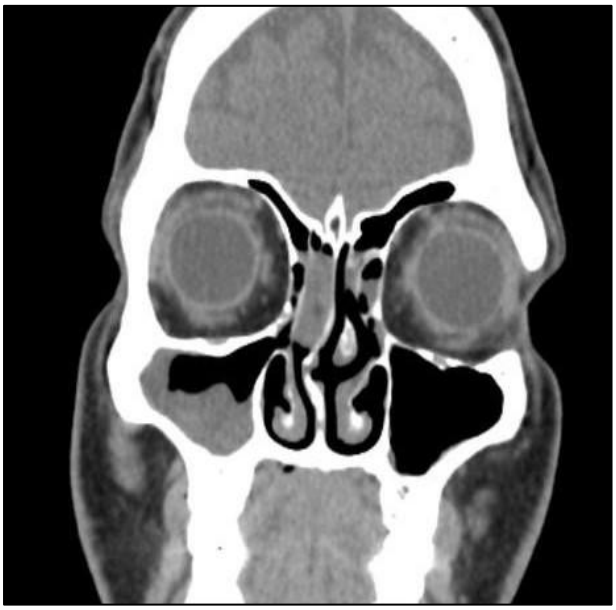

Figure 2: Preoperative CT of paranasal sinuses.

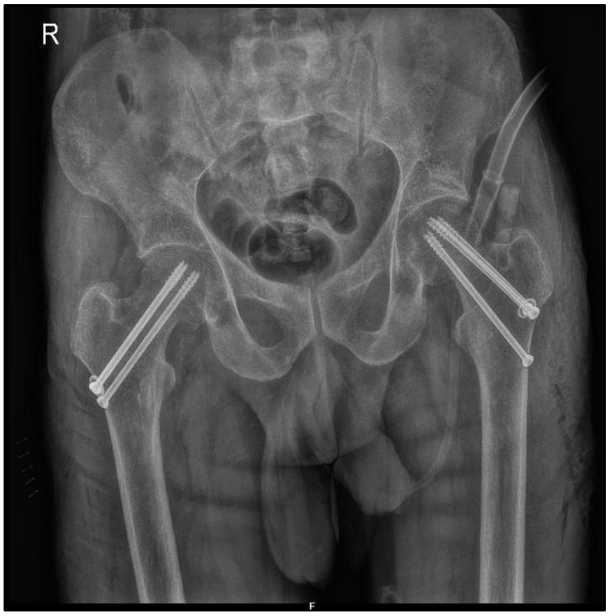

Figure 3: Postoperative X-ray of bilateral neck of femur fracture fixed with CC screws.

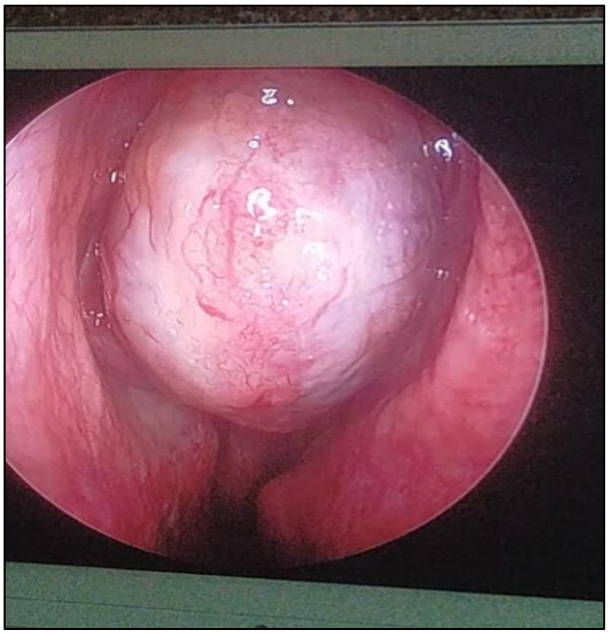

Figure 4: Intraoperative endoscopic picture of mesenchymal tumor of paranasal sinus.

Radiological investigations, including MRI of the hip and pelvis, showed bilateral neck of femur fractures, with associated sclerotic changes in the superior and inferior pubic rami, sacral ala, and bilateral iliac wings, suggestive of metabolic bone disease.

Laboratory tests revealed severe hypophosphatemia (serum phosphorus: 1.8 mg/dl), low serum 1,25-dihydroxy vitamin D levels, and elevated serum FGF23 levels, confirming a diagnosis of osteomalacia. A search for an underlying cause led to further imaging, which identified a small tumor in the right anterior ethmoidal sinus. A

biopsy confirmed the diagnosis of a phosphaturic mesenchymal tumor.

Treatment and management

The patient underwent closed reduction and internal fixation of both femoral neck fractures using cannulated cancellous (CC) screws to ensure fracture stability and early mobilization. Simultaneously, medical management was initiated with phosphate and active vitamin D (calcitriol) supplementation to correct the metabolic abnormalities. After stabilization, he underwent endoscopic surgical resection of the ethmoidal sinus tumor. The resection was confirmed to be complete on postoperative imaging, and histopathology reconfirmed the diagnosis of a phosphaturic mesenchymal tumor.

Postoperatively, the patient demonstrated significant clinical and biochemical improvement. Serum phosphorus levels increased from 1.8 mg/dl to 3.6 mg/dl, and there was a gradual improvement in bone mineral density. Functional recovery was closely monitored, and at the one-year follow-up, there was no evidence of non-union or malunion of the femoral fractures. The patient remained pain-free, ambulatory, and showed improved overall mobility.

DISCUSSION

A bilateral neck of femur fracture (BNFF) caused by osteomalacia is rare but can be linked to phosphaturic mesenchymal tumors (PMTs), which are most commonly found in bone or soft tissue but can also occur in the paranasal sinuses. These tumors secrete fibroblast growth factor 23 (FGF23), leading to phosphate waste, reduced vitamin D production, and impaired bone mineralization

This results in osteomalacia, making bones prone to fractures under minimal stress, with the femoral neck being particularly vulnerable. In our case, the unusual site of the tumor-in the anterior ethmoidal sinus-complicated the diagnosis. PMTs in the paranasal sinuses are uncommon but have been reported in literature

The delayed presentation of symptoms such as generalized myalgia and fatigue prior to the fracture suggests the chronic nature of phosphate dysregulation, a pattern consistent with previous large case series. Several studies have emphasized the diagnostic delay associated with PMTs, largely due to their small size and nonspecific symptomatology

Feng et al described a mean diagnostic delay of 2.5 years in a cohort of 144 patients, underscoring the need for heightened clinical suspicion in unexplained fragility fractures.[12] The patient in this case improved rapidly after surgical resection of the tumor and metabolic correction, similar to findings from Jiang et al., who observed that surgical removal of the tumor resulted in normalization of phosphate levels and healing of fractures in the majority of their cohort.[6] Additionally, Brandi et al. discussed the challenges in managing TIO, particularly the need for a multidisciplinary approach involving Orthopaedics, endocrinology, radiology, and pathology for accurate localization and management.[13]

Our case adds to the growing body of evidence highlighting that even in elderly patients, a presentation with multiple fractures and hypophosphatemia should raise suspicion for TIO. Early recognition and intervention remain the key to avoiding prolonged morbidity.

CONCLUSION

In conclusion, bilateral neck of femur fractures induced by osteomalacia secondary to a phosphaturic mesenchymal tumor (PMT) of the paranasal sinus are rare but serious conditions that require early diagnosis and comprehensive management. The underlying PMT secretes FGF23, leading to phosphate deficiency, impaired bone mineralization, and increased fracture risk. Prompt surgical stabilization of fractures, tumor resection, and subsequent metabolic correction with phosphate and vitamin D supplementation are essential for effective treatment. With timely intervention, patients can achieve significant improvement in bone health and function, while delayed diagnosis can result in long-term complications, including chronic pain and repeated fractures.

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