Pathological Fracture of Femur - A Case Report

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Abstract

Background: Fractures of the subtrochanteric region of the femur provide several challenges to the operating surgeon due to anatomic and biomechanical peculiarities inherent to this region. These challenges are compounded several times in a severely osteoporotic bone.

Case presentation: We report a case of pathological fracture following Vitamin D3 deficiency. The patient had sustained a subtrochanteric fracture of left femur & incomplete fracture of right tibia which was managed with a DHS (Dynamic Hip Screw) and PTB (Patella Tendon Bearing) cast respectively for the two different fractures.

Conclusion: This highlights the fact that pathological fracture can be due to Vitamin D3 deficiency, but needs to be differentiated from other causes of pathological fracture like infection or neoplastic conditions. While DHS provides a viable alternative in the management of fractures of the subtrochanteric region of femur in severe osteoporosis, incomplete fracture of tibia can be treated with PTB cast.

Introduction

The existence of osteoporosis has been documented in Egyptians as far back as 990 B.C. [1]. The incidence of fragility fractures around the hip is rising exponentially [2]. These fractures account for a significant economic burden on the health care system of a country [3]. Subtrochanteric fractures of femur pose significant challenges for fixation in terms of anatomic and biomechanical reasons. These include a very high stress across the medial cortex (1200 lb/sq inch), smaller cross sectional area and the occurrence of shear forces across the fracture. These challenges are further compounded by the presence of powerful muscle vectors [4]. The major problem in fractures of the osteoporotic bone is fixation of the device to the bone as bone failure is commoner than implant breakage. We report a case with subtrochanteric fracture of the left femur with Singh's grade one osteoporosis & incomplete fracture of right tibia which was managed by fixation with a DHS and PTB cast respectively. At six months follow-up the patient had a normal range of motion and was pain free.

Case Report(s)

A 68 year old female patient reported to the outdoor department of our hospital with a history of sudden onset of pain in her left hip and right leg. There was no history of trauma, fever or weight loss. The left lower extremity was externally rotated and shortened, while there was only tenderness in the proximal metaphyseal region of right tibia. Movements elicited pain in the area of the left hip and right knee. Radiographs of the pelvis with both hip and left femur lateral views revealed a transverse fracture at the subtrochanteric region of left femur which was displaced (Figure 1). While radiograph of both knee antero-posterior & lateral views (Figure 2) showed incomplete fracture of right tibia, involving the medial cortex of the proximal metaphyseal region. On assessing the trabeculae pattern of the femur the patient was found to have Singh's grade one osteoporosis with near absence of the trabeculae in the femoral head and neck. Her serological investigation showed, 25-OH Vitamin D Total levels as 10.82 ng/ml (reference range of 6-20 ng/ml as insufficiency). Her blood calcium and phosphorus levels were normal. Dual X-Ray absorbiometry showed a T score greater than 2.5 standard deviations below normal. Other investigations were done like urine for Bence Jones's protein and lateral X-ray of skull (Figure 3) to rule out multiple myeloma as a cause of pathological fracture, which were negative. X-rays of Dorso-Lumbar spine (Figure 4) was also done to check for any signs of metastases or any infective etiology which were negative in this case. The patient was put on skin traction for the left lower limb and advised to undergo surgery for the subtrochanteric fracture of left femur in view of the nature of the fracture and the requirement of early ambulation. Patient was taken for surgery and the fracture was reduced on a traction table after opening the fracture area. Fixation was held with a DHS and 135 degree barrel plate. In view of the tenuous nature of the fracture a 9 holes barrel plate was affixed with 7 cortical screws (Figure 5). For the right sided incomplete tibia fracture PTB cast was given. Post operatively the patient underwent supervised physiotherapy over a period of six weeks. She was also treated with injectable Vitamin D (Arachitol) 6,00,000 units intramuscularly, along with oral calcium.
citrate 1gm daily and Vitamin D3 orally 60,000 units once weekly. At twelve weeks the fracture had united and the patient was allowed full weight bearing (Figure 6).

**Discussion**

In planning treatment in older patients with fractures of the osteoporotic bone, several important factors are to be considered. The functional demands of the elderly are different from young healthy and long term immobilization in bed must be avoided. Delaying treatment has been reported to increase mortality [5]. Reduced bone mass, increase bone brittleness and medullary expansion must be factored in when deciding the type of surgical method to be used. Improved implant design and surgical techniques are in a constant race to keep pace with increasing demands for stable fixation of these fractures. Immobilization in splints and cast causes further immobilization resulting in stiffness and worsening the osteoporosis. A cast also does not control fracture shortening which is often seen in osteoporotic bone. Various implants have been used for fracture fixation in the upper femur. These include ender nails, short femoral nails, sliding hip screws, fixed nail plate, Kuntscher nail and percutaneous compression plate. Many series report complications with these methods. However none of these series exclusively focus on cases with severe osteoporosis with cortices as thin as found in our patient. Among the most common treatments for extra-capsular fractures, the average rate of cut out was 2.6% in patients receiving a short femoral nail, 3.1% in those receiving a sliding hip screw, 3.6% in those receiving a Medoff sliding plate and 6.7% in those receiving an Ender nail. Operative fractures of the femur occurred in 2.4% of those receiving Ender nail and in 2.7% in short femoral nails. The rate of operative fractures was negligible in those receiving a sliding hip screw (0.4%). The overall average rate of valgus deformity was 7.7% and that of leg shortening 9.4% [6]. A study conducted by Yoshimine et al on bones with grade 1to3 osteoporosis showed a cut out rate of 36% [7].

**Conclusion**

The DHS provides a good alternative to intramedullary nails in the fixation of subtrochanteric fracture in the severely osteoporotic bone. Although the cause of osteoporosis must also be taken care of, which in this case was Vitamin D insufficiency.

**Abbreviations(s)**

DHS: Dynamic Hip Screw  
PTB: Patella Tendon Bearing

**References**

Illustrations

Illustration 1

Figure 1: X-Rays PBH & Lateral view of left hip shows subtrochanteric fracture of left femur

Illustration 2

Figure 2: X-Rays Both knee antero-posterior & lateral views shows incomplete fracture of right tibia
Illustration 3

Figure 3: Lateral X-ray of Skull

Illustration 4

Figure 4: X-Ray antero-posterior & lateral views of Dorso-Lumbar Spine
Illustration 5

Figure 5: Post-operative X-ray

![Post-operative X-ray](image)

Illustration 6

Figure 6: At 3 months follow-up

![At 3 months follow-up](image)
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