

ATRAUMATIC BILATERAL FEMORAL NECK FRACTURES IN A PREMENOPAUSAL FEMALE WITH HYPOVITAMINOSIS D

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ABSTRACT

Bilateral femur neck fractures in young adult patients are very rare in atraumatic circumstances. We report a young premenopausal female with osteomalacia secondary to vitamin D deficiency and spontaneous bilateral femur neck fractures. Patient had no reported risk factors for osteomalacia but hypovitaminosis D was noted on laboratory evaluation. Osteomalacia secondary to low serum levels of vitamin D may lead to stress and fragility fractures. Identification and treatment of at risk patients may decrease the incidence of stress fractures and its possible complications.

Index words: *atraumatic, bilateral, femoral fractures, premenopausal, female, hypovitaminosis*

INTRODUCTION

Bilateral femur neck fractures in premenopausal females or young adult males occur in one of two scenarios, either high-energy trauma or secondary to metabolic disorders. Reports exist of two Japanese individuals with bilateral and unilateral femoral neck fractures secondary to hypovitaminosis D (1, 2). In these cases both patients showed poor dietary habits and alcoholism. Most reports in the literature of atraumatic bilateral femur fractures have documented causes of osteomalacia, including oncogenic osteomalacia, malabsorption, chronic steroid use, pregnancy and alcoholism, among others (3,4,5,6).

Low levels of Vitamin D have been documented in normal/healthy individuals as well as in the orthopedic patient population seen on everyday orthopedic practice (7). We present a young adult premenopausal female with atraumatic bilateral femoral neck fracture. This patient had normal laboratory values except for very low serum level of vitamin D3. Our patient was notified and consented for presentation of her case in the literature.

Case History

This is the case of a 46-year-old female patient with progressive bilateral hip pain. Her hip symptoms began twenty-two days prior to presenting at our clinic at the Puerto Rico Medical Center. She reported her bilateral hip pain as developing insidiously and associated with gradual bilateral knee pain. Symptoms did improve after a short course of physical therapy and non-steroidal anti-inflammatory drugs. Given some improvement in her pain she continued with her PT regimen as directed by her primary physician who documented negative findings on pelvis and bilateral knee radiographs.

During this second stage of physical therapy she developed worsening bilateral thigh pain with radiation to both her gluteal and hip regions. At this time, her hip pain was 7/10 on visual analogue scale (VAS) with marked limitation of her daily activities. At this time, her primary physician ordered further radiographic workup, which included radiographs, computerized tomography (CT) scan, and pelvic magnetic resonance imaging (MRI). After imaging results showed bilateral

femoral neck fractures she was then referred to our clinic for further evaluation and management.

The patient was 160 cm tall and her weight was 66 kg (body mass index; 25.9). She had a past medical history of hypothyroidism that was well controlled with levothyroxine sodium 50 micrograms daily (TSH – 2.04). She denied other medical conditions or medication treatments. She had no history of trauma, seizures, or bone metabolic diseases. Both her family and dietary history were also unremarkable.

Upon arrival at our clinic patient had pain on inguinal area upon ambulation and associated antalgic gait. Both hips had decreased range of motion secondary to pain. Radiographs and computerized tomogram (CT) showed possible stress fractures of bilateral femoral necks and no looser's zones on pubic rami or femoral cortex (see Figures 1 & 2). Pelvic MRI did show evidence of non-displaced acute bilateral femoral neck stress fractures (see Figure 3). Dual-energy x-ray absorptiometry showed lumbar spine Z score -1.4, femoral neck Z score 1.3, totals hip Z score -0.1.

FRAX score for major osteoporotic fracture and hip fracture were 2.6% and < 0.1% respectively.

Laboratory results displayed normal values of total serum calcium (9.6 mg/dL; reference range, 9-10.5 mg/dL), serum phosphorus (3.7 mg/dL; reference range, 3-4.5 mg/dL), and alkaline phosphatase (71 IU/L; reference range, 36-92 IU/L). Serum level of 1,25(OH)₂vitamin D3 was decreased (18.3 pg/mL; reference range, 15-80 pg/mL). The serum albumin was normal (4.1 g/dL; reference range, 3.5-5.1 g/dL). Her PTH level at most recent follow up was 23pg/mL (reference range, 16-64pg/mL).

Given previous failure of conservative management and symptoms of severe bilateral hip pain we recommended and internal fixation with two cannulated hip screws for both hips (see Figures 4). Decision for internal fixation versus arthroplasty was made given the non-displaced nature of the fractures. At the time of surgery and given the possibility of osteomalacia a tricortical biopsy of the ilium was obtained. It showed no histologic evidence of osteomalacia. She was started on daily oral calcium and vitamin D supplements (50,000 Units). Partial weight bearing was allowed with assistive devices 60 days postoperatively. Complete weight bearing was not allowed until 90 days postoperatively at which time patient had complete radiographic healing apparent on radiographs. Follow up laboratories showed improvement in hypovitaminosis D (Vitamin D3 = 47.26 ng/mL) following two months of oral supplements. Our patient was able to return to her activities of daily living without assistance three months post operatively.

DISCUSSION

Vitamin D has received considerable attention in recent years, because of studies demonstrating inadequate levels in otherwise healthy populations (5,6). Recent recommendations of the International Osteoporosis Foundation and Osteoporosis Canada show that optimum levels vitamin D

Figure 1: Preoperative anteroposterior radiograph of the bilateral hip joints. There are no looser's zones in the pubic rami or stress fractures apparent in this examination.



Figure 2: Preoperative coronal (a) and sagittal (b) tomographic images showing bilateral femoral necks with vertical sclerotic lesions. Noted how lesions are on tension side of the bone.

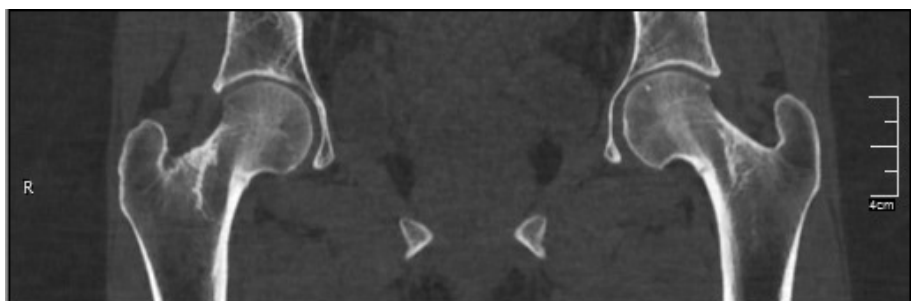


Figure 3: Preoperative T1 (a) and T2 Fat Suppression (b) magnetic resonance imaging (MRI) showing bilateral femoral neck fractures



Hypovitaminosis D may result in osteomalacia, a metabolic bone condition resulting in weak demineralized bone. Long termed hypovitaminosis D may result in spontaneous fractures secondary to this poorly mineralized weakened bone. Multiple risk factors for hypovitaminosis D exist such as:

decrease sun exposure, obesity, dietary deficiency, malabsorption, medication-induced, breast-feeding, cholesterol-lowering agents, genetic disorder, anti-seizure medication, and hyperthyroidism. None of these risk factors were identified in our patient.

Orthopedic surgeons and physicians in general should be aware of

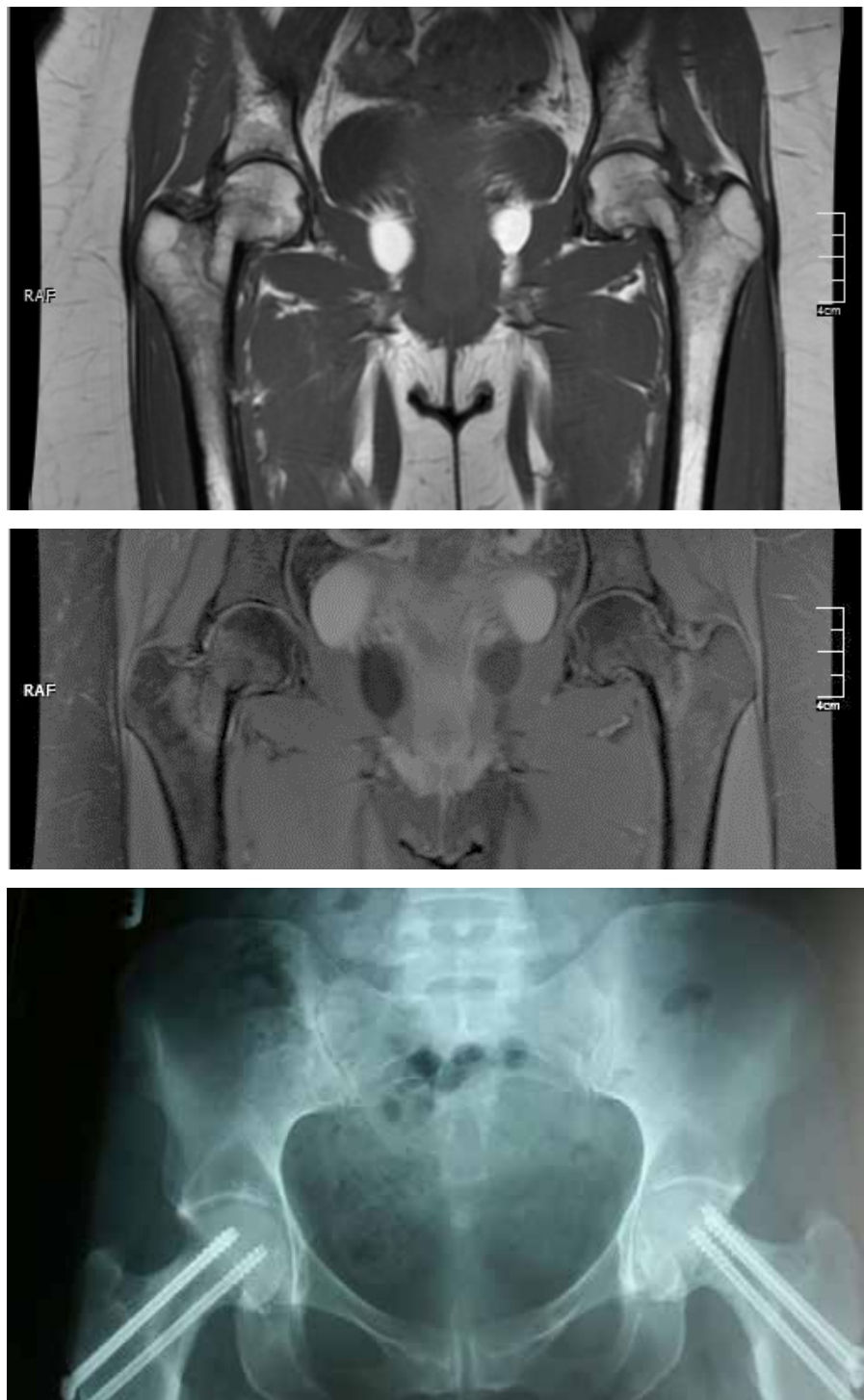
these increasing trends in Vitamin D deficiency. Similar to the American Academy of Orthopedic Surgeons move towards better osteoporosis awareness and prevention of fragility fracture, screening and early recognition of high risk patients with vitamin D deficiency and osteomalacia can decrease the incidence of morbid hip fractures.

In the present case, the patient had no history of major trauma or any known risk factors for osteomalacia. Her presenting symptoms of insidious atraumatic bilateral thigh/inguinal pain imply a fragility fracture secondary to possible bone mineral deficiency. Laboratory data did not demonstrate any abnormality in the serum levels of calcium, phosphorus, or bone alkaline phosphatase, but she did have a low serum level of 1,25 (OH)₂ vitamin D₃. Moreover, radiographs did not show typical features of osteomalacia such as Looser's zone, but addition of CT scan did show sclerotic vertical lines on both femoral necks implying healing stress fractures. Given normal dietary and other lifestyle habits the cause of the low serum level of vitamin D in this case is still not clear.

To our knowledge, a previous report exists in the literature of bilateral femur fractures in a patient with low levels of vitamin D. This report was in an Asian patient with dietary deficiencies and alcoholism (1). Our patient underwent bilateral internal fixation with cannulated screws given the early recognition and non-displaced fracture pattern. Further delay in treatment may have led to displacement of the fractures and hip replacement surgery. With this, we think that prevention and early diagnosis seem of paramount importance to prevent occurrence and displacement of hip stress fractures on patients with osteomalacia.

The increasing incidence of hypovitaminosis D in the general population will lead to an increase in reported incidence of fragility fractures.. Femoral neck fractures, as in this case, require early diagnosis to prevent morbidities associated with fragility fractures. Given the

Figure 4: Postoperative radiograph showing bilateral cannulated screw fixation of femoral neck fractures.



previously reported elevated rate of undiagnosed hypovitaminosis D, preventive medicine with screening and oral vitamin D supplementation should be implemented by primary care physicians and orthopedic specialists.

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RESUMEN

Las fracturas bilaterales de cuello femoral en jóvenes adultos son inusuales en circunstancias no traumáticas. En este reporte presentamos un paciente con osteomalacia sin factores de riesgo por historial y fracturas bilaterales de cuello femoral. En nuestra evaluación preoperatoria se identificaron niveles disminuidos de vitamina D. Osteomalacia secundaria a niveles bajos de vitamina D puede llevar a fracturas de estrés o fragilidad. El tratamiento de esta condición debe ser preventivo. La identificación con tratamiento temprano de pacientes a riesgo puede prevenir complicaciones mayores asociadas con fracturas de estrés en la cadera.



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