

Case report

Atraumatic segmental atypical femur fracture secondary to bisphosphonate use: A case report

Andrew J. Lovy^a, Diana Patterson^a, Laura Skeeles^b, Richard Ghillani^{a,b}, David Joseph^{a,b}, Yangguan Wu^b, Rohit Hasija^{b,*}

^a Mount Sinai Hospital, Department of Orthopaedic Surgery, 5 E 98th St., New York, NY 10029, United States

^b Elmhurst Hospital Center, Department of Orthopaedic Surgery, 79-01 Broadway, Queens, NY 11373, United States

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ABSTRACT

Atypical femur fractures as a result of long term bisphosphonate use are characterized by several unique radiographic features. We describe an atypical femur fracture treated by cephalomedullary nail with a previously undescribed segmental fracture pattern. Other than 1.5 years of bisphosphonate use the patient did not have any other risk factors known to cause atypical femur fractures. Judicious bisphosphonate use as well as increased awareness of the associated complications may help reduce the rate of bisphosphonate associated atypical femur fractures.

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1. Introduction

Bisphosphonate use has been shown to significantly reduce the risk of osteoporotic fractures in several randomized trials¹. However, recently several studies have demonstrated an increased risk of low energy subtrochanteric and femoral shaft fractures associated with long term bisphosphonate use^{2–5}. These fractures have been designated “Atypical Femur Fractures” as a result of their characteristic radiographic appearance. We describe a patient who sustained a segmental atypical femur fracture associated with bisphosphonate use treated with cephalomedullary nailing. To our knowledge, this is the first reported case in the literature of an atraumatic segmental atypical femur fracture.

2. Case report

A 63-year-old female presented to our trauma center with right hip and thigh pain after a mechanical fall from a standing height. Additionally, the patient denied antecedent pain to the ipsilateral and contralateral thigh. Past medical history was significant for osteoporosis treated with monthly oral ibandronate sodium for 1.5 years, hypertension, hyperlipidemia and hypothyroidism. Initial physical examination revealed a shortened, externally rotated right lower extremity with intact neurovascular exam. Radiographs obtained revealed a segmental femur fracture with

subtrochanteric and diaphyseal fracture site (Fig. 1). Upon further examination both fracture sites were found to be consistent with an atypical femur fracture characterized by non-comminuted, transversely oriented, complete fractures with a medial spike. Contralateral femur radiographs revealed thickened cortices without evidence of incomplete fracture. Prior to operative fixation a tibial traction pin was placed.

The patient was indicated for operative fixation with a cephalomedullary nail (Gamma Nail, Stryker) and was taken to the operating room within 24 h of injury. The patient was positioned on the fracture table and provisional reduction was obtained with the use of a posterior reduction device at the diaphyseal fracture site. To facilitate reduction of the flexed proximal fragment and accurate nail starting point, a small lateral incision was made at the approximate level of anticipated central lag screw placement. The flexed proximal fragment was reduced with a Hohmann retractor allowing accurate nail starting point trajectory (Fig. 2). An additional small lateral incision was made at the diaphyseal fracture site which was reduced with percutaneous compression plating (Gotfried PC.C.P, Orthofix) reduction forceps. Despite the use of the entry reamer as well as flexible intramedullary reaming 2 mm above selected nail diameter initial attempts to pass the cephalomedullary nail were blocked by the thickened cortices of the proximal fragment. Following sequential flexible reaming of the proximal fragment up to 15.5 mm the cephalomedullary nail was placed uneventfully and distally locked in the dynamic position. Final intraoperative radiographs revealed near anatomic reduction of both subtrochanteric and diaphyseal

* Corresponding author at: Department of Orthopaedic Surgery, 79-01 Broadway Elmhurst Hospital Center, Elmhurst, New York, United States.



Fig. 1. Anterior-posterior and lateral radiographs revealing non comminuted short oblique subtrochanteric and diaphyseal femur fractures with medial spikes. Additionally note the thickened cortices.

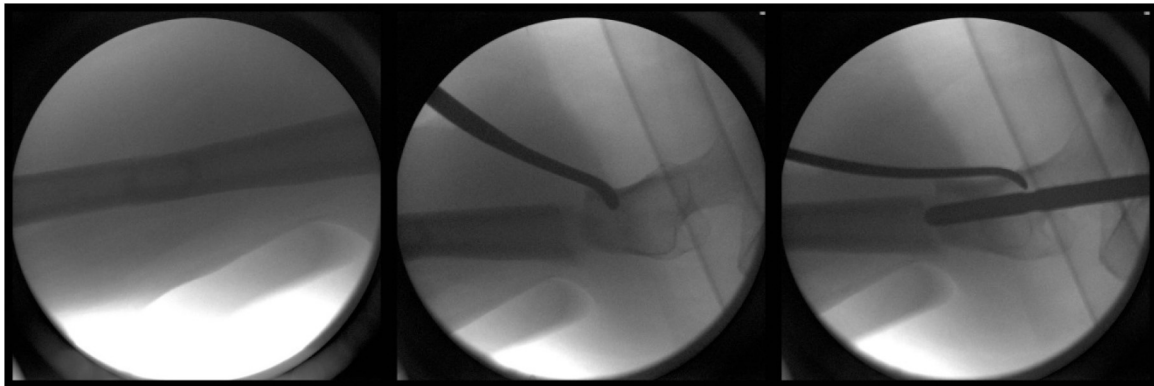


Fig. 2. Intraoperative radiographs revealing (A) provisional reduction of the diaphyseal fracture with pord device, (B & C) reduction of flexion deformity allowing accurate nail starting point.

fracture sites (Fig. 3). There were no intraoperative complications and postoperatively the patient was allowed to weight bear as tolerated.

Metabolic work up revealed normal thyroid serologies (TSH 1.58 uIU/mL, T3 62.9 ng/dL, T4 9.06 mcg/dL), normal PTH (40.4 pg/mL), low serum calcium (8.1 mg/dL), low Vitamin D, 25 OH (13 ng/mL) and was started on Vitamin D supplementation. Metastatic workup including bone scan as well as CT chest/abdomen/pelvis was negative for malignancy. The surgical pathology of the right femoral reaming specimen demonstrated marked disruption of trabecular architecture without any evidence of malignancy.

The patient was followed up in the clinic and radiographs of the right femur were performed at one month, two months, five months, one year, and two years intervals. The X-ray images

revealed routine progression of healing at the fracture sites, with callus formation at 2 months post-operatively and complete union at 1 year (Figs. 4 and 5).

3. Discussion

To our knowledge this is the first reported case of a segmental atypical femur fracture as a result of bisphosphonate use. Distinct radiographic features of atypical femur fractures have been identified by the American Society for Bone and Mineral Research suggesting a unique pathogenesis consistent with an “insufficiency fracture” caused by normal loading of abnormal bone². Bisphosphonate associated atypical femur fractures are thought to occur as a result of inhibited bone resorption primarily by inducing apoptosis

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