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Case report

Proximal femoral reconstruction for failed internal fixation of a bisphosphonate-related femur fracture

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ABSTRACT

We present a case of a bisphosphonate-related femur fracture in an elderly woman, who failed treatment with both cephalomedullary nail and proximal femoral locking plate, leading to successful treatment with total hip arthroplasty. Hardware failure should be included in the differential of patients with previous internal fixation of bisphosphonate-related femur fracture that present with hip or groin pain. Arthroplasty can be an acceptable salvage option in an active elderly patient with a bisphosphonate-related femur fracture.

Introduction

Bisphosphonates reduce the overall risk of fractures in patients with osteoporosis, even after cessation of use [1]. Numerous studies suggest a link between prolonged bisphosphonate therapy and atypical fractures of the femur [2,3]. The consensus is that bisphosphonate-related femur fractures (BRFFs) are rare [2,3].

There are no standardized practices for the surgical management of BRFFs. The use of total hip arthroplasty (THA) in the management of a bisphosphonate-related subtrochanteric femur fracture has not been reported in the surgical literature. We describe such a case in an active elderly woman who failed fixation with a cephalomedullary nail (CMN) and proximal femoral locking plate (PFLP) necessitating treatment with proximal femoral replacement (PFR). The patient was informed that information concerning her case would be submitted for publication.

Case history

A 69-year-old woman treated with a CMN a month prior at an outside hospital for a left atypical subtrochanteric femur fracture presented to our emergency department with a complaint of left hip pain. She was on bisphosphonate therapy for the past 10 years. She was physically active before her initial fracture. She reported a one-day history of pain that began suddenly while attempting to get off the toilet. The pain was localized to her left groin and was steady, continuous, nonradiating, exacerbated by movement, and inhibited ambulation. Physical examination revealed a healed operative wound at her lateral left hip. Her left leg was held preferentially in external rotation. Subsequent radiographs revealed an angulated left subtrochanteric fracture with a transverse fracture line through the lateral cortex, a short medial spike, and failure of the CMN (Fig. 1).

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There is no institutional review board approval required at our institution for case reports. However, the authors have obtained the patient's informed verbal consent for print and electronic publication of the case report.

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Figure 1. Anteroposterior (AP) radiograph of the left hip showing a bisphosphonate-related femur fracture treated with a cephalomedullary nail that went on to implant failure.

The next morning, she underwent surgery for removal of hardware and open reduction and internal fixation of her left proximal femur. After the CMN was removed, impaction bone grafting of the femoral head, femoral neck, and greater trochanter was performed using allograft bone chips and demineralized bone matrix. A laterally based PFLP was applied after compression of the fracture (Fig. 2a and b). She was discharged 4 days later to a skilled nursing facility with toe-touch weight-bearing precautions with calcium carbonate and vitamin D supplementation. Her bisphosphonate therapy was discontinued.

At 2 weeks, her left hip pain was steadily decreasing, her wound was healed, and she had no postoperative neurovascular deficits. Radiographic images revealed a stable construct and showed no evidence of hardware failure (Fig. 2c).

At 2 months, the patient complained of increasing left hip pain and inability to ambulate. She did not report any recent falls or other traumatic events. A physical examination was notable for pain with range of motion of her hip. Review of her radiographs demonstrated an atrophic nonunion at the site of the displaced subtrochanteric femur fracture and failure of the laterally based PFLP just proximal to the fracture site (Fig. 2d). Erythrocyte sedimentation and C-reactive protein levels were normal, so 2 surgical options were reviewed with the patient—(1) placement of a fixed angle blade plate with compression at the fracture site, possible addition of autologous bone graft or other biologic agent, and initiation of teriparatide therapy or (2) THA with a distally fixed implant. The risks and benefits of each intervention were outlined, including the off label use of teriparatide to act as an anabolic agent and make bone as well as the theoretical risk of osteosarcoma. The patient, in concert with her family and surgeon, selected THA.

The next morning, she underwent removal of hardware and reconstruction of the left hip via a posterior approach. A large amount of the proximal femur necessitated resection as it was deemed intraoperatively to be nonviable. Once the nonunion was resected back to healthy bone, a PFR was required for reconstruction of the left hip (Fig. 3a). Intraoperative range of motion at the hip joint was observed to be stable. The remainder of the patient's hospitalization was uneventful. She was able to ambulate with physical therapy on postoperative day 1 and was subsequently discharged to a skilled nursing facility for further rehabilitation with left-sided posterior hip precautions and touch down weight-bearing restrictions.

At 6 weeks, she reported good pain control on occasional oral narcotic pain medication. Her incision was healed. She was routinely ambulating over 300 feet with a front-wheel walker. She was advanced to weight bearing at tolerated and instructed to begin weaning her assistive device. At 3 months, she reported good pain control off oral narcotic pain medication and was ambulating over 300 feet with a cane. At 2 years, she reported no pain, however, still required a cane (Fig. 3b). Her Harris hip score had improved dramatically from 20 preoperatively to 80 at final follow-up.

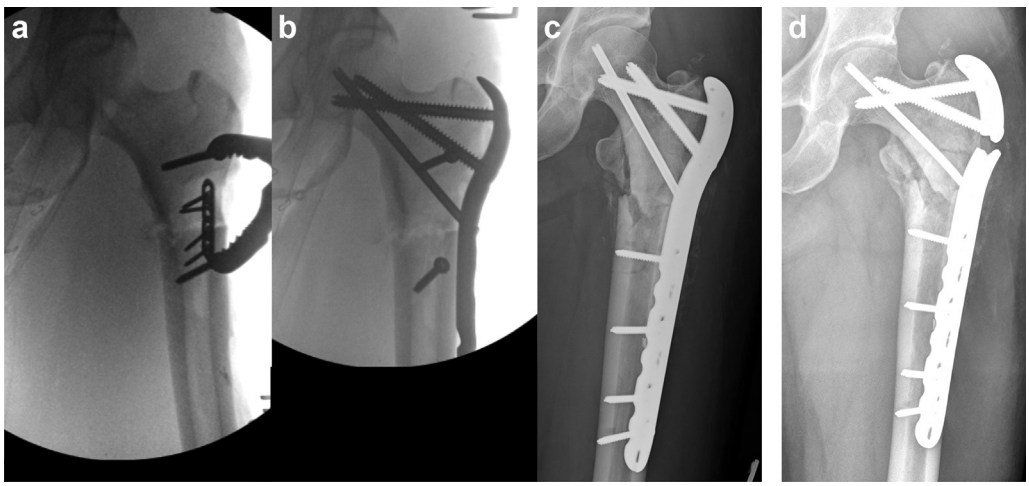

Figure 2. (a) Flouroscopic view of compression being applied via a Farabeuf clamp. (b) Flouroscopic view after application of the proximal femoral locking plate. (c) AP radiograph of the left hip after treatment of the bisphosphonate-related femur fracture with compression and a proximal femoral locking plate. (d) AP radiograph of a bisphosphonate-related femur fracture treated with a proximal femoral locking plate that went on to implant failure.

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