



CASE REPORT

Subcapital femoral neck fracture after removal of Gamma/Proximal Femoral nails: report of two cases

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Accepted 30 October 2004

Introduction

The removal of metalwork occasionally causes unexpected problems. Removal may not be possible⁹ and healed bone may be split during removal.⁵ From March 1993 to March 2003, 269 Asian-Pacific type Gamma nails and 127 Asian type Proximal Femoral nails (PFN)⁷ were inserted for peri-trochanteric fractures at our institute. Nine Gamma nails and five PFNs (3.5%) were removed after bone union due to persistent pain at the buttock and thigh caused by the prominence of a nail tip or a lag screw. We experienced two cases of insufficiency fracture of the femoral neck after removal of the implant.

Case 1

A 64-year-old woman was admitted to the emergency room following a fall at home. Plain radiographs showed a left trochanteric fracture (AO classification 31-A1.2). This was reduced and fixed with a Gamma nail (Asian-Pacific type) without difficulty. A dual-energy X-ray absorptiometry

(DXA) scan showed a T-score in the trochanteric region on the normal side of -4.45 . At 6 weeks, she was walking full-weight-bearing without supports and bony union was occurred by 20 weeks. She complained of buttock pain due to prominence of the tip of the nail over the greater trochanter (Fig. 1A).

The Gamma nail was removed at 16 months postoperatively due to continuing discomfort. The patient was discharged with bilateral crutches, but returned to the clinic 2 weeks after removal of the hardware complaining of a left inguinal pain. There had been no traumatic events postoperatively. Plain radiography showed a subcapital femoral neck fracture (Fig. 1C). The patient then underwent closed reduction and internal fixation with three cannulated screws. On final follow-up, bone union was observed and she was able to walk full-weight-bearing at 7 months.

Case 2

An 80-year-old woman was admitted to our emergency room after a fall in the bathroom. She complained of left hip pain, and a plain radiograph showed an unstable trochanteric fracture (AO

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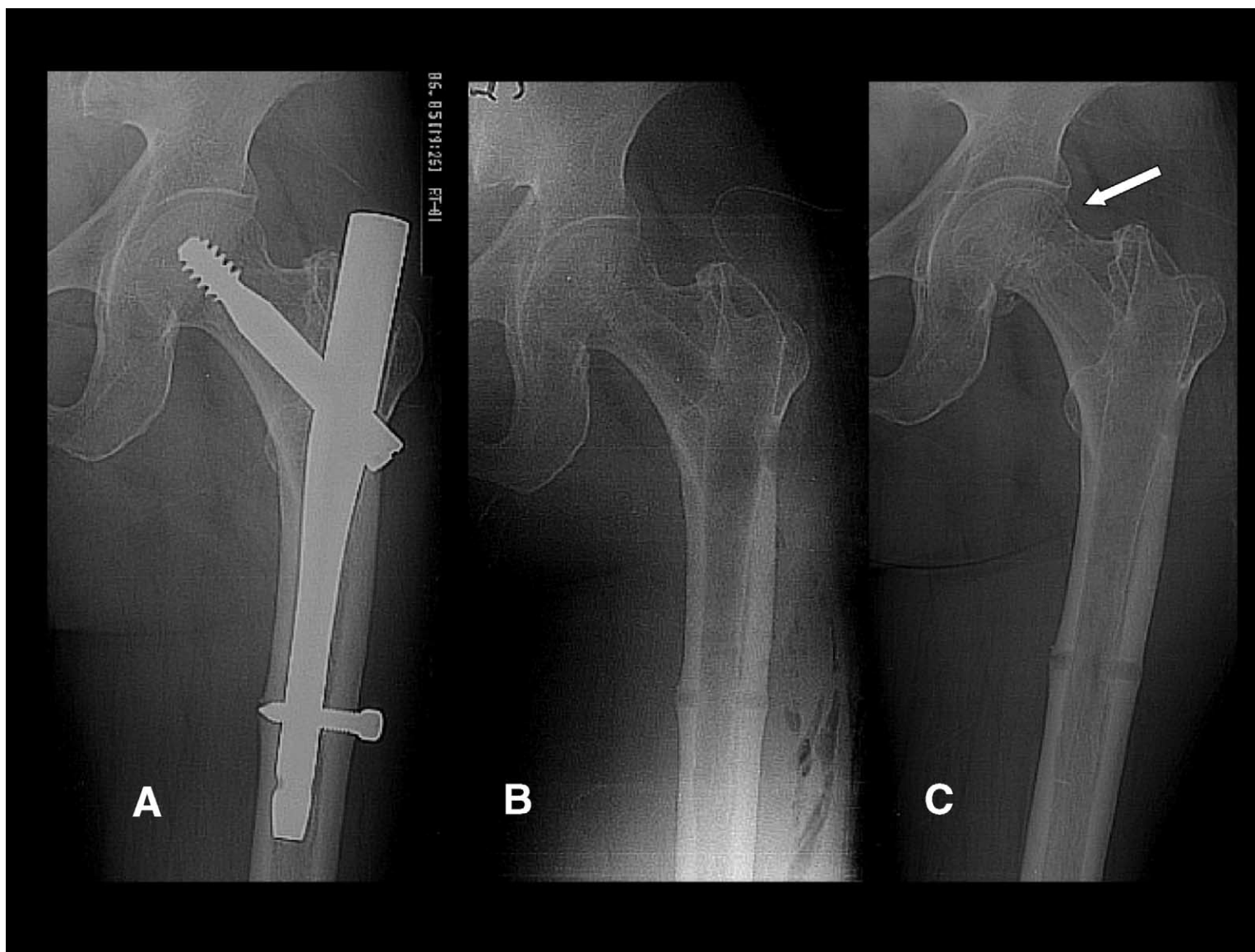


Figure 1 (A) Postoperative radiograph at 16 months shows union of the trochanteric fracture and prominence at the proximal tip of the Gamma nail. (B) Immediate postoperative radiograph of the hip after removal of the nail. (C) Postoperative radiograph at 2 weeks shows a subcapital femoral neck fracture (arrow).

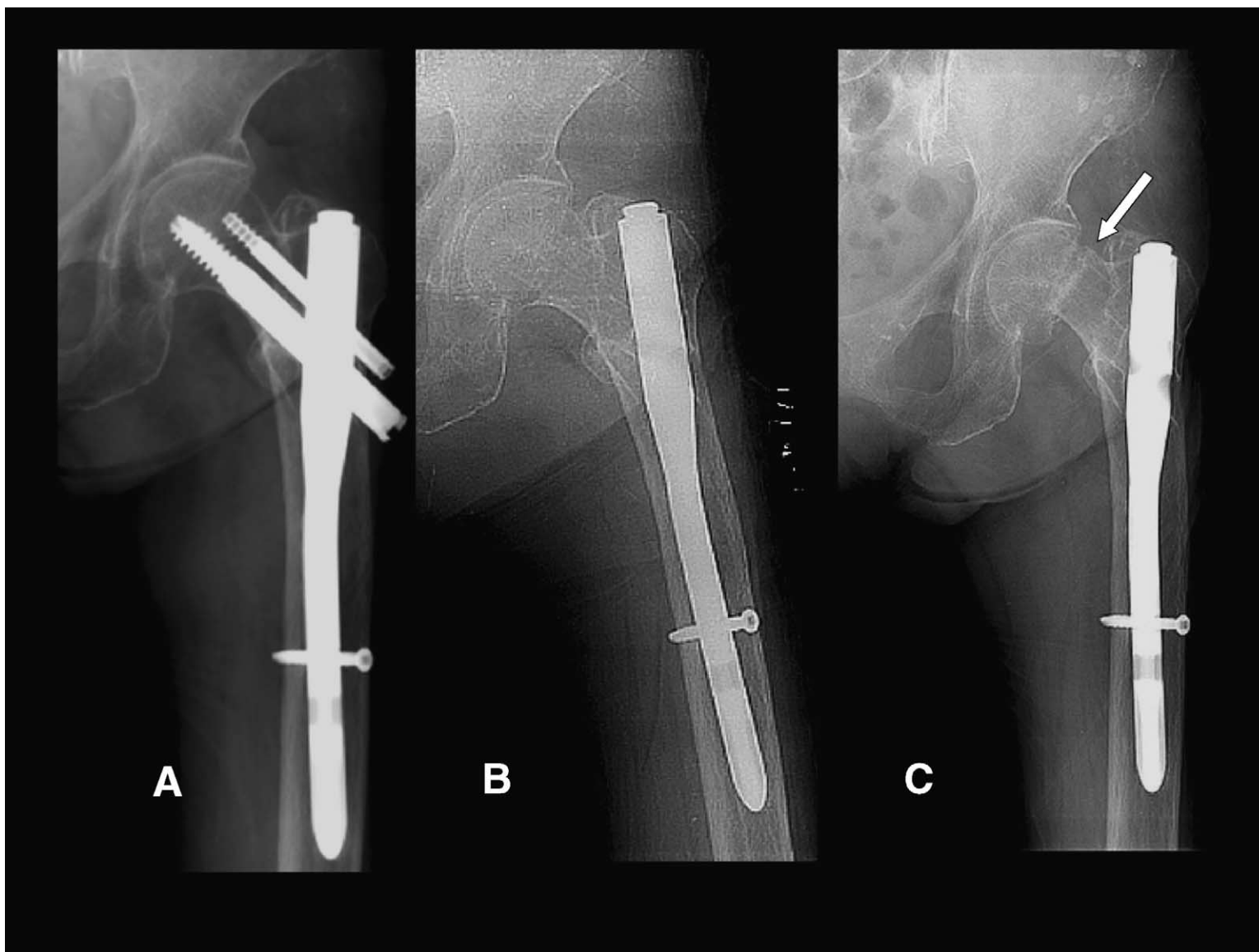


Figure 2 (A) Eighteen months follow-up radiograph after insertion of the PFN shows excessive sliding of the hip pin and femoral neck screw. (B) Immediate postoperative radiograph of the hip after removal of the screws. (C) Postoperative radiograph at 2 weeks shows a subcapital femoral neck fracture (arrow).

classification 31-A2.1). Closed reduction and internal fixation was performed with PFN, and she was discharged 3 weeks postoperatively, partial-weight-bearing. At the 5 months follow-up, she was able to walk without a walking aid but she complained of continued left hip pain, and a plain radiograph revealed excessive sliding of the lag screw and hip pin (Fig. 2A). Conservative management with medication was tried for 1 year, but at 18 months the pain still persisted so the hip pin and femoral neck screw only were removed, and the patient was allowed to walk with bilateral crutches. At 2 weeks postoperatively, the patient returned to clinic complaining of left inguinal pain. The plain radiograph showed a subcapital femoral neck fracture (Fig. 2C). Bipolar hemiarthroplasty was offered, but she refused.

Discussion

The causes of femoral neck fracture after fixation and healing of the trochanteric and/or subtrochanteric fracture are not clear. Subcapital femoral neck fracture occurs around the margin of the lag screw of the sliding hip screw (SHS),² fixed angle plate,⁸ femoral nail³ and Zickel nail.⁶ To prevent this complication, it is recommended that the lag screw is inserted close to the subchondral bone of the femoral head. Femoral neck fractures after removal of the implants, which were inserted for the treatment of trochanteric fracture, have also been reported.^{8,9} They occur after removal of the SHS,¹ fixed angle blade plate¹ and the Gamma nail.⁴ Kukla et al.⁴ studied the biomechanics of the femur after implant removal. Removal of the Gamma nail decreased the resistance to fracture of the femoral neck by about 41% compared to the 20% of dynamic hip screw (DHS). The lag screw diameters of the DHS, PFN, and Gamma nail are 8, 11 and 12 mm, respectively. When the diameter of the lag screw

reaches a certain size, the incidence of fracture increases geometrically. Because, the bone defect after implant removal further weakens a femoral neck with preexisting osteoporosis. If excessive sliding of the lag screw causes persistent hip pain after intramedullary hip nailing, the lag screw should be replaced with a shorter one, rather than removing the implant. In addition, pain in the hip region may imply an impending subcapital femoral neck fracture. Filling up the defect after hardware removal with bone graft or bone graft substitute may be considered if removal of the nail and lag screws is unavoidable.

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