Insufficiency fracture of the proximal fibula and then tibia: a case report

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ABSTRACT

Elderly people with osteoarthritis of the knee and postpartum women are at risk of insufficiency fractures of the proximal fibular or tibia. We report on an 82-year-old woman with valgus osteoarthritis of the knee who developed insufficiency fractures of the right proximal fibula and then the right proximal tibia. She underwent total knee arthroplasty using a long tibial stem and a tibial locking plate with the Less Invasive Stabilization System.

Key words: fibula; fractures, stress; osteoarthritis; tibia

INTRODUCTION

Stress fractures can be classified into (1) fatigue fractures that involve repeated abnormal stress on normal bones and (2) insufficiency fractures that involve normal stress on deficient bones. 1 Fatigue fractures of the proximal fibula or tibia usually result from jumping and running activities in military recruits or athletes. 1 Occurrence in a rower is rare. 2 The distal third fibula is the most common site of involvement. 1 Elderly people with osteoarthritis of the knee and postpartum women are at risk of insufficiency fractures. 3-6 The injury mechanism involves a combination of compression loading, biceps femoris contraction, and shear fatigue. 3 We report on an 82-year-old woman with valgus osteoarthritis of the knee who developed insufficiency fractures of the right proximal fibula and then the right proximal tibia. She underwent total knee arthroplasty using a long tibial stem and a tibial locking plate with the Less Invasive Stabilization System. 7

CASE REPORT

In December 2009, an 82-year-old woman presented with a 2-year history of bilateral knee pain and progressive valgus deformity of her right knee. The right knee pain was more severe and she walked with a stick. The active range of motion of her right knee was 0 to 120°. Radiographs showed osteoporotic...
bones, and the valgus angle of the right knee was 20° when non–weight bearing and increased to 30° on standing (Fig. 1). She had refused to undergo total knee arthroplasty some years previously. She became unable to walk after she had sudden severe exacerbation of right knee pain while walking along the street. There was tenderness at her right proximal fibula and grade-3 laxity of the medial collateral ligament of her right knee. There was no pain, swelling or tenderness over the right proximal tibia. Radiographs showed a right proximal fibular fracture (Fig. 2a). She was treated conservatively with a knee brace and touch down weight-bearing walking with crutches. Two weeks later, she had spontaneous onset of right proximal tibial swelling and pain. Radiographs showed an incomplete fracture of the right tibia (Fig. 2b).

She underwent total knee arthroplasty using the Less Invasive Stabilization System. A long tibial stem was used to bypass the tibial fracture, and a locking plate was applied to the lateral tibial cortex across the implant to confer rotational stability (Fig. 3). Postoperatively, gradual weight-bearing walking was allowed. Callus formation at the tibial and fibular fracture sites was noted at week 6 (Fig. 4). Pain subsided completely, and she could resume full weight-bearing walking at month 3.

**DISCUSSION**

The fibula receives only 6.4% to 16.7% of the load transmitted from the lower extremity. Thus, insufficiency fractures of the fibula are rare. Valgus deformity of the knee produces abnormal loading of the proximal fibula and tibia. Stress fractures of the lateral tibial plateau or the proximal tibia in severe valgus deformity of the knee have been reported.

The proximal fibula provides mechanical support to the lateral side of the proximal tibia and knee joint. The fibula, whether broken or intact, determines the angulatory behaviour of tibial plateau fractures under weight-bearing and functional

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**Figure 1**  (a) Osteoporotic bone and 20° of valgus deformity of the right knee when non–weight bearing and (b) valgus deformity increasing to 30° on standing with opening up of the medial joint space.

**Figure 2**  Insufficiency fractures of the (a) right proximal fibula and (b) right proximal tibia (arrows).
Insufficiency fracture of the proximal fibula and then tibia

Isolated fractures of the lateral tibial condyle do not collapse further with the support of an intact fibula. In our patient, the loss of the lateral support provided by the fibula resulted in abnormal eccentric loading of the tibia. The proximal tibia then fractured at the medial cortex (tension stress). Total knee arthroplasty using a long tibial stem to bridge the tibial fracture was the treatment of choice, as it corrected the deformity, stabilised the fractures, and treated the osteoarthritis. Locked plating systems are effective in treating complex periprosthetic fractures around the knee and enable early motion in complex fractures. Total knee arthroplasty was supplemented with a tibial locking plate using the Less Invasive Stabilization System to avoid exposure of the tibial fracture site. This provided additional fracture stabilisation and hastened the fracture healing.

**DISCLOSURE**

No conflicts of interest were declared by the authors.

**REFERENCES**