

# Extreme Injuries from Yoga - Case Report of Two Femur Shaft Fractures

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## ABSTRACT

The practice of yoga has rapidly gained popularity in the past two decades amongst various ages due to its innumerable health and physical benefits. While largely a safe form of calisthenics, fractures as a result of its practice have been described in the literature. Uncommonly however, these fractures can occur in the femur, one of the strongest bones in the skeletal system. At the time of writing, there was only one other case report of femur fracture during yoga [1]. We present two cases of femur fracture in otherwise healthy adults from yoga practice.

**ABBREVIATIONS:** A2FN: A2 Femoral Nail; FRN: Femoral Recon Nail; BMD: Bone Mineral Density; SFEs: Spinal Flexion Exercises

## INTRODUCTION

Yoga rapidly gained popularity in the past two decades amongst various ages due to innumerable widely believed health and physical benefits from continued practice. Physical injuries arising from the practice of yoga are also becoming increasingly common. Reported physical injuries include virtually any part of the body from the axial skeleton to all four limbs most of them being minor injuries such as sprains and strains [2]. Severe injuries such as fractures and joint dislocations are rare. We present two cases of femur fracture in healthy adults from yoga practice despite the femur being one of the strongest bones in the skeletal system. To our knowledge there is only one case report of femur fracture during yoga [1].

## CASE 1

A previously healthy 33-year-old woman was in the middle of a yoga position where she was lying on her back with her legs up and arms being used to prop herself up. She reported that the instructor axially loaded her thigh, which was followed by an audible snapping sound. This was accompanied by severe pain and inability to weight bear thereafter. On arrival at the Emergency Department, her left leg was shortened and externally rotated with an obvious deformity

without an open wound. Her leg compartments were soft, distal foot pulses were present without any neurological deficits. There were no other detected injuries.

Radiographs of her left femur performed in the Emergency Department revealed a left mid-shaft femur spiral fracture without comminution. A temporary traction splint was applied to the left leg. Her femur fracture was expediently treated with intramedullary antegrade nailing with a 360mm length 9mm diameter Expert A2 Femoral Nail (A2FN) (DePuy Synthes) proximally locked with 2 interlocking screws in the standard locking configuration. Distally the nail was locked with 2 screws. Additional minimally invasive cerclage wire was placed to assist reduction prior to nailing. An intraoperative bone tissue sample was taken and sent for histological analysis and was negative for any malignancy. Mild hypocalcaemia (Ca = 2.17mmol/L) and Vitamin D deficiency (Vit D = 20µg/L) was detected, and oral supplementation was given. Her Bone Mineral Density (BMD) scan did not show any osteoporosis. Post-operatively, full weight-bearing was allowed on the left leg. With inpatient rehabilitation, she was discharged home on the seventh post-operative day (Figure 1).

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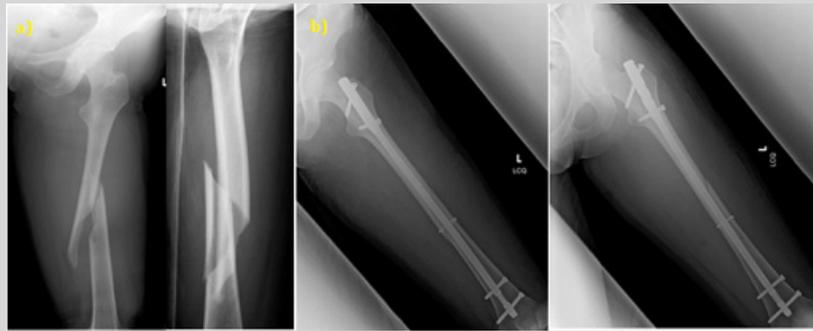


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**Figure 1:** a) Preoperative images of left midshaft spiral fracture and b) intramedullary nailing of left femur fracture with A2FN and cerclage wire.

## CASE 2

A previously healthy 54-year-old woman was lying with her back on the floor with her hip flexed during a deep stretch. Her instructor was applying an axial loading force with her hip in internal rotation. This was followed by an audible snap, severe pain and inability to weight bear thereafter. Similar to Case 1, her left leg was shortened with an obvious deformity in the upper thigh and significant swelling. There were no open wounds or distal neurovascular compromise. Radiographs performed in the Emergency Department showed spiral pattern subtrochanteric fracture with significant comminution. A temporary traction splint was applied on her left leg.

She underwent emergency antegrade intramedullary nailing her left subtrochanteric fracture with a 320mm length, 9mm diameter Femoral Recon Nail (FRN) (DePuy Synthes) with 2 reconstruction proximal screws and 2 distal interlocking screws. Two cerclage wires were placed not to aid reduction due to the high level of circumferential comminution, but to lasso the anteromedial fragments down onto the femur to aid healing. Her serum calcium levels were normal, but she was vitamin D deficient (Vit D = 16µg/L). Oral supplementation was given to replace the Vitamin D level. Her BMD revealed osteopenia. Her Fracture Risk Assessment Score (FRAX) score was 0.6% for hip fracture and 2.3% for major osteoporotic fracture. Post-operatively, she was allowed full weight bearing and she was discharged home post-operative day 9 (Figure 2).



**Figure 2:** a) Preoperative images of left subtrochanteric spiral fracture with circumferential comminution and b) intramedullary nailing of left femur fracture with FRN and cerclage wires.

## DISCUSSION

In most developed countries including Singapore, there is a growing consciousness toward sport and fitness. Increasingly, there is recognition of the positive impact exercise has on both physical and mental health. Calisthenic activities such as yoga are gaining popularity due to their ease of access, requiring as little as a yoga mat and an instructional video to get started. Health benefits are a strong appeal and on top of improving general fitness may help to alleviating back pain [3] and improved sleep quality [4]. Fractures as a result of yoga are rare especially in the context of a long bone. In the literature, case reports of a great toe proximal phalanx fracture [5], distal tibia epiphyseal separation [6], and two case series of vertebral compression fractures [7-8] as a result of yoga have been reported. Vertebral compression fractures are likely the most common yoga associated fracture. The common causative yoga exercise identified by the two case series were

spinal flexion exercises (SFEs). All nine of their patients described acute lower back pain following SFEs leading to their diagnosis of acute vertebral compression fractures [7]. By BMD criteria, only five of the nine patients had osteoporosis. At the time of writing, only one other case report of femur fracture from yoga [1] was found. The novelty of this paper belies the scarcity of literature on yoga associated fractures. Distinct from the yoga associated femur fractures presented in this case study, stress fractures of the lower limb are relatively well documented in the literature [9-11]. These tend to develop under repeated loading and overuse, culminating in complete fractures under sufficient loading force. Bending forces are the most commonly implicated deforming force in their development [12]. Modifiable extrinsic risk factors such as body weight, hypovitaminosis D and hypocalcaemia have a role in reducing risk of fracture. For example, Vitamin D (800 iU/d) supplementation has been shown to reduce risk of hip fracture by up to 26% in the elderly [13]. In this paper we have identified factors

contributing to fracture. Strategies can be developed to address modifiable risk factors such as body weight, hypovitaminosis D, and hypocalcaemia.

## CONCLUSION

Although yoga and Pilates are seemingly safe, severe injuries such as femur fractures have resulted from inappropriate or even over-zealous practice. Care is needed to avoid such injuries during yoga and Pilates. Evaluation of any underlying risk factor or stress fracture maybe necessary to avoid a similar occurrence in future.

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