



*Case Report*

# **Femoral Nerve Injury Due to an Open Subtrochanteric Hip Fracture – The Importance of Early Detection and Implication for Rehabilitation**

**Tim Harrison<sup>1</sup>, Chun Shing Kwok<sup>2</sup>, David Wordsworth<sup>1</sup>  
and Christopher Terence Jackson Servant<sup>3</sup>**

<sup>1</sup>Trauma and Orthopaedics Surgery, East Anglia and Cambridge Training Programme, United Kingdom

<sup>2</sup>East Anglian Foundation School, United Kingdom

<sup>3</sup>Trauma and Orthopaedics, Ipswich Hospital, United Kingdom

Correspondence should be addressed to: Christopher Terence Jackson Servant; [chris.servant@virgin.net](mailto:chris.servant@virgin.net)

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## **Abstract**

**Purpose:** Here we present the unusual case report of where a woman sustained a traumatic injury causing an open right subtrochanteric hip fracture which damaged the femoral nerve.

**Case Report:** A 39-year old woman presented with an open right subtrochanteric hip fracture following an accident at work where a large heavy pallet fell onto her causing both hips to hyperextend. She sustained 10 cm transverse wound near the groin crease and the proximal end of the shaft of the femur was visible in the wound. Initial neurological examination was limited by the fracture and associated pain but it was noted that she had decreased sensation to light touch in the distribution of the femoral nerve. She was taken to theatre that day and underwent debridement with exploration of the right groin and fracture fixation with a femoral nail. She recovered well post-operatively though was noted to have patchy numbness over the leg in a non-dermatomal pattern. Subsequent EMG examination demonstrated a near complete lesion to the right femoral nerve to quadriceps. She continued physiotherapy and gradually improved but three years after the injury she still struggles with her gait because of reduced hip flexion power and restricted knee flexion.

**Conclusions:** This case highlights the importance of assessing femoral nerve function after open subtrochanteric femur fractures and the implications of this injury for rehabilitation and recovery.

**Keywords:** Trauma, hip fracture, open fracture, femoral nerve injury.

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## Introduction

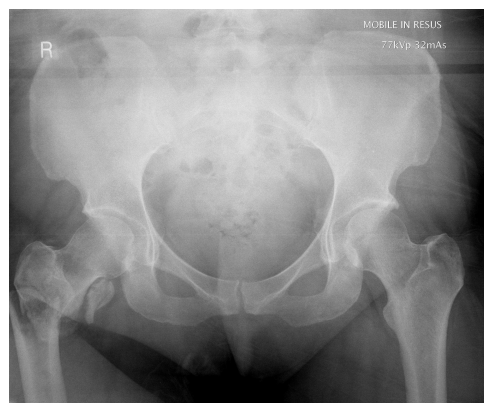
Subtrochanteric hip fractures account for 10-30% of hip fractures [1]. Open subtrochanteric fractures are typically the result of high-energy blunt or penetrating mechanism [2]. Open subtrochanteric fractures due to blunt trauma are rare because of the thick investing muscular envelope of the proximal thigh so significant displacement at time of injury is required to produce an open injury due to blunt trauma [2]. Associated nerve injuries are rare and though cases of sciatic, obturator and pudendal nerve injury have been reported we could find no previous reports of femoral nerve injury [3-5]. This case highlights the importance of assessing femoral nerve function after open subtrochanteric femur fractures and the implications of this injury for rehabilitation and recovery.

## Case Report

The patient gave informed consent to be included into this case report.

A 39-year old woman who works in a supermarket store presented with an open right subtrochanteric hip fracture following an accident at work. She was unloading a lorry and a large heavy pallet fell onto her causing both hips to hyperextend.

On examination in the emergency department there was a 10cm transverse wound near the groin crease and the proximal end of the shaft of the femur was visible in the wound. Distal pulses were intact; the initial neurological examination was limited by the fracture and associated pain but it was noted that she had decreased sensation to light touch in the distribution of the femoral nerve. She was also noted to have grazes over the anterior aspect of both knees and was tender over both medial collateral ligaments. Her X-ray is shown in Figure 1.



**Figure 1: Pre-Operative X-Ray Showing Femoral Fracture**

She was taken to theatre that day and underwent debridement with exploration of the right groin and fracture fixation with a short ITST femoral nail (intertrochanteric / subtrochanteric fixation femoral nail, Zimmer). The femoral nerve was not formally explored but the femoral pulse was palpable

and there was no significant bleeding. Examination under anaesthesia of both knee at the end of the operation revealed a stable right knee and grade II valgus laxity of the left knee indicative of a medial collateral ligament injury. The post-operative X-ray is shown in Figure 2.



**Figure 2: Post-Operative X-Ray Showing Fracture Fixation with Short Intertrochanteric/Subtrochanteric Femoral Nail**

She recovered well post-operatively though was noted on the second day to have patchy numbness over the leg in a non-dermatomal pattern. When she was seen in clinic 4 weeks after surgery it was noted that she had decreased sensation over the anterior thigh and grade 1 power of her quadriceps. Subsequent EMG examination demonstrated a severe lesion to the right femoral nerve to quadriceps. This was nearly complete with the exception of a few motor units in vastusintermedius.

She was referred to the regional peripheral nerve injury unit who felt there was some gradual improvement and continued to monitor her progress. By 5 months her power had improved to 4-/5 but flexion was limited to 90 degrees by anterior knee pain. Saphenous nerve function was nearly normal.

At the most recent review at the three year mark she is still struggling with her gait, has reduced hip flexor power (4/5) and restricted knee flexion to 70 degrees. She has developed iliotibial band syndrome due to altered gait and continues to have physiotherapy.

It is unknown whether the patient is seeking medicolegal compensation for her work injury.

### Discussion

The subtrochanteric region is defined as a below the lesser trochanter to 5 cm distally in the shaft of femur [6]. Subtrochanteric fractures are most commonly seen in older patients with pathological bone (osteoporosis or metastatic disease). In younger patients they are usually the result of high energy injuries.

Although injuries to the sciatic, obturator and pudendal nerve have been associated with subtrochanteric fractures and there treatment, we could not find previous reports of an associated femoral nerve palsy [3-5]. This maybe related to the anatomy of the femoral nerve; on entering thigh, after passing under the inguinal ligament, the femoral nerve immediately branches to innervate the muscles of the anterior compartment and is not a single trunk like the sciatic nerve. Therefore unless lesions are very proximal (near the groin crease) they may not present clinically as such a complete and obvious injury.

Early recognition of afemoral nerve palsy is important as it has significant rehabilitation implications. Nerve conduction studies may help guide recovery potential as the estimated axonal loss has been shown to be prognostic in femoral neuropathy recovery [7].

Despite the success of the surgical treatment and subsequent fracture union, our patient is still significantly disabled three years after the injury. Thorough assessment and documentation of the deficit pre-operatively confirmed the nerve injury was related to the fracture and not the surgical debridement. Although features of a femoral nerve injury were present pre-operatively, the treating surgeon elected not to explore the nerve formally as it was felt that a complete femoral nerve transection was unlikely and formal exploration carried a risk of iatrogenic damage. Initial observation of the recovery of the injury was felt to be appropriate. The subsequent EMG examination confirmed that the nerve injury was an axonotmesis (severe stretching or contusion) rather than a neurotmesis (complete transection). In the event that a complete transection had occurred, then the patient would have been referred to the regional peripheral nerve injury unit earlier.

This report highlights the importance of assessing femoral nerve function in patients with open subtrochanteric femur fractures, particularly sensation as testing of femoral nerve motor function is compromised by the presence of the fracture.

Nerve injuries associated with subtrochanteric fractures are rare and to our knowledge, this case is the first to report a femoral nerve injury associated with subtrochanteric fracture. The associated femoral nerve injury can be easily missed on initial assessment but has important implications for prognosis and rehabilitation.

#### Statement

This is a retrospective study and the need for informed consent was waived by the ethical committee since rights and interests of the patients would not be violated and their privacy and anonymity would be assured by this study design. The research conforms to the Declaration of Helsinki.

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