

Case Report

Combined pudendal and sciatic nerve palsy following intramedullary nailing in fracture shaft femur: a rare case report

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Abstract: Traction tables have been widely used by orthopaedic surgeons for the management of femoral shaft fractures. Although complications associated with their use are uncommon, they can still occur. Among neurological complications, sciatic and pudendal nerve palsies are the most frequently reported. Recognizing the potential causes and analyzing these complications are crucial for raising awareness among surgeons and implementing preventive strategies to enhance patient safety during surgical procedures. A 22-year-old male sustained a comminuted fracture of the left femoral shaft following a road traffic accident. The patient had an intact distal neurovascular status (DNVS) at presentation. Open reduction and internal fixation (ORIF) with femoral interlocking nail (FIN) was done using a traction table. Post-operatively, he developed signs of both sciatic and pudendal nerve palsy. The simultaneous occurrence of pudendal and sciatic nerve palsy is rare. In this case, pudendal nerve palsy was likely caused by prolonged traction with sustained hip adduction throughout the procedure, while sciatic nerve palsy was attributed to postoperative hematoma formation. To minimize such complications, it is advisable to limit soft tissue dissection during femoral shaft fracture reduction and promptly release traction after interlocking screw placement. Additionally, adherence to a "tourniquet safety protocol" that is, releasing traction every 120 minutes in prolonged surgeries can be beneficial. Hip adduction beyond the neutral position should also be avoided to reduce the risk of nerve injury.

Keywords: Femur fracture, traction table, complications, pudendal nerve palsy, sciatic nerve palsy

Introduction

Intramedullary (IM) nailing is a widely accepted and effective treatment for femoral shaft fractures due to its minimally invasive approach, reliable fixation, and promotion of early mobilization. However, its use particularly when aided by traction tables can lead to rare but serious complications, including nerve injuries. Among these, sciatic and pudendal nerve palsies are significant due to their functional implications [1-3]. Sciatic nerve palsy following femoral IM nailing has been attributed to various intraoperative factors such as excessive traction, prolonged surgical duration, iatrogenic injury from instruments (e.g., Heygroves clamps), nerve entrapment at the fracture site, and postoperative hematoma formation [4, 8, 11]. Additionally, sciatic nerve palsy may present in a delayed fashion due to anticoagulant use or as

a complication of the hemi-lithotomy position on the orthopaedic traction table [5].

Pudendal nerve injury, though less commonly reported in orthopaedic literature, is frequently associated with the use of perineal posts on traction tables [1, 6]. Compression of the nerve between the perineal post and ischium can result in perineal numbness, sexual dysfunction, or urinary symptoms [1, 2, 6]. The risk increases with smaller post diameters, inadequate padding, sustained traction, and excessive hip adduction [3, 7]. Brumback et al. noted that pudendal nerve palsy is primarily caused by high intraoperative traction forces rather than just the duration of surgery [1]. Lindenbaum et al. showed that smaller post diameters concentrate perineal pressure, increasing the likelihood of nerve injury [3].



Figure 1. 22 year/male sustained injury to left thigh. Radiograph of left thigh (antero-posterior and lateral views) showing comminuted fracture shaft left femur.

Although isolated cases of either sciatic or pudendal nerve palsy following femoral nailing have been reported, simultaneous involvement of both nerves is exceedingly rare. To our knowledge, no prior case has documented this specific combination. Here, we present a rare case of combined pudendal and sciatic nerve palsy following IM nailing of a femoral shaft fracture using a traction table, emphasizing the importance of surgical awareness, appropriate intraoperative positioning, and preventive strategies to mitigate such neurovascular complications.

Case presentation

A 22-year-old male with a body mass index (BMI) of 35 kg/m² sustained a closed injury to his left thigh following a road traffic accident (RTA). On presentation, there was diffuse swelling and deformity over the left thigh. Distal neurovascular status (DNVS) was intact. Radiographs of the left thigh (anteroposterior and lateral views) revealed a comminuted fracture of the femoral shaft (**Figure 1**). The patient was taken for surgery on the same day. Under neuraxial anaesthesia, he was positioned supine on a traction table. The injured limb was secured in a boot with proper padding, and baseline traction was applied to bring the limb into a

neutral position. A cotton-padded perineal post (9 cm diameter) was applied on the left side. The fractured leg was positioned in approximately 20° of hip flexion and 20° adduction, while the unaffected limb was placed in 90° hip and knee flexion. A 5 cm lateral skin incision was made from the tip of the greater trochanter extending toward the anterior superior iliac spine (ASIS). After dissecting through subcutaneous tissue and muscle, the tip of the greater trochanter and piriform fossa were palpated manually. Entry into the femur was made via the piriform fossa using a hand-held awl under fluoroscopic guidance. A guidewire was inserted into the proximal femoral fragment. An 8 mm hand reamer was used to open the proximal canal. Fracture alignment was achieved under fluoroscopy by increasing traction, lifting the proximal fragment, and manually aligning the distal segment. The guidewire was advanced into the distal fragment. Serial reaming was done up to 11 mm in 1 mm increments. Upon using the 11 mm reamer, comminuted fragments were noted to have displaced and rotated) (**Figure 2A, 2B**). A 36 × 11 mm femoral interlocking nail was inserted with the proximal jig. However, due to persistent malalignment, the fracture site was surgically exposed via a lateral approach, and the fragments were manually derotated using a haemostat. No cerclage or fixation sutures were applied (**Figure 2C**). After confirming satisfactory reduction, the wound was irrigated and closed in layers. Total operative time was 135 minutes (**Figure 3**).

Postoperatively, the patient developed ipsilateral foot drop with approximately 20% sensory loss below the inguinal ligament, particularly in the perineal and scrotal regions. He also complained of urinary incontinence and erectile dysfunction. Clinical examination revealed decreased dorsiflexion strength (0/5, Medical Research Council grading), diminished sensation over the perineum, and absent cremasteric reflex on the affected side. Anal sphincter tone was mildly reduced. These findings suggested involvement of both the sciatic and pudendal nerves. Further evaluation included ultrasonography of the left thigh on postoperative day 1, which revealed a 50-60 ml hypoechoic collection along the lateral aspect of the thigh. Although the patient had no fever or pain, the swelling prompted surgical re-exploration the same day. Approximately 50 ml of blood was drained, and the wound was irrigated. Gram stain revealed abundant pus cells with no

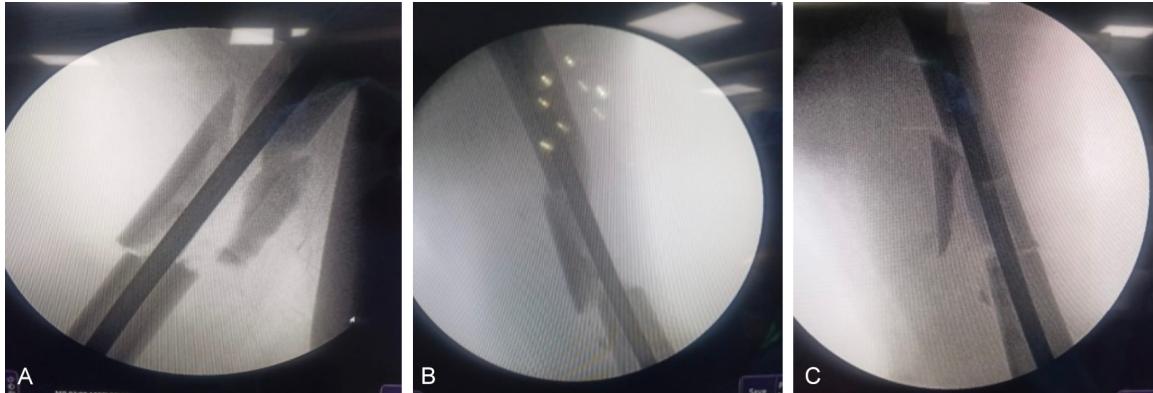


Figure 2. Intra-operative lateral (A) and antero-posterior (B) iitv views showing displaced fracture fragments with hand reamer of diameter 10 mm insitu. IITV antero-posterior view after fragment manipulation (C). IM- intramedullary, IITV- image intensifying television.

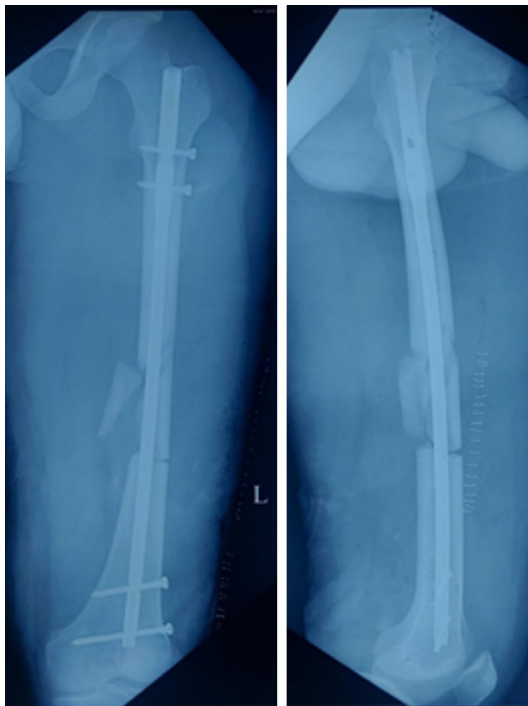


Figure 3. Immediate post-operative X-ray showing intra-medullary nail in-situ with moderately displaced middle fragment.

identifiable organisms, and culture sensitivity showed no microbial growth. Following drainage, the patient's perineal sensation gradually improved, and urinary incontinence and erectile dysfunction resolved by postoperative day 3. Early flickering movement of the ankle and extensor hallucis longus (EHL) was noted at three weeks. At one-year follow-up (telephonic), the patient reported improved dorsiflexion with power graded as 3/5 and complete resolution of sensory deficits.

Discussion

This case highlights a rare but clinically significant occurrence of simultaneous pudendal and sciatic nerve palsy following intramedullary nailing (IMN) of a femoral shaft fracture using a traction table. While isolated nerve injuries have been described in the literature, the combined presentation remains exceedingly rare (**Table 1**). This case offers valuable insights into potential mechanisms, clinical recognition, and practical strategies for the prevention and management of nerve injuries in orthopaedic trauma surgery.

Diagnosis and clinical recognition

Neurological complications following IMN may be under-recognized, particularly when masked by post-operative pain or swelling. In our case, the patient presented postoperatively with ipsilateral foot drop, perineal numbness, urinary incontinence, and erectile dysfunction, all signs suggestive of combined sciatic and pudendal nerve involvement. Prompt clinical assessment, including detailed neurological examination, is critical in identifying such deficits early. Sensory loss below the inguinal ligament and motor weakness of dorsiflexors should alert the surgeon to sciatic nerve compromise, while perineal hypoesthesia and urogenital symptoms point toward pudendal neuropathy.

Mechanisms of injury

The etiology of nerve palsies in this case was multifactorial. Pudendal nerve injury most likely resulted from prolonged compression against

Nerve palsy post IMN in femur shaft fracture

Table 1. Literature of similar case report of sciatic and pudendal nerve palsy

S. NO.	STUDY	NO OF CASES	NERVE INVOLVED	PATTERN OF INVOLEMENT	DETAILS	FOLLOW UP
1	George D Chloros et al, 2021 [8]	1	Sciatic nerve	high sciatic nerve palsy	Heygroves clamp around neck of femur was used during fracture reduction. Following fixation, patient developed symptoms of complete left sciatic nerve palsy	NCV (Nerve Conduction Velocity) at 4 months follow-up shows high sciatic nerve palsy and no functional recovery at 1 year follow-up
2	Tony G Pedri et al, 2017 [4]	1	Sciatic nerve	no sensory and motor function below knee	approximately 100 ml hematoma was drained 13 hours post-operatively	complete resolution of sciatic nerve palsy at 1 month follow-up.
3	Ioannis V Polyzos et al, 2013 [2]	Prospective study: 106, Retrospective study-63	pudendal nerve	prospective study- 10 patients had sensory loss and 1 patient had erectile dysfunction retrospective study - 7 patients had pure Sensory loss and 3 patients Had erectile dysfunction Sciatic nerve	compression neuropathy between perineum and the counter traction post	prospective study- sensory loss and erectile dysfunction resolved on 6 and 11 months follow-up retrospective study return of sensation and erection at 5.8 and 2 months rare
4	Jehad A Alzahrani et al, 2023 [5]	1	sciatic nerve	ipsilateral foot drop	fractured leg with traction in 20° hip flex position and and unaffected leg in 30° hip extension position on the other side of the post	incomplete recovery at 1 month follow-up
5	Andrea Attenasio et al, 2023 [12]	10 studies (2 prospective, 8 retrospective) total- 351 patients (293 femur shaft Fractures and 58 Hip fractures)	pudendal nerve	8 studies reported pudendal nerve palsy. Among these total 35 patients had erectile dysfunction and 22 patients had sensory loss	perineal post related complications while using traction table	variable duration of pudendal nerve palsy complete recovery ranged between 10 and 639 days

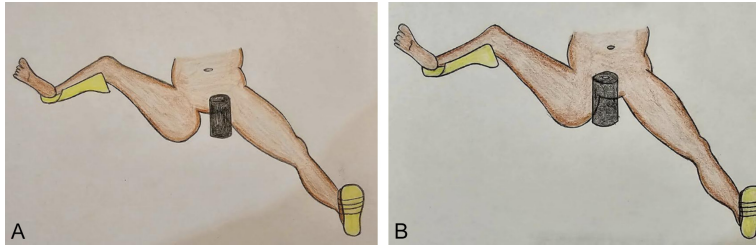


Figure 4. Schematic picture showing intra-operative position of the counter-traction post in our case (A). Schematic picture showing ideal position of the counter-traction post which should be kept while performing IM nailing of the left side shaft femur (B).

the perineal post, particularly with the hip in sustained adduction, as described in biomechanical and clinical studies (**Figure 4A, 4B**) [1, 2]. Even with adequate padding and appropriate post diameter, the combination of position and duration may create excessive perineal pressure leading to neuropraxia [3, 7].

Sciatic nerve palsy, on the other hand, is often due to iatrogenic injury or indirect compression. In our patient, the formation of a postoperative hematoma likely led to extrinsic compression of the sciatic nerve. Similar cases have been reported where delayed sciatic palsy developed secondary to hematoma formation after femoral nailing [4, 9]. Additionally, soft tissue manipulation during open reduction and excessive traction force may have contributed to neural compromise.

Comparison with literature

Brumback et al. first emphasized the importance of intraoperative traction forces in causing pudendal neuropathy, concluding that force intensity was more harmful than duration alone [1]. Lindenbaum et al. demonstrated that smaller perineal posts increase focused pressure on the perineum, predisposing to pudendal nerve compression [3]. Kao et al. and Rose et al. further supported these findings, linking smaller post diameters with higher incidence of pudendal neuropathy [6, 10]. For sciatic nerve palsy, Chloros et al. reported a case of high sciatic nerve injury caused by an improperly placed clamp during fracture reduction [8], while Pedri et al. documented complete resolution of sciatic nerve palsy after evacuation of a postoperative hematoma [4]. These cases underscore the necessity of avoiding aggressive manipulation and maintaining awareness of potential

compressive sources, including soft tissue hematomas.

Practical recommendations

This case emphasizes several key preventive and management strategies: 1) Use of a well-padded perineal post with a diameter of 8-10 cm and central positioning. 2) Avoidance of sustained hip adduction; maintain neutral or abducted hip alignment during traction. 3) Minimizing surgical duration and releasing traction intermittently during prolonged procedures. 4) Limiting soft tissue dissection during open reduction to prevent hematoma formation. 5) Early postoperative imaging (e.g., ultrasonography) when neurological deficits and limb swelling are noted.

Prompt recognition and early intervention are essential. In our case, surgical drainage of the hematoma improved the patient's neurological symptoms, highlighting the benefit of early decompression.

Conclusion

A review of the literature indicates that most cases of nerve palsy following femoral shaft fracture fixation using a traction table involve either pudendal or sciatic nerve palsy, but not both. The simultaneous occurrence of pudendal and sciatic nerve palsy, as observed in our case, is a rare presentation. This was likely due to prolonged traction force and duration with sustained hip adduction throughout the procedure, along with the development of a postoperative hematoma.

Disclosure of conflict of interest

None.

Abbreviations

IMN, Intramedullary nailing; BMI, Body mass index; RTA, Road traffic accident.

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