

Case Report

Femoral nerve palsy following total hip arthroplasty via posterolateral approach: a report of two cases and literature review

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Abstract: Femoral nerve palsy is a rare but serious complication following total hip arthroplasty (THA), particularly when performed through the posterolateral approach. Early diagnosis and prompt rehabilitation are crucial for functional recovery. We report two cases of femoral nerve palsy following THA, highlighting the clinical course, management, and outcomes. The first case involved a 53-year-old male with ankylosing spondylitis that underwent right-sided uncemented THA via the posterolateral approach. Postoperatively, he developed femoral nerve palsy, likely due to skin traction applied for residual hip flexion contracture. Early removal of traction, initiation of physiotherapy, and use of a static knee brace led to gradual recovery, with full restoration of quadriceps function by one year. The second case involved a 46-year-old obese female with a history of hip tuberculosis who underwent uncemented THA via the posterolateral approach. She developed femoral nerve palsy immediately postoperatively, likely related to intraoperative retractor placement difficulties due to tight soft tissues. Early mobilization and physiotherapy led to complete recovery of quadriceps strength within six months. Femoral nerve palsy, though uncommon after posterolateral THA, can significantly impact postoperative recovery. Awareness of risk factors such as soft tissue tightness and traction, combined with early diagnosis, rehabilitation, and supportive bracing, can lead to favorable outcomes. Surgeons must be cautious during soft tissue handling and retractor placement to minimize this complication.

Keywords: Femoral nerve palsy, total hip arthroplasty, posterolateral approach, nerve injury, rehabilitation

Introduction

Total hip arthroplasty (THA) is widely regarded as one of the most successful orthopaedic interventions for alleviating pain and restoring mobility in patients with advanced hip pathology. Despite its overall safety and efficacy, the procedure is not without risk. One of the recognized but uncommon complications is nerve injury, with an incidence ranging from 0.08% to 3.7% following THA. While the sciatic nerve is the most frequently affected, femoral nerve palsy is a rarer occurrence, especially when the procedure is performed through the posterolateral approach [1, 2].

The femoral nerve, derived from the lumbar plexus (L2-L4), is critical for motor innervation of the quadriceps muscle and for providing sensory input to the anterior thigh and medial leg. Damage to this nerve can result in weak-

ness or complete loss of knee extension, sensory disturbances in the thigh, and compromised mobility and balance [3]. Early recognition of femoral nerve palsy is crucial. Once identified, management is largely conservative and includes immediate removal of contributing factors such as traction or compressive dressings, protective knee bracing, initiation of targeted physiotherapy, and close monitoring through clinical and nerve conduction studies. Most patients experience gradual recovery over a period of 6-12 months with such measures [4, 5].

Avoiding femoral nerve injury during THA necessitates a multifactorial approach. Preventive strategies include gentle soft tissue handling, cautious placement of retractors, and avoidance of prolonged or excessive hip flexion or extension during surgery. Preoperative assessment of patients with conditions like ankylosing

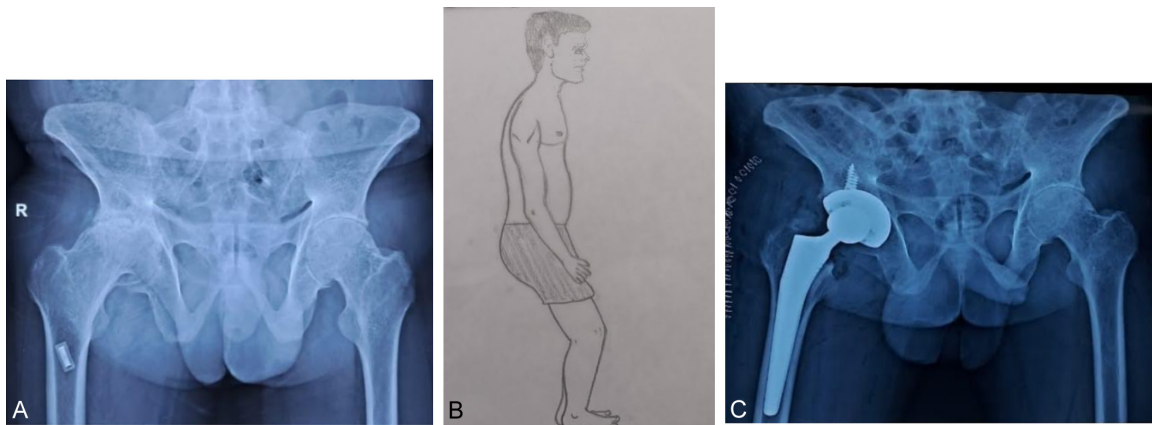


Figure 1. 53 year old male patient presented with pain in both hip. X-ray revealed concentric reduction in both hip joint spaces with fused bilateral Sacro-iliac joint space (A); Schematic clinical picture of the patient (B); uncemented right sided THA was done (C) and below knee skin traction applied to correct residual flexion deformity. Patient developed signs of femoral nerve palsy next day after surgery. Skin traction was discontinued. The femoral nerve recovered to its complete function at 1 year follow-up.

spondylitis or tubercular arthritis is important, as soft tissue contractures may complicate exposure and elevate the risk of nerve traction or compression. Using blunt-tipped retractors, avoiding excessive anterior acetabular retraction, and limiting intraoperative traction are recommended technical precautions [6-8].

In this case series, we report two rare instances of femoral nerve palsy following THA via the posterolateral approach, one in a patient with ankylosing spondylitis and the other in a patient with hip tuberculosis. Through these cases, we explore etiological factors, highlight critical intraoperative and postoperative precautions, and emphasize the importance of early diagnosis and rehabilitation in achieving favorable neurological outcomes.

Case presentation

Case 1

A 53-year-old male presented with a three-year history of bilateral hip pain, more prominent on the right side. Clinical examination revealed a fixed flexion deformity of 30° in the right hip. Radiographs showed complete joint space obliteration in the right hip, reduced space in the left hip, and bilateral sacroiliac joint fusion, confirming a diagnosis of ankylosing spondylitis (**Figure 1**). He underwent right-sided uncemented THA under spinal-epidural anaesthesia via the posterolateral approach (implants: cup size 53 mm, stem size 2, head size 32 mm;

DePuy). Intraoperatively, significant soft tissue contractures required adductor tenotomy, and due to residual hip flexion, below-knee skin traction was applied postoperatively. On post-operative day one, the patient developed femoral nerve palsy, manifesting as inability to actively extend the knee. Traction was discontinued immediately, and a comprehensive neuro-rehabilitation program was initiated. For 1 to 4 week, static quadriceps exercises (isometric), ankle pumps, passive knee range of motion exercises, static knee brace and gait training with walker were commenced. For 5 to 12 weeks, assisted SLR, neuromuscular electrical stimulation (NMES), sit to stand exercises were set forth and for 3 to 6 months, resisted knee extension using ankle weights, closed kinetic chain exercises, cycling on static bicycle and proprioceptive training were introduced. By six months, the patient had regained partial knee extension. At one year, full recovery of quadriceps strength was noted (MRC grade 5/5), and the patient resumed independent ambulation without assistive devices.

Case 2

A 46-year-old obese female of short stature presented with chronic right hip pain. Radiographs and MRI revealed joint space collapse with subchondral cysts, suggestive of tuberculous arthritis, which was confirmed on histopathology (**Figure 2**). She was treated with anti-tubercular therapy (ATT) for eight months; however, persistent pain necessitated surgical

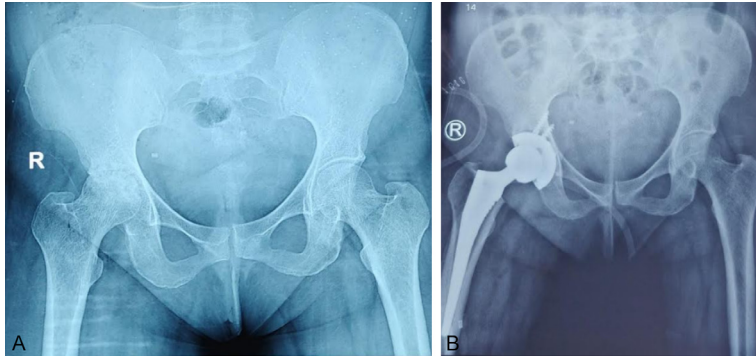


Figure 2. 46 year old short statured obese female presented with pain in right hip. X-ray revealed collapse of right hip joint space with subchondral cyst both on the femoral and acetabular side (A). MRI and CBNAAT were done which confirmed it to be tuberculosis right hip. ATT was started and after 8 months due to persistence of right hip pain, uncemented THA was done (B). Patient developed signs of femoral nerve palsy next day after surgery which recovered at 6 weeks follow-up. MRI: Magnetic Resonance Imaging, CBNAAT: Cartridge based nucleic acid amplification test, ATT: Anti-tubercular therapy, THA: Total hip arthroplasty.

intervention. She underwent uncemented THA via the posterolateral approach (implants: cup size 51 mm, stem size 2, head size 32 mm; DePuy). Intraoperative challenges included tight soft tissues and difficulty in retracting the anterior acetabular wall. On the first postoperative day, she developed sensory loss over the anterior and medial thigh, along with complete loss of active knee extension, consistent with femoral nerve palsy. Early weight-bearing mobilization and a structured neuro-rehabilitation program were started in consultation with a neurologist and physical therapist. For 1 to 4 week, Quadriceps setting exercises, Electrotherapy (NMES), Bed mobility training and rolling exercises, Static knee brace in extension for walking, Ambulation training with walker were commenced. For 5 to 8 week, active-assisted knee flexion and extension exercises, recumbent cycling (minimal resistance), partial weight-bearing squats with therapist support and mirror feedback training were given and for 9 to 16 week, open kinetic chain exercises, gait re-education, obstacle navigation drills and functional tasks (Step-ups, stair climbing, sit-to-stand from lower chairs) were introduced. By one month, her sensory symptoms had improved, and motor activity began returning. By six months, she achieved complete active knee extension with full quadriceps strength (MRC grade 5/5), resuming normal walking and daily activity without support.

Discussion

Femoral nerve palsy is a relatively rare complication following total hip arthroplasty (THA), particularly when performed via the posterolateral approach, which is generally considered safer for anterior neurovascular structures. Most literature associates femoral nerve injury with the direct anterior or anterolateral approach, where proximity to the femoral nerve places it at higher risk (**Table 1**) [1, 7]. However, our two cases emphasize that femoral nerve palsy can still occur with the posterolateral approach under certain conditions, especially when

soft tissue tightness, difficult surgical exposure, or intraoperative traction are involved.

In Case 1, the patient had long-standing ankylosing spondylitis with a fixed flexion deformity of the hip. Intraoperatively, even after adductor tenotomy, the hip could not be fully extended. Postoperative skin traction was applied to correct the residual deformity. In retrospect, we believe this traction played a direct role in stretching the femoral nerve, already under tension due to shortened anterior soft tissues. This aligns with reports that prolonged or forceful traction especially in patients with chronic contractures can precipitate neuropraxia or axonotmesis [4, 5]. As the nerve is anchored proximally at the lumbar plexus and distally within the thigh, any attempt to forcibly align a stiff joint may result in pathological tension. Our decision to immediately discontinue traction and initiate early rehabilitation with knee bracing was instrumental in ensuring full neurological recovery over time. This case serves as a reminder that in patients with longstanding contractures, corrective maneuvers must be gradual, and overzealous traction should be avoided altogether.

In Case 2, the patient had post-tubercular sequelae involving fibrosis and scarring of the soft tissues surrounding the hip. Intraoperative access was extremely difficult due to adherent and inelastic anterior structures. The placement of the anterior acetabular retractors was

Table 1. Literature review on femoral nerve palsy after total hip arthroplasty

First Author	Study Type	Surgical Approach	Proposed Etiology	Outcome
AlGhufaily M [11]	Case Report	Posterolateral	Soft tissue tension in DDH	Full recovery by 6 months
Nached J [12]	Case Report	Direct Lateral	Retraction injury in polyangiitis patient	Near-complete recovery
Kim H [13]	Case Series (3 cases)	Direct Anterior	Retractor placement, leg lengthening	Near-complete recovery
Yoon JH [14]	Case Report	Not specified	Iliopsoas hematoma and bursitis	Dramatic recovery after surgery
Haidar R [15]	Case Report	Anterolateral	Femoral artery pseudoaneurysm	Full recovery by 6 months
Gu A [16]	Case Report	Not specified	Iliopsoas hematoma due to pseudoaneurysm	Significant improvement after decompression

technically challenging and required repeated adjustments to gain adequate exposure. We suspect that direct compression or traction injury to the femoral nerve occurred due to forceful retractor positioning. Although the retractor was placed carefully and for a limited duration, the limited pliability of fibrotic soft tissue may have transmitted unintentional pressure to the nerve. This experience highlights the need for extra vigilance during exposure in patients with prior infection or fibrosis, and where possible, the use of blunt-tipped retractors and minimal force is advisable [6, 8].

What is striking in both our cases is the complete neurological recovery, achieved through early diagnosis, avoidance of further nerve insult, and dedicated physiotherapy which were consistent with favourable outcomes described in previous studies [10]. The use of neuromuscular electrical stimulation, static bracing, and graded quadriceps strengthening were vital in maintaining muscle tone and promoting motor recovery. This outcome underscores the fact that even when femoral nerve palsy occurs postoperatively, the prognosis is generally favorable if managed proactively [4, 9]. Another point worth emphasizing is the importance of early clinical suspicion. In both cases, the diagnosis was made within 24 hours, prompting immediate corrective measures. We believe this early window is crucial in determining the extent of nerve recovery. Delayed diagnosis not only prolongs disability but can also allow secondary complications like joint stiffness or quadriceps wasting to set in.

Overall, our experience with these two rare cases of femoral nerve palsy following posterolateral THA reiterates a few critical lessons: (1) Preoperative planning must account for pre-

existing deformities or fibrosis, which may increase nerve vulnerability. (2) Intraoperative retractor placement should be gentle, intermittent, and well-visualized, particularly in fibrotic joints. (3) Postoperative traction should be used with extreme caution, if at all, in stiff or contracted hips. (4) A structured and early neuro-rehabilitation protocol improves outcomes and prevents secondary disability.

To our knowledge, reports of femoral nerve palsy after posterolateral THA are limited in the literature, making these cases valuable in expanding the surgical community's understanding of this unusual but significant complication.

Conclusion

Femoral nerve palsy is an uncommon but potentially debilitating complication of total hip arthroplasty, particularly unexpected when using the posterolateral approach. Our two cases underscore that this complication can still occur in the presence of contributing risk factors such as pre-existing soft tissue contractures, post-infectious fibrosis, and technical challenges during exposure, and postoperative traction. Early identification of nerve dysfunction, discontinuation of any aggravating factors, and the prompt initiation of a structured neuro-rehabilitation program tailored to the patient's functional deficits can lead to full neurological recovery, as demonstrated in both our patients. Surgeons must remain vigilant in complex hip cases, especially when encountering stiff joints or difficult soft tissue planes, and prioritize gentle tissue handling, judicious retractor use, and nerve-sparing techniques. A high index of suspicion for postoperative neurological deficit, coupled with proactive manage-

ment, remains the cornerstone of achieving favorable outcomes in femoral nerve palsy following THA.

Disclosure of conflict of interest

None.

Abbreviations

THA, Total hip arthroplasty; SEA, Spinal epidural anaesthesia; MRC, Medical research council; NCV, Nerve conduction velocity; ATT, Anti-tubercular therapy; NMES, Neuromuscular electrical stimulation.

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