

## Case Report

# Iatrogenic femoral nerve palsy after a routine knee ligament surgery

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**Received:** 14 October 2023

**Accepted:** 14 November 2023

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### ABSTRACT

Peripheral nerve injuries following surgery can have a significant impact on the rehabilitation process. We report a case of a 25-year-old male who was unable to actively raise his leg and extend his knee following knee surgery (arthroscopic posterior cruciate ligament reconstruction and posterolateral corner reconstruction). Following the surgery, it was noticed that the patient's knee range of movements and power was 0/5 as per the medical research council scale. On subsequent evaluation, it was found to be due to femoral nerve axonal neuropathy. We report such a case of femoral nerve axonal neuropathy following arthroscopic posterior cruciate ligament reconstruction and posterolateral corner reconstruction.

**Keywords:** Femoral nerve, Tourniquet-palsy, Irrigation pump, Iatrogenic nerve injury, Knee ligament surgery

### INTRODUCTION

Many local and systemic complications associated with tourniquet usage have been well documented in the literature. The pathophysiology of a nerve injury may include mechanical compression with or without concomitant neural ischemia.<sup>1</sup> Neurological injuries may range between transient loss of function and sometimes to irreversible nerve damage and paralysis. Nerve injuries of the common peroneal nerve, tibial nerve, femoral nerve, and saphenous nerve in association with tourniquet usage have been previously reported in the literature.<sup>1,2</sup> We report this case of femoral nerve palsy subsequent to arthroscopic PCL and PLC reconstruction surgery.

### CASE REPORT

Our patient is a 25-year-old man who was diagnosed with a posterior cruciate ligament (PCL) and posterolateral corner (PLC) injury of his right knee for which surgery was indicated. Standard pre-operative protocol and operative procedure were followed. The patient underwent

arthroscopic reconstruction of the Posterior cruciate ligament with ipsilateral Peroneus longus and Gracilis graft and Posterolateral corner reconstruction using a modified Laprade's technique using ipsilateral and contralateral semitendinosus graft. The water flow and pressure for the arthroscopic pump irrigation system was maintained within permissible limits. The total duration of surgery was 4 hours. The tourniquet was initially inflated for 2 hours followed by a deflation interval of 20 minutes and again re-inflated for another 2 hours. Post-operative rehabilitation was initiated as per standard protocol. It was at this time, the patient started complaining of inability to actively extend his knee from any degree of flexion. Clinical examination showed weakness of the quadriceps, with the power of the quadriceps femoris muscle being 0/5 on the medical research council (MRC) scale. The patient-initiated physiotherapy for the empowerment of the quadriceps, hip abductors, and hamstrings, and Transcutaneous Electric Neuromuscular Stimulation. On later follow-up, due to persistent motor deficit and inability to actively extend the knee (Figure 1) and the

apparent atrophy of the quadriceps (Figure 2-3), a neurophysiological study was performed.



**Figure 1: Patient unable to actively extend the operated knee (right knee).**

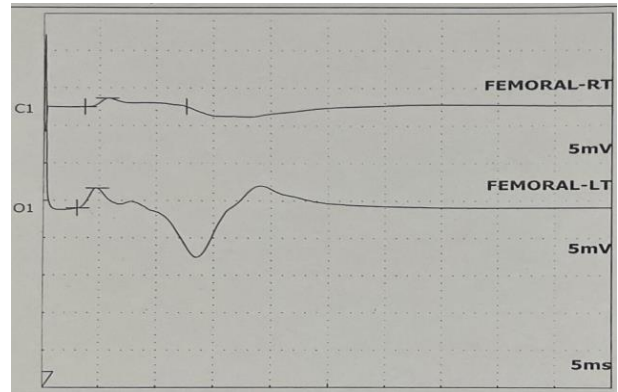


**Figure 2: Quadriceps Muscle atrophy (right lower limb).**



**Figure 3: Quadriceps Muscle atrophy (right lower limb).**

Nerve conduction and electromyography studies were conducted following standard protocols. The studies showed a reduced Compound muscle action potential (CMAP) of the right femoral nerve. The left side femoral nerve, bilateral common peroneal nerves, and bilateral sural nerve showed a normal study. The final report was concluded as a severe motor axonal neuropathy involving the right femoral nerve (Figure 4).



**Figure 4: Nerve conduction study showing right femoral nerve motor axonal neuropathy.**

After the diagnosis was established, the patient was advised to continue ambulation with the support of a hinged extension knee brace.

## DISCUSSION

When pneumatic tourniquets are used following standard protocol, studies have shown the incidence of neurovascular complications to be relatively low, with the incidence of permanent neurovascular damage of 0.032%.<sup>3</sup> In our patient, the cause of the femoral nerve injury was narrowed down to two possibilities as per our hypothesis. The first one is attributed to the compression of the tourniquet despite the time and pressure being maintained within standard limits. The second probable cause was an improper functioning of the irrigation pump system despite the flow and pressure being set within the permissible limits. All other causes of iatrogenic femoral nerve palsy such as direct injury or compression by hematoma or pseudoaneurysm were excluded. MRI spine also ruled out any lumbar pathology and Electromyographic studies further excluded injury of L3-L4 spinal nerve roots. Iatrogenic femoral nerve injury caused by femoral nerve block was also ruled out since our patient underwent spinal with epidural anesthesia. A publication by Sonnery-Cottet et al demonstrated evidence supporting the efficacy of physical exercises and cryotherapy in the treatment of quadriceps weakness in association with arthrogenic muscle inhibition.<sup>4</sup> Nerve transfers using the anterior branch of the obturator nerve have been described in the literature.<sup>5</sup> In this case report, there was a judicious tourniquet within permissible limits as per standard protocol. The Association of peri-operative registered nurses (AORN) guidelines have recommended

that the tourniquet must be inflated to a pressure slightly higher than the limb occlusion pressure.<sup>6</sup> We suggest that while using the irrigation pump system for arthroscopic knee surgery, apart from maintaining the water flow and pressure within the permissible limits, it is also crucial to have the pump irrigation systems maintained properly to prevent chances of iatrogenic femoral nerve injury due to fluid extravasation by a faulty pump irrigation system. We suggest that the pump irrigation system should undergo periodic maintenance which includes checking the tubing set and pressure gauge functioning by trained professionals at regular intervals. We also recommend the calibration and maintenance of the tourniquet by trained professionals at regular intervals.

## CONCLUSION

Persistent poor post-operative recovery following knee surgery using a tourniquet or pump irrigation system warrants further investigation to exclude peripheral nerve palsy as a cause. Early diagnosis, treatment, and evaluation of the nerve palsy help to initiate the treatment early and aid in functional recovery. We also recommend having the pump irrigation system maintained at regular intervals to prevent neurological injury due to improper pressure and flow meter malfunction leading to fluid extravasation causing nerve damage.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: Not required*

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**Cite this article as:** Raj PAP, Mohan M, Pilar A, Kodi H, Amaravathi RS. Iatrogenic femoral nerve palsy after a routine knee ligament surgery. *Int J Res Orthop* 2024;10:196-8.