Idiopathic femoral nerve palsy - a case report

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ABSTRACT

Background: Femoral neuropathy is a clinical condition that may be associated with a wide variety of etiologies and may cause severe walking difficulties. Symptoms and signs of femoral neuropathy vary depending on the severity and level of the lesion. Clinical examination, electrophysiological studies, and radiological evaluation are very important in diagnosis. Treatment is planned according to the symptoms and the underlying cause, and surgical or conservative approaches can be applied.

Case Presentation: A 39-year-old man presented with weakness and thinning in the right leg and numbness, burning, and tingling in the medial of the right lower extremity. A diagnosis of idiopathic femoral nerve neuropathy was made as a result of neurological examination, electrophysiological, and radiological evaluations.

Conclusion: Isolated femoral neuropathy is a rare condition that can be misdiagnosed and may result in treatment delays and permanent damage. Clinicians must be aware of this clinical picture.

Keywords: Idiopathic femoral neuropathy, a rare condition, case report.

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Background

The femoral nerve is formed by joining the L2-L4 anterior roots of the spinal nerve of the lumbar plexus in the psoas muscle. Then, the femoral nerve continues between the psoas muscle tendon and the musculus iliacus. It passes under the inguinal ligament and through the femoral canal, providing sensory and motor innervation to the thigh [1]. It innervates the iliacus muscle in the abdomen, the pectineus and sartorius muscles in the upper thigh, and the quadriceps femoris muscles in the anterior part of the thigh. It carries the sensation of the medial and anterior part of the thigh. The terminal branch of the nerve is the nervous saphenous, which carries the sensation of the medial part of the leg [2].

Isolated femoral neuropathy is rare and the most common cause is iatrogenic [3]. The reasons that can cause femoral nerve neuropathy include abdominal pelvic surgery, amyloidosis, blunt trauma, coronary angiography, femoral acetabular impingement, femoral nerve block, hydatid cyst, iatrogenic ilioinguinal/iliohypogastric nerve block, laparoscopic surgery, lithotomy position, lymphomatous compression, pelvic extraperitoneal hematoma, postpartum psoas muscle hematoma, renal failure, kidney transplantation, retroperitoneal hematoma, rhabdomyolysis, total hip arthroplasty, urological surgery, and vasculitis [4].

Symptoms and signs of femoral neuropathy vary depending on the severity and level of the lesion. Weakness is observed in the quadriceps femoris muscle, and iliopsoas muscle weakness can be seen in especially proximal injuries of the femoral nerve. Instability of the knee and atrophy of the quadriceps femoris muscle can be detected. Sensory deficits can be seen in the anteromedial thigh, medial of the leg, and medial of the foot. Patellar reflex is usually absent [5,6]. Electromyography (EMG) studies allow us to determine the level of the lesion and to evaluate the severity of axonal damage. It also helps to rule out other possibilities involved in differential diagnosis, such as lumbar plexopathy or radiculopathy. Early rehabilitation is important during treatment. Passive, active-assistive, or active quadriceps exercises and transcutaneous electrical stimulation can be given during treatment, depending on the level of muscle strength. If neuropathic pain develops in the patient, medical treatment can be given. Surgery can be performed if there is an iliopsoas hematoma or direct nerve injury [6].

Case Presentation

A 39-year-old male patient was admitted to the physical therapy and rehabilitation outpatient clinic with complaints of weakness and thinning in the right leg. The

patient's complaints of numbness, burning, and tingling started in the medial of the right lower extremity, approximately 4 months ago. Two months ago, the complaint of weakness and thinning in his right thigh started and it gradually became more severe. The patient had no history of trauma or any systemic disease. No history of smoking, alcohol, or steroid use. The patient, whose complaints gradually increased, was diagnosed with L5-S1 radiculopathy as a result of the EMG examination carried out in an external center. There was L5-S1 protrusion in the lumbar spine magnetic resonance imaging (MRI) of the patient. In the physical examination of the patient, the range of motion was normal for all joints. The right thigh was measured 4 cm atrophic compared to the left (Figure 1). The right quadriceps muscle strength was 3/5. There was severe hypoesthesia in the right thigh and medial right leg. Patellar tendon reflex was absent in the right side and the patient was having trouble locking the knee. Other sensory examination tests of the patient's lower extremity (such as sural nerve) were within normal limits. Femoral nerve neuropathy was considered in the patient. Since the patient's current examination findings were inconsistent with the EMG examination carried out at an external center, the EMG examination was carried out again. EMG examination revealed the absence of the right saphenous sensory response. Right tibial and peroneal nerve motor responses were normal. In needle EMG, a positive spike and fibrillation potentials were detected in the right vastus lateralis and rectus femoris muscles. In these muscles, a reduction in the number of motor unit potentials (MUPs) and long duration MUPs were obtained. These findings in the EMG study are consistent with subacute partial axonal degeneration in the segment of the right femoral nerve after innervating the iliopsoas muscle. A contrast-enhanced lower abdomen MRI was normal. L5-S1 protrusion was detected in the lumbar spine MRI as before. Hyperintense signal changes were detected in the vastus medialis, lateralis, rectus femoris, and sartorius muscles on MRI of the right thigh, and these changes were attributed to atrophy. Blood tests were unremarkable. The patient was diagnosed with idiopathic femoral nerve neuropathy. During the treatment, Russian current was applied to the quadriceps femoris muscle. The patient was given quadriceps and hip flexor strengthening exercises, bicycle ergometry exercise with increasing resistance, and walking and balance training. A home exercise program was also administered to the patient, who was given a 30-session rehabilitation program. At the follow-up, 6 months later, the patient stated that he could walk longer than before. The right thigh measured 2.5 cm atrophic compared to the left (Figure 2). The right quadriceps muscle strength was 4/5. Sensory examination revealed hypoesthesia in the right thigh and right medial leg compared to the left. Patellar tendon reflex was weak in the right side. Right saphenous sensory response was not obtained in the control EMG examination performed 6 months after the treatment. The femoral motor response amplitude in the right vastus medialis muscle was found to be low. In needle EMG, long duration MUPs and serious decreased activity was obtained in the right vastus lateralis muscle. Also, MUPs showing moderately decreased activity were detected in the right rectus femoris muscle. Rare spike potentials were observed in these muscles. Bioelectrical activities of the right iliopsoas, adductor magnus, tibialis anterior, and gastrocnemius muscles were found to be normal. In conclusion, all these findings are consistent with subacute-chronic severe partial axonal degeneration in the segment of the right femoral nerve after innervating the iliopsoas muscle. The patient was advised to continue the home exercise program.

Discussion

The femoral nerve is a compound nerve that has sensory and motor functions. It is the largest branch of the lumbar

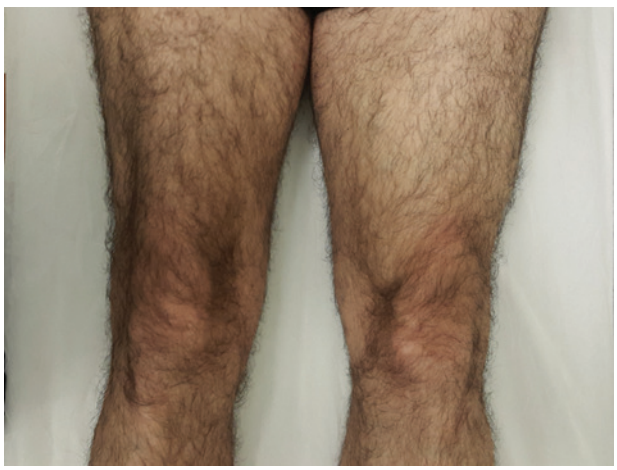

Figure 1. *The right thigh measuring 4 cm atrophic compared to the left (before treatment).*

Figure 2. *The right thigh measuring 2.5 cm atrophic compared to the left (after treatment).*

plexus. It originates from the L2-L4 roots and innervates the psoas muscle. The femoral nerve passes through the iliacus compartment in the pelvis and branches out to the iliacus and psoas muscles, approximately 5 cm proximal to the inguinal ligament. In the thigh proximal, it branches out to the sartorius, pectineus, and quadriceps muscles. It gives cutaneous branches that provide sensation to anterior and medial of the thigh distally; it forms the saphenous nerve that provides sensation to the anterior and medial parts of the cruris region. Isolated femoral neuropathy is a rare clinical picture and iatrogenic causes take the first place in its etiology [3]. Motor dysfunction of the femoral nerve is associated with the level affected. While hip flexion is affected in proximal level lesions, in the lesions at the inguinal ligament level, hip flexion is preserved and the problem is mostly related to knee extension. In this situation, the patient has difficulty extending the knee and locking it there. This situation causes instability and loss of balance in the knee. Patients with femoral neuropathy often have atrophy in the quadriceps muscle group, loss of patellar tendon reflex, sensory defects in the anterior and medial of the thigh, as well as in the medial of the cruris. In our case, while the iliopsoas muscle strength was preserved, there was a decrease in the quadriceps femoris muscle strength. This finding suggested that the nerve was damaged distal to the innervation of the iliopsoas muscle. Femoral neuropathy can be confused clinically with lumbar plexus pathology and L4 radiculopathy. In our case, L5-S1 radiculopathy was misdiagnosed in the previous center evaluation.

The region where the femoral nerve is most susceptible to trauma is the iliacus compartment. Most femoral nerve entrapment neuropathies develop due to hematomas and rupture of the iliacus or iliopsoas muscles caused by traumas in the iliopsoas compartment [7,8]. Femoral nerve compression and neuropathy can also be seen in cases such as abdominal surgery, gynecological surgery, femoral arterial catheterization, lithotomy position, hematoma in the inguinal or retroperitoneal area, pelvic fractures, and total hip arthroplasty [9].

Despite the large size of the femoral nerve, it can be difficult to identify on MR images. It can be seen at the level of the inguinal ligament, in coronal images. Changes in signal intensity and trace of the nerve are easier to detect in the intrapelvic part. In the thigh region, these changes are relatively difficult to detect due to the small size of the nerve. Detection of signal intensity changes compatible with denervation in the iliopsoas muscle should suggest an intrapelvic femoral nerve lesion.

In our case, we did not find any mass or anatomical variation that could cause compression of the femoral nerve in contrast-enhanced lower abdominal MRI, lumbar spine MRI, hip joint, and thigh MRI. There was no history of trauma, operation, or nerve compression in the patient. Also, the results of the laboratory tests were normal. The creatinine kinase value was also within normal limits to exclude rhabdomyolysis in the differential diagnosis. Therefore, we diagnosed the patient with idiopathic femoral nerve neuropathy. Idiopathic femoral nerve neuropathy is extremely rare in the literature. We wanted to present this patient since we found only three cases with idiopathic femoral nerve neuropathy presented as a result of our literature review [10-12].

Electrodiagnostic studies help localize the lesion level and assess the degree of axonal loss. It also helps to rule out lumbar plexopathy or radiculopathy. In our case, the EMG examination supported the examination findings and showed subacute partial axonal degeneration in the segment of the femoral nerve after innervating the iliopsoas muscle.

Early rehabilitation programs are important in treatment. Passive, active-assistive, or active quadriceps exercises and transcutaneous electrical stimulation can be given during the treatment, depending on the level of muscle strength. Medical treatment can be given if the patient has neuropathic pain. Surgery can be performed if there is an iliopsoas hematoma or direct nerve injury, but complications of surgical treatment in femoral nerve entrapment neuropathy can lead to serious consequences. Therefore, conservative methods should be tried first during treatment.

Conclusion

Idiopathic femoral neuropathy is an extremely rare clinical case presented as there are only a few case reports in the literature. Lower extremity peripheral neuropathy can cause misdiagnoses and patients may lose time with ineffective treatments, and permanent damage may develop. Weakness in hip flexion or knee extension, instability and loss of balance in the knee, atrophy in the quadriceps muscle group, loss of patellar tendon reflex, and sensory defects in the anterior and medial of the thigh and in the medial of the cruris are some of the symptoms clinicians should be aware of while diagnosing femoral neuropathy.

What is new?

Isolated femoral neuropathy is an entity that is rarely observed and reported in the literature. For this reason, we present this case to create awareness among clinicians about this clinical picture.

List of Abbreviations

EMG	Electromyography
MRI	Magnetic resonance imaging
MUPs	Motor unit potentials

Consent for publication

Written consent was obtained from the patient for publication.

Ethical approval

Ethical approval is not required at our institution to publish an anonymous case report.

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Summary of the case

1	**Patient (gender, age)**	Male, 39-year old
2	**Final diagnosis**	Idiopathic femoral nerve palsy
3	**Symptoms**	Weakness in hip flexion or knee extension, instability and loss of balance in the knee, atrophy in the quadriceps muscle group, loss of patellar tendon reflex, sensory defects in the anterior and medial of the thigh, as well as in the medial of the cruris
4	**Medications**	Russian current, quadriceps and hip flexor strengthening exercises, Bicycle ergometry exercise with increasing resistance, walking and balance training, a home exercise program, and a 30-session rehabilitation program.
5	**Clinical procedure**	Russian current was applied to the quadriceps femoris muscle. The patient was given quadriceps and hip flexor strengthening exercises, bicycle ergometry exercise with increasing resistance, and walking and balance training. A home exercise program was also given to the patient, who was given a 30-session rehabilitation program.
6	**Specialty**	Physical Medicine and Rehabilitation