PROXIMAL SCIATIC NEUROPATHY SECONDARY TO HAMSTRING TENDON AVULSION

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We herein present the exceptional case of a patient, who injured a sciatic nerve due to avulsion of proximal hamstring tendon in a motorcycle accident. The 63-year-old man was diagnosed firstly with an incomplete fracture of distal femur. A foot drop on the right side was observed when the full-length cast was removed two months later. The patient was referred to the neurology clinic and was diagnosed with a sciatic nerve lesion at the proximal level of the biceps femoris. Magnetic resonance imaging of the thigh showed a proximal avulsion of hamstring muscles tendon. The patient did not improve by short-term physiotherapy and neurosurgical intervention.
Sciatic nerve injury can be a result of proximal hamstring avulsion in events such as motorcycle accidents even in the absence of complete or major femur fracture.

Keywords: *avulsion, hamstring muscles, motorcycle accident, sciatic neuropathy*

PROXIMÁLIS ÜLŐIDEG-SÉRÜLÉS A COMBHAJLÍTÓ ÍN SZAKADÁSA KÖVETKEZTÉBEN

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Bemutatjuk egy motorkerékpár-balesetben sérült beteg különleges esetét; a balesetben a combhajlító ín proximális szakadása miatt megsérült az ülőideg. A 63 éves betegnél először a distalis combcsont inkomplett törését diagnosztizálták. Két hónappal később, amikor a teljes hosszúságú gipszet eltávolították, a lábfej dorsoflexiós képtelenségét állapították meg a jobb oldalon. A beteget ideggyógyászati klinikára irányították, ahol ülőideg-sérülést diagnosztizáltak a femoralis bicepsz proximális részén. A comb mágnesrezonanciás vizsgálata a combhajlító izom inának proximális szakadását mutatta.
A beteg állapota rövid távú fizioterápia és idegsebészeti beavatkozás révén nem javult. Az ülőideg-sérülés a combhajlító ín proximális szakadásának következménye is lehet például motorkerékpár-baleset esetén, még akkor is, ha nem áll fenn súlyos vagy komplett combcsonttörés.

Kulcsszavak: *ínszakadás, combhajlító izom, motorkerékpár-baleset, ülőideg-sérülés*

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The hamstring muscles are closely associated with the sciatic nerve and this relation puts the sciatic nerve at risk of injury arising from proximal hamstring tendon avulsion. Complete ruptures of the hamstring muscles or the proximal hamstring tendon are difficult to identify and are relatively rare injuries. Besides, sciatic nerve-related symptoms after proximal hamstring avulsion might be underrecognized[1]. The usual causes of sciatic nerve injury are fractures of the hip joint, surgery (iatrogenic) like hip replacement procedures, immobilization in intensive care units, the piriformis syndrome, an intramuscular injection, and neoplasms[2]. Also hamstring syndrome, that is entrapment of the proximal sciatic nerve caused by tendinous structures along the hamstring muscles, can be a cause of sciatic neuropathy[3]. Herein we present an exceptional case of a man, whose sciatic nerve injured

proximally due to proximal tendon avulsion of hamstring muscles in a motorcycle accident.

Case report

A 63-year-old male was involved in a motorcycle accident without collision at low speed about 20 km/h. He further described his hip going into flexion and ipsilateral knee hyperextension while falling off. He was diagnosed with incomplete fracture of distal femur and he was then discharged with a full length cast. When the full length cast was removed two months later, the orthopedician recognized a foot drop on the right side, and the patient was referred to neurology clinic. Neurologic examination revealed no ecchymosis at the posterior thigh, however the patient described an ecchymosis and severe pain in this area after the accident. The right leg was edematous, that might be secondary to immobility of the lower limb. He described diminished sensation to light touch at the dorsal and plantar aspect of the right foot. Muscle strength was 3/5 for Medical Research Council Scale at the right hamstring muscles, 1/5 at the tibialis anterior, peroneus longus and brevis, extensor hallucis longus, and 4/5 at the right gastrocnemius. Patellar tendon reflex was normal, however achilles tendon reflex was absent. There was no Tinel sign over the right sciatic nerve. Muscle strength was 5/5 at the muscles of left leg.

Electroneuromyography (ENMG) was performed. Sensory nerve conduction studies revealed no sensory nerve action potential (SNAP) in the superficial peroneal or sural nerves on the right side. Motor conduction studies in the right tibial nerve showed low compound muscle action potential (CMAP), with slow conduction velocities and normal distal latencies. CMAP was absent on recording from the right peroneal nerve at the extensor digitorum brevis muscle and tibialis anterior. Needle examination of the right lower extremity revealed evidence of total denervation in the tibialis anterior and the short head of biceps femoris, while partial denervation and decreased recruitment of the long head of biceps femoris and gastrocnemius muscles. The tensor fascia lata and paraspinal muscles were normal. These findings were compatible with sciatic nerve injury proximal to biceps femoris and we ruled out radiculopathy or plexopathy. We requested magnetic resonance imaging (MRI) for detailed lesion localization.

MRI of the right thigh showed an extensive, complete hamstring tendon rupture involving the long head of the biceps femoris, semimembranosus,

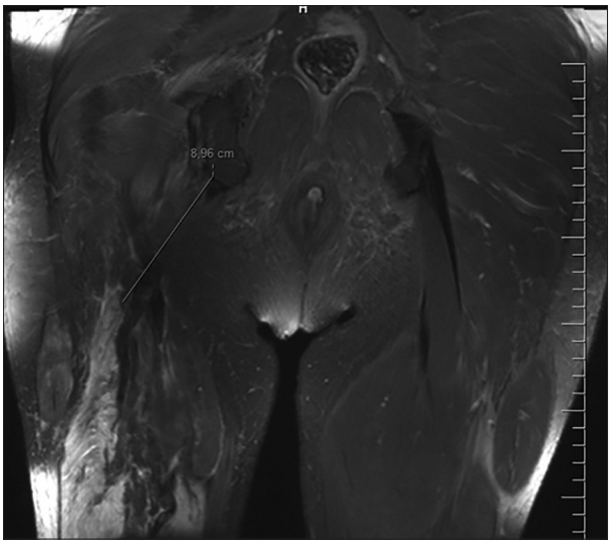

Figure 1. *T2 W-coronal sequence MRI of the right thigh showing complete hamstring tendon rupture. The hamstring muscles were atrophied and located almost 10 cm distal to ischial tuberosity on the right*

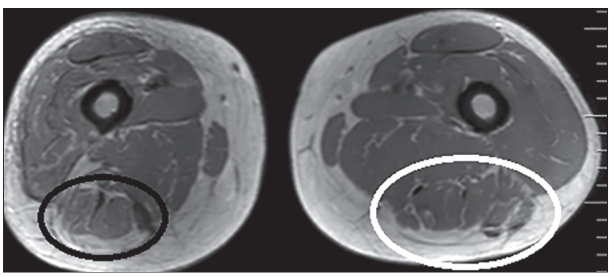

Figure 2. *T1 WI-axial scan showed atrophy of the right hamstring muscles (black circle). The hamstring muscles on the left side in normal size and shaped (white circle)*

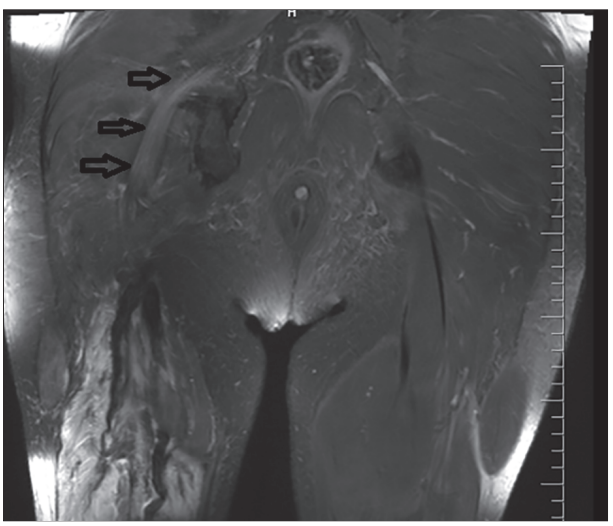

Figure 3. *T2 W-coronal scan shows increased diameter and intensity of the right sciatic nerve consistent with sciatic neuropathy (black arrows)*

and semitendinosus muscles, all of which were atrophied and located almost 10 cm distal to the ischial tuberosity **(Figure 1** and **2)**. The MRI also showed increased diameter and intensity of the right sciatic nerve consistent with sciatic neuropathy **(Figure 3)**. Although the sciatic nerve was seen intact in MRI, in the light of clinical and ENMG findings we predicted there was an axonotmesis, that could be a third degree nerve injury of Sunderland classification, at the proximal site of sciatic nerve. The patient was referred to physiotherapy department firstly, he received physiotherapy for three weeks but did not improved significantly. Orthopedicians didn't concerned about surgery because the time was not appropriate to repair a proximal avulsion of the hamstring muscle tendon for an accident that occurred almost three months ago. After that he was referred to neurosurgery department and the patient underwent a surgery of sciatic nerve. The sciatic nerve was noted to be intact, although it was edematous and adherent to scar tissue of the avulsed hamstring tendons. A sciatic neurolysis was performed. After surgery, the patient had still foot drop and his muscle strength showed minimal improvement. It is too early to say a definite opinion about complete benefit of surgery but at the third month follow-up, his dorsal foot muscles strength was 3/5 and he could walk with a crutch. A written informed consent to present this case report was obtained from the patient.

Discussion

Hamstring strains are common injuries, however complete rupture of the proximal hamstrings or avulsion of proximal tendon of hamstring muscles is uncommon. If complete rupture of hamstring tendon is not treated in early times, that may lead to weakness, chronic pain, overall loss of functional control of the affected leg despite adequate rehabilitation and potential for sciatic neuralgia. Acute diagnosis of complete ruptures could be difficult due to the minimal clinical awareness[4]. A palpating defect in the muscle belly often is a classic sign, but it is difficult to aware of this sign[5]. Although the clinical history, physical examination and radiological imaging are substantial, also electrodiagnostic studies are crucial in the diagnosis to accurately identify the site of the sciatic nerve injury, determine the severity of sciatic nerve involvement, and aid in surgical approach planning.

A mechanism of sciatic nerve injury with hamstring tendon avulsions is not clear, however a few differential could account for the nerve-related symptoms, including contusion of the nerve by the avulsed tendon, stretch of the nerve at the time of injury, compression or irritation of the nerve by associated hematoma, and secondary injuries, including entrapment of the nerve by scar formation or injury to the sciatic nerve in the segment exposed by retraction of the hamstring muscle group[4]. In our case, the lesion was on the proximal and relatively medial site of the sciatic nerve, however peroneal trunk of the sciatic nerve was more affected than tibial trunk. That can be related with stretch injury because sciatic nerve was edematous although it was intact.

Ultrasound and MRI are the most frequently used imaging technics for visualizing peripheral nerve damages. Ultrasound can identify nerve continuity and lesions, however MRI can identify muscle denervation and atrophy better than ultrasound. MRI can be more suitable in areas that are difficult to visualize or to localize the lesion using ultrasound such as radiculopathy, proximal sciatic nerve and lumbosacral plexus lesions[6]. Besides suspected lesion site was difficult to be shown by ultrasonography, also we preferred MRI studies to show if there was any damage at the bone and muscles, and MRI studies were read by the radiologist with expertise in MRI of the nerve and musculoskeletal system at our tertiary care center. In conventional MRI sequences acute axonal nerve lesions cause a hyperintense signal on T2-weighted MRI characterized by a prolongation of the T2 relaxation time at the lesion site and distal to it[7].

On a literature review, pain was the most common symptom, however motor deficit like foot drop in our patient was seen in only a small portion of the cases of proximal hamstring tendon avulsion[4]. Furthermore sciatic nerve involvement was shown in only 5% of the patients[8]. If an interdisciplinary approach involving neurosurgeon or neurologist is applied, the rate of diagnosis can be increased like the study of *Wilson* et al. showed 11% of patients had sciatic nerve related motor or sensorial symptoms[4].

The management can be a combination of non-operative modalities, such as rest and ice with non-steroidal anti-inflammatory drugs, physiotherapy, extracorporeal shock wave therapy, or peri-tendinous injections in incomplete rupture of hamstring tendon, however non-operative treatment was often inefficient in complete ruptures. So surgical repair can be offered especially in early times of avulsion because acute (<2 months) surgery is more satisfactory than late one. The procedure is technically more challenging and the risk of complications is higher in chronic cases[8]. Our patient was diagnosed with proximal hamstring tendon avulsion two months after the accident and the repair of proximal

tendon was not considered, however we referred him to neurosurgery for sciatic nerve surgery. The majority of patients who underwent a neurolysis had good outcome in the studies[4, 9]. Our patient improved slightly one year after sciatic nerve surgery, however the follow-up period was longer than three years in most of the studies[2, 9]. So we need a long-term follow-up to determine that the patient got benefit from sciatic nerve surgery.

Additionally, proximal hamstring avulsions in the literature belong to sports injuries in the most cases. The patient in our case report was involved in a noncollision motorcycle accident, felt off slowly and so the diagnosing was complicated.

Conclusion

Proximal sciatic nerve lesions can be a result of hamstring tendon avulsion in events such as motorcycle accidents even in the absence of complete fracture of femur.

CONFLICT OF INTEREST
The authors have no conflicts of interest to declare.

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