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Case report

Bilateral piriformis syndrome in two elite soccer players: Report of two cases

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ABSTRACT

Piriformis syndrome, a relatively rare condition, is described as entrapment of a sciatic nerve at the level of the piriformis muscle. There have been a few reports of bilateral piriformis syndrome in literature. In this study, we present bilateral piriformis syndrome in two professional soccer players from different teams who are symptom free at last follow-up after surgery. In both patients, resting EMG records were read normal, however EMG recording during the activity revealed prolonged H-reflexes. Both patients had no relief from conservative treatment and rehabilitation, therefore surgical treatment was performed. Preoperative mean visual analogue scale (VAS) value was 7, and decreased to 3 at the sixth month follow-up visit and at the longer term follow-up, mean 85 months (74–96) it was valued at 1. Both soccer players returned to their active sports lives in the sixth postoperative month. According to Benson's functional evaluation scale, in long-term follow-up, there have been excellent results and both patients resumed their professional carrier for many years (mean 7 years).

1. Introduction

Piriformis syndrome is a rare entrapment neuropathy, and there is usually some confusion about its diagnosis. Piriformis syndrome is often overlooked or misdiagnosed. The literature indicates 0.33–6% of dorsalgia and/or sciatica cases are caused by piriformis [1].

Research about piriformis syndrome usually includes evaluations of the general population. No articles reporting on soccer players are available. Bilateral cases were reported as cadaver studies, anatomic variations of the gluteal region or complications that developed after hip surgery [2–6]. It was interesting to observe two cases of bilateral piriformis syndrome (without any anatomic variations or surgical treatment complications) in the same season in two professional elite soccer players. More study is needed to investigate the incidence of piriformis syndrome in athletes. This syndrome should be considered in the differential diagnoses of patients with bilateral lower extremity pain, particularly soccer players.

2. Case 1

The 32-year-old male professional soccer player was diagnosed with piriformis syndrome at another sports medicine center and received conservative treatment (i.e., stretching exercise, ultrasound, non-steroidal anti-inflammatory drugs, massage, muscle stretches, physical therapy, ice, and rest). As the pain did not diminish, ultrasound guided local anesthetic plus corticosteroid injection was administered twice (the first injection one year later and the second injection one year after the first injection) to the painful region. After both injections, rest for sport activities was given for six weeks. The patient also continued physical therapy during this period. His pain was relieved to some degree, but the pain started again when he returned to soccer.

Upon physical examination, there was pain with palpation on the bilateral gluteal muscles, sacroiliac joint and greater sciatic notch. The strength of the pain was approximately 6/10 on the visual analogue scale (VAS). The bilateral lower extremity sensation was decreased in the superficial and deep peroneal nerve distribution. There electromyographic study revealed no pathologic findings.

Tests were repeated when the patient was running for a certain time at a certain velocity, and electromyography (EMG) examination was performed. After the exercise, bilateral lower extremity Lasègue, Pace and Freiberg signs were found to be positive, and

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Table 1
EMG results of the patients before running.

Nerve	Patient 1			Patient 2		
	Left	Right	Normal	Left	Right	Normal
Sural sensory						
Amplitude	1.2	1.3	1.5 mV	1.2	1.2	1.5 mV
Distal latency	5	5	2–4 ms	4.5	5	2–4 ms
Conduction velocity	38	36	45 m/s	35	36	45 m/s
Peroneal motor (recording tibialis anterior)						
Amplitude	1.1	1.1	1.5 mV	1.4	1.4	1.5 mV
Distal latency	5	6	2–4 ms	6	6	2–4 ms
Tibial motor (recording abductor hallucis)						
Amplitude	6	7	5 mV	8	8	5 mV
Distal latency	3	3	2–4 ms	4	4	2–4 ms
Conduction velocity	48	48	45 m/s	50	50	45 m/s
H (Hoffman rekleksi)	27.73	27.75	<28 m/s	27.99	27.97	<28 m/s

Table 2
EMG results of the patients after 20 minutes running.

Nerve	Patient 1			Patient 2		
	Left	Right	Normal	Left	Right	Normal
Sural sensory						
Amplitude	5.3	5.3	5 uV	6.0	6.0	5 uV
Distal peak latency	5	5	2–4 ms	2.5	2.5	2–4 ms
Peroneal motor (recording EDB)						
Amplitude	1.8	1.8	1.5 mV	1.7	1.7	1.5 mV
Distal latency	3	3	2–4 ms	4	3	2–4 ms
Conduction velocity	50	50	45 m/s	50	50	45 m/s
Peroneal motor (recording tibialis anterior)						
Amplitude	1.5	1.5	1.5 mV	1.7	1.7	1.5 mV
Distal latency	4	3	2–4 ms	4	3	2–4 ms
Tibial motor (recording abductor hallucis)						
Amplitude	5	6	5 mV	8	8	5 mV
Distal latency	3	3	2–4 ms	4	4	2–4 ms
Conduction velocity	40	40	45 m/s	50	50	45 m/s
H (Hoffman rekleksi)	34.15	34.13	<28 m/s	33.15	33.17	<28 m/s

the amplitudes and the velocities of the peroneal and sural nerves were reduced according to the EMG; H-reflex delay (5.16 m) was detected when the patient was in the flexion, adduction and internal rotation positions (Tables 1–2). Magnetic resonance imaging (MRI) of the pelvis and lumbar region were evaluated as normal (Fig. 1). All causes of sciatica and dorsalgia leading to sciatic nerve irritation were excluded. These clinical, radiographic, and neurophysiologic findings were suggestive of bilateral piriformis syndrome.

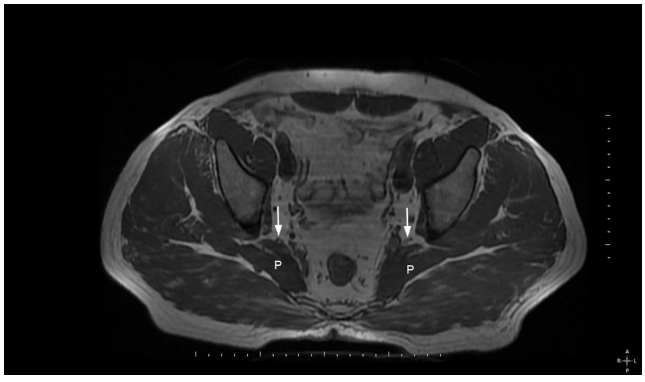

Fig. 1. Normal axial T1-weighted pelvic MR imaging (piriformis muscle: P; sciatic nerve: arrows).

3. Case 2

A 26-year-old male soccer player with bilateral hip pain, buttock pain and sitting intolerance complaints during 18 months after an injury occurred while he was sprinting was referred to a sports medicine clinic. The diagnosis was made as piriformis syndrome and conservative treatment was applied. Ultrasound guided local anesthetic plus corticosteroid injection was administered. The pain was relieved for a short-time period after the injection, but the patient was admitted to our sports medicine clinic, as his pain recurred.

In the physical examination, there was pain with palpation on the bilateral gluteal muscles, sacroiliac joint and greater sciatic notch. The patient reported decreased leg strength and severe pain at the bilateral buttock and thigh. The VAS score was 8. The sensation was decreased in the superficial and deep peroneal nerve distribution. The motor strength was 4/5 for the extensor halluces longus and tibialis anterior and 5/5 for the flexor halluces longus and gastro soleus. The bilateral Lasègue, Pace and Freiberg signs were negative [7,8]. There were no pathologic findings supporting piriformis syndrome on EMG. Tests were repeated when the patient was running for 20 min at a certain velocity. EMG tests and examinations appeared to be positive. Amplitudes and velocities of the peroneal and sural nerves were reduced on the EMG, and H-reflex delay (5.20 m/s) was detected when the patient's hip was in

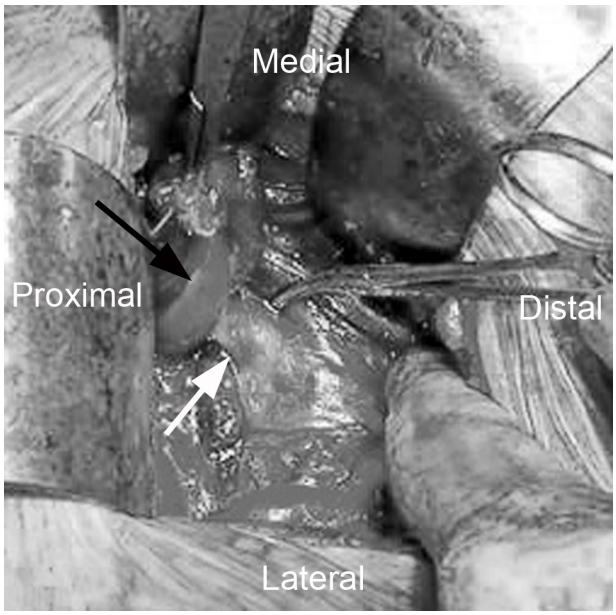

Fig. 2. Left hip. The tendinous insertion of the piriform is muscle (1) has been released, tension is maintained with a tag suture, and a portion is resected within the muscle fibers proximal to the tendon. Sciatic nerve (2) is exposed.

the flexion, adduction and internal rotation position (Tables 1–2). These electrophysiological findings were interpreted as proximal involvement of bilateral sciatic nerve. The radiographs and the MRI of the lumbar spine showed no relevant findings. An MRI image of the pelvis was evaluated as normal. Both athletes were diagnosed with piriformis syndrome, and surgical treatment was planned.

4. Surgical technique

A skin incision was made beginning from the posterolateral end of the greater trochanter and proceeded to posterior and proximal (to align with the gluteus maximus fibers). The insertion of the piriformis tendon was palpated after the fascia was separated from the gluteus maximus muscle. The sciatic nerve was observed under the muscle. The incision remained open thereafter. The tendon was taken from the insertion point at the greater trochanter and grasped with an Allis clamp. Then, it was taken towards the starting point near the proximal end of the greater sciatic notch and dissected (Fig. 2). The sciatic nerve became visible. The nerve was mobilized from short rotatory and piriformis muscles through a blunt dissection distally to the terminal part of the incision and proximally towards the greater sciatic foramen, and a neurolysis procedure was performed. A right-angled clamp could be passed between short rotatory muscles and the nerve following the nerve release. A large compression dressing was applied, and vacuum drainage was not needed. Infection prophylaxis was performed with 1 g of IV cefazolin injected preoperatively.

Benson's assessment scale was used to determine the postoperative functional outcomes after six months follow-up. [9]. A perfect outcome was obtained in four thighs of two patients according to this outcome assessment scale. The average follow-up period was 85 months (74–96 months) after the surgical procedures. Both soccer players returned active sports without any problem after six months postoperatively. They continued their professional football lives for a mean of 7 years (6–8) with no complaints.

5. Discussion

The mean patient age was 29 years (26–32), which was consistent with the literature [9]. Piriformis syndrome in sports is rarely reported [10]. We founded only two case studies of piriformis syndrome representing in athletes [10–12]. One case was a rugby player, with avulsion fracture of ischial tuberosity and subsequent exostosis lead to piriformis syndrome and treated conservatively [11]. The second case was a female runner and managed with conservative means [12]. Bilateral piriformis syndrome is very uncommon. In the literature, bilateral cases were reported as cadaver studies, anatomic variations of gluteal region or complications developing after hip surgery [3–6].

Benson et al. reported 15 cases of surgically treated piriformis syndromes with an etiology of blunt trauma to buttock [9] The repetitive microtrauma may also cause inflammation of piriformis muscle and released mediators may irritate the sciatic nerve, and the pain-spasm-inflammation-irritation cycle begins. This cycle gives rise to spasticity and stretching and causes entrapment of the sciatic nerve between bony pelvis and piriformis muscle [2]. We considered this finding when reviewing the EMGs that appeared positive in favor of piriformis syndrome; the resting EMGs were negative because of the pressure on the sciatic nerve between the tendinous parts of the inflamed, spastic or stretched piriformis muscle and bony pelvis [13–16]. Neurological deficits may be observed in patients in whom the sciatic nerve is compressed, and abnormal electrodiagnostic findings may be detected. However, neurologic deficits are not the major complaint in a typical patient with piriformis syndrome. In our study, pathology was detected in the EMGs performed after exercise. Although the diagnostic value of various imaging techniques was emphasized, the displayed abnormalities were demonstrated not to be the main cause of the pain [17–19].

The incidence of piriformis syndrome has been reported to be six times more prevalent in females than males. While no dominant etiological factors have been reported, piriformis syndrome often occurs following a minor trauma to the buttocks or pelvis [20]. Our cases were male, and the etiologic factor was thought to be the repeated micro-trauma to the buttocks and pelvis, as the patients were soccer players and no anatomic variations were detected intraoperatively.

New evidence shows that botulinum neurotoxin injections play an important role in piriformis syndrome-related pain. It may take 2–4 days for the onset of the effect, and the results last approximately 3–6 months [21]. Botulinum injection was not considered because of professional level of patients, as the effect lasts for approximately 6 months, and the recurrence rate is high, according to the literature.

In our patients, proper physical therapies and injection treatments were performed in a sports medicine center, and the pain diminished for a short time before starting again. Therefore, we did not plan physical therapy. Short- (6 months) and long-term (85 months) postoperative assessments of our patients were performed according to Benson's functional assessment scale, and according to the VAS, excellent results were observed.

6. Conclusion

While the EMGs were negative before exercising, the positive piriformis syndrome results were striking. However, we could not fully explain the cause of the disease because bilateral piriformis syndrome was detected in two soccer players in the same season. Satisfactory results were obtained with open surgery in the soccer players. The patients had previously undergone all treatment options that were recommended in the literature, except

botulinum toxin injection, but they did not benefit from these treatments. They continued their active soccer careers for many years. It provided a different point of view on the diagnosis, tests and treatment of piriformis syndrome.

Disclosure of interest

The authors declare that they have no competing interest.

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