Quadriceps muscle rupture mimicking lumbar radiculopathy

Joon-Ho Lee · Sung-Hwan Cho · Sang-Hyun Kim ·
Won-Soek Chae · Hee-Cheol Jin

Received: 2 March 2011 / Revised: 5 January 2012 / Accepted: 2 February 2012 / Published online: 15 February 2012
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Abstract

Study design Case report.

Objective To report an unusual case of vastus lateralis muscle rupture not accompanied by any history of major trauma or the presence of a risk factor in a patient with spinal stenosis.

Summary of background data Isolated vastus lateralis muscle rupture without an obvious cause is very rare. Localized pain and claudication are the most common symptoms and can be misdiagnosed as lumbar radiculopathy.

Methods A 70-year-old patient presented with right lower extremity and back pain, diagnosed as spinal stenosis. He was initially treated with caudal epidural block and transforaminal epidural block, which resulted in nearly complete relief of his symptoms. However, he subsequently experienced a pain that was no longer responsive to treatment. The ultrasonographic exam revealed a partial tear of the right vastus lateralis muscle.

Result Injection of local anesthetics relieved the patient's symptoms. At 1-month follow-up, he remained pain-free.

Conclusions In patients with lower back and leg pain, physicians should consider non-spinal conditions that can cause signs and symptoms mimicking lumbar radiculopathy.

Keywords Muscle injury · Quadriceps muscle · Radiculopathy · Spinal stenosis

Introduction

Quadriceps rupture is usually seen in the middle-aged and elderly and is associated with steroid use or underlying medical problems, such as chronic renal failure, hyperparathyroidism, diabetes, gout, and obesity [1]. Rupture of the quadriceps muscle belly is an extremely uncommon type of injury except following direct major trauma or as a sports-related injury [2].

Lumbar spinal stenosis, a frequent source of lower extremity pain in the elderly, can cause several forms of disability. However, the clinical features are often diverse and require the differential diagnosis includes other spinal and extraspinal comorbidities, such as vascular abnormalities, peripheral-nerve entrapment syndromes, musculoskeletal problems, and metabolic neuropathies [3].

Here, we report a case of quadriceps muscle rupture (vastus lateralis muscle) misdiagnosed as lumbar spinal stenosis in a 70-year-old man with low back and leg pain who had no risk factor or history of major trauma.

Case report

A 70-year-old male (height, 178 cm; weight, 68 kg) visited our clinic with a 3-month history of tingling sensations, intermittent claudication, and cramping pain radiating from the right lateral thigh into the lower leg around the L5 dermatome. A 100-mm visual analog scale (VAS) of pain yielded a score of 50–60 mm on a scale of 0 (no pain) to 100 (worst pain imaginable). He had no medical problem except hypertension and had undergone surgery for a right femoral shaft fracture about 30 years ago. His pain was aggravated by walking or extension and relieved by sitting or flexion. The straight leg raise test was negative. Motor,

J.-H. Lee (✉) · S.-H. Cho · S.-H. Kim · W.-S. Chae · H.-C. Jin
Department of Anesthesiology and Pain Medicine, University
of Soonchunhyang, Bucheon Hospital, 1174 Jung-Dong,
Wonmi-Gu, Bucheon-Si, Gyeonggi-Do 420-767, Korea
e-mail: anpuno@gmail.com

sensory, and reflex responses were normal and the vascular examination of the limb was unremarkable. MRI performed at that time indicated a herniated intervertebral disc and foraminal-type spinal stenosis at the L5–S1 level (Fig. 1). Caudal epidural block was performed with 10 mL of 0.15% ropivacaine and 20 mg of triamcinolone acetate. While pain relief was achieved immediately after caudal block, the effect lasted only 3–4 days. Transforaminal epidural steroid injection at the right L5 with 4 mL of 0.15% ropivacaine and 20 mg of triamcinolone acetate was done twice with a 2-week interval, and the pain gradually decreased during the follow-up period. Two weeks after the last procedure, he was symptom-free (VAS score of 10–20 mm).

However, 1 week later, he returned to our clinic due to the sudden onset of leg pain radiating from the lateral thigh to below the knee and mild low back pain. He reported slightly stumbling on the stairs the day before visiting our clinic. A straight leg raise test was positive and the pain was aggravated by weight bearing or walking and relieved by resting or lying down. The VAS score of the pain was between 60 and 70 mm. No sign of infection, including fever, chills, malaise and bowel or urinary incontinence, was observed. No obvious deformity, localized swelling, or ecchymosis was noted on inspection. There were no distinct tender points; his motor, sensory, and reflex responses were normal. However, knee extension was restricted and stiffness of the entire lateral thigh muscle was observed. Based on the assumption of reflex muscle spasm due to nerve root irritation, a caudal epidural block consisting of 10 mL of 0.5% mepivacaine was administered. However, although slightly lessened (VAS score of 50 mm) the pain persisted.

At that time, the ultrasonographic examination of the right lateral thigh area, performed with the patient in the supine position, revealed hypoechoic lesions in the middle

Fig. 1 Axial T2-weighted image of the lumbar spine demonstrates a herniated intervertebral disc and foraminal-type stenosis in the right L5–S1

third of the vastus lateralis muscle area (Fig. 2). Negative aspiration of the lesion showed a few old blood clots. The injection of 3 mL of 0.5% mepivacaine into the lesion under ultrasound guidance decreased the pain to a VAS score of 20–30 mm. An elastic bandage and an ice bag were applied at the lesion site and the patient was advised to rest for a few days. We also recommended MRI of the thigh for the evaluation of lesions other than muscle tear. However, he refused it for economic reasons.

After a 2-week follow-up, his pain relief continued, with a VAS score of 20. Unfortunately, he refused further ultrasonographic examination. The patient remained free of symptoms as reported in a 1-month telephone follow-up. Four months later, he visited our clinic complaining of mild pain in the right buttock without leg pain. He showed no specific tender points or muscle tightness. We recommended further evaluation of the thigh lesion, but he refused MRI exam and requested only medication.

Fig. 2 **a** Longitudinal and **b** transverse 12.5 MHz ultrasound images obtained over the mid-third of the right lateral thigh show a hypoechoic lesion, revealed as a partial tear of the vastus lateralis muscle

Discussion

Isolated quadriceps muscle rupture is usually associated with sports-related injury or occupational trauma, especially from direct contusion [1, 2]. Among the quadriceps muscle groups, the rectus femoris muscle is the most vulnerable to intrinsic trauma injuries because it crosses two joints (hip and knee joints). In contrast, vastus muscles, which cross only the knee joint, are usually injured in relation to extrinsic trauma [4]. As the weakest point is the musculotendinous junction, rupture occurs mostly in this area [5]. However, rupture of a previously healthy quadriceps muscle without a history of major trauma is uncommon. In the case of muscle injuries, the most common targets are the vastus lateralis and vastus intermedius and the most frequent type of injury is a partial rupture.

Patients with quadriceps rupture present with the sudden onset of local pain, claudication, and a limited range of motion in active extension of the knee. Diagnosis is most commonly made by MRI. In addition, MRI should be performed to determine the precise size and shape of the lesion and the involvement of surrounding tissue, and for differential diagnosis from other pathological lesions.

However, due to its costs and relative limited accessibility, ultrasound may instead be the preferred alternative diagnostic imaging modality, based on its high sensitivity and specificity [6]. Sometimes, the low awareness of physicians about this type of injury makes the diagnosis difficult [2]. In our patient, ultrasonography provided a crucial clue in both the diagnosis and the decision for immediate treatment.

Low back pain with leg pain in the elderly is most often caused by lumbar spinal stenosis [7]. However, there is no standard diagnostic tool for lumbar spinal stenosis and discrepancies between clinical symptoms and imaging findings are common [8]. A patient's complaints about the pain distribution may be the only meaningful parameter [9, 10]. Thus, it is important but difficult to diagnose the "true clinical stenosis patient." Overlooked non-spinal sources of pain are obviously associated with diagnostic and prognostic impacts [11].

After a non-spinal source is ruled out, musculoskeletal problems should be considered as the source of the patient's symptom. Some musculoskeletal disorders, such as trochanteric bursitis or iliotibial band syndrome, can cause symptoms similar to those of lumbar radiculopathy [12]. Furthermore, Cannon and colleagues [13] found that nearly one-third of the patients with radiculopathy confirmed by electrodiagnostic study had coexisting musculoskeletal disorders. Thus, the correct identification of a musculoskeletal disorder, accompanied by lumbar radiculopathy, is important to avoid unnecessary evaluations and treatment. Our patient was previously diagnosed with

spinal stenosis and he complained of pain involving almost the same area as previously affected, which at least partially explains our confusion in the initial diagnosis of his pain.

There were few case reports in which vastus lateralis muscle rupture occurred without a history of major trauma or underlying risk factors. Aydemir and colleagues [14] recently reported a case of vastus lateralis muscle partial tear after intramuscular injection in a child.

Pathological lesions other than muscle rupture, such as sarcoma or hemangioma, should also be taken into consideration in such cases. Soft tissue sarcomas are most commonly located in the lower extremities [15]. Spontaneous necrosis or rupture of sarcoma has been reported previously, but these lesions usually occur in internal organs such as the spleen [16]. Intramuscular hemangiomas usually present with pain and can also rupture spontaneously. These lesions also usually occur in internal organs such as the liver and spleen [16]. However, these tumors are usually found in younger patients and show calcified lesions or increased vascularity on color Doppler examination [17–19]. In the present case, it was difficult to assume that tumors remained asymptomatic until age of 70. Furthermore, no blood flow or calcification was observed around the lesion. There was no pathognomonic ultrasonographic representation of sarcoma and hemangioma, and the size and shape of the lesion did not correspond to the patterns associated with sarcoma or hemangioma.

The reason why the patient's vastus lateralis muscle ruptured could not be determined. As mentioned above, vastus muscles are typically vulnerable to extrinsic, not intrinsic, trauma. Unknown previous injuries may result in chronic lesions, such as myositis ossificans or cicatricial fibrosis that lead to rupture after a minor trauma. However, we failed to find any evidence of such a lesion by ultrasonography.

This report describes an unusual cause of lower extremity pain in an elderly patient that was misdiagnosed as radiculopathy. Thus, when examining a patient with lower back and leg pain, physicians should be meticulous in searching for musculoskeletal conditions that may cause signs and symptoms mimicking lumbar radiculopathy.

Conflict of interest None of the authors has any potential conflict of interest.

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