

Simultaneous bilateral traumatic quadriceps tendon rupture in a bodybuilding patient. Case report and literature review

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ABSTRACT

The traumatic bilateral and simultaneous quadriceps tendon rupture is a rare injury, usually associated with other systemic diseases such as renal insufficiency or endocrine disorders. We present the case of a 38-year-old healthy male athlete who sustained this injury while performing a squat at the gym.

Keywords: quadriceps tendon, quadriceps tendon rupture, sports trauma, sports medicine, bodybuilding.

INTRODUCTION

Simultaneous bilateral quadriceps tendon rupture is a rare injury in healthy patients. Only a few cases have been reported in athletes, requiring prompt diagnosis and surgical treatment.

Very few cases in the literature occurred during a sporting event¹⁻⁴ or due to direct trauma, such as a 16-year-old patient who suffered a ruptured tendon after being kicked by a horse⁴ or a 39-year-old patient who suffered this injury playing basketball⁵.

Spontaneous rupture of the quadriceps tendon is more frequent in patients with chronic kidney disease or other systemic diseases that weaken the tendons, such as gout, hyperparathyroidism, rheumatoid arthritis, diabetes, or obesity. The abuse of anabolic steroids and the use of fluoroquinolones also predispose to this condition⁶.

The most common cause of bilateral rupture is a sudden violent contraction of the quadriceps muscles with a semi-flexed knee and feet flat on the floor⁶.

Clinically, it presents with joint effusion, acute knee swelling, visible and/or palpable suprapatellar gaps, and inability to extend both knees and to lift the legs erect and straight. Other findings include hemarthrosis and a patella mobile and floating to the touch⁶.

CASE DESCRIPTION

A 38-year-old male bodybuilder with no relevant medical history presents to the emergency department of our institution with acute pain and swelling in both knees after having performed a squat at the gym, reporting an inability to walk after the event and to extend his legs.

Physical examination reveals the patient is a male of athletic build, with highly developed musculature (weight 90 kg, height 1.80 m, body mass index of 27 kg/m², predominantly muscle and with little fat). He is unable to extend his legs actively and has bilateral suprapatellar breaches.

We took X-rays of both knees, which showed effusion and disruption of the quadriceps tendon in both knees. We also performed an ultrasound and MRI of both knees (Figs. 1 and 2), which showed significant soft tissue swelling and frank rupture of the quadriceps tendon.

His blood analysis is standard. The patient reports taking anabolic steroids years ago but states that he no longer does so. As for dietary supplements, he refers to consuming 30 grams of protein powder and 5 grams of creatine monohydrate daily. He denies local steroid injections and has no history of tendonitis.

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Therefore, we reached a clinical and imaging diagnosis of simultaneous bilateral quadriceps tendon rupture and scheduled surgical resolution for the following day.

The surgery was performed under spinal anesthesia and sedation. Following an anterior approach in both knees, we repaired the quadriceps tendons with two 3.5 mm metal anchors with high-strength sutures (Fig. 3). The extensor retinaculum was reapproximated medially and laterally.

His legs underwent immobilization with knee extension splints for six weeks. He received pain medication during that period and 40 IU/day of low molecular weight heparin. He underwent physical therapy to regain strength and range of motion.

Six months after surgery, the patient achieved *ad integrum* recovery: full bilateral extension of both knees and full bilateral flexion. He had no difficulties in performing activities of daily living.

One year after surgical treatment he could return to sports such as running or brisk walking, but not weightlifting.

It is worth noting that, in this clinical report, we protect the dignity, identity, integrity, and well-being of the subject presented and respect his human rights.



Figure 2. Sagittal MRI of the left knee in T2 sequence, showing a continuity lesion at the insertion level of the quadriceps tendon in the superior pole of the patellar tendon (the same lesion as in the contralateral knee).

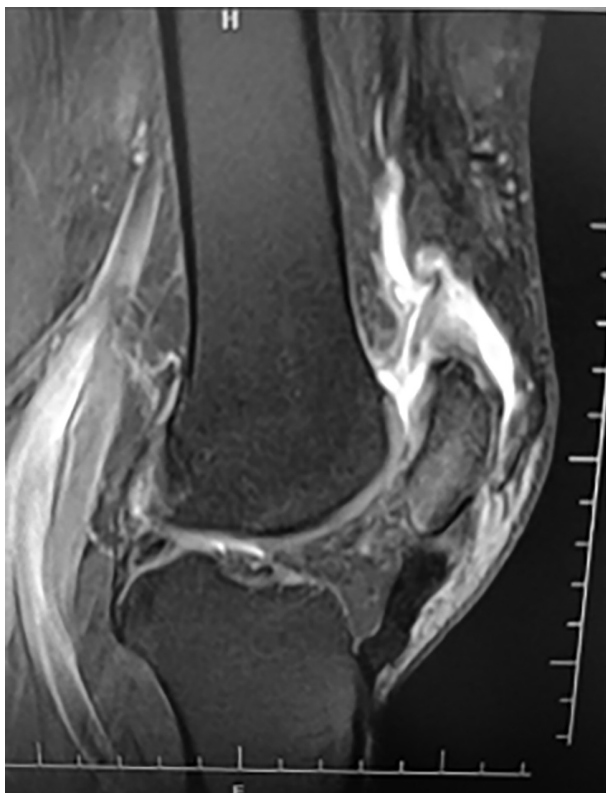


Figure 1. Sagittal MRI of the right knee in T2 sequence, showing a continuity lesion at the insertion level of the quadriceps tendon in the superior pole of the patellar tendon.

We do not expose images or data that would allow the identification of the patient in question.

DISCUSSION

Simultaneous and bilateral quadriceps tendon rupture is a very uncommon condition.

It occurs in men in 80% of cases⁷. Major trauma is an uncommon cause of bilateral rupture of this tendon. In a small minority of cases, there is no risk factor for such an injury, and in those cases, some repeated microtrauma may play an important role in the pathogenesis⁸.

Several recent studies report simultaneous injury to the patellar tendon and contralateral quadriceps tendon⁹, and others report rupture of both patellar tendons¹⁰. However, there is little evidence of simultaneous bilateral rupture of both quadriceps tendons. The most recently published article on the latter condition is the case of an elite weightlifting athlete who suffered a spontaneous injury during competition¹¹, similar to this patient.

Knee flexion during a squat increases the force imposed on the quadriceps tendon. When the flexion angle is greater than 50°, the load on this tendon is higher than that imposed on the patellar tendon, making the quadriceps tendon more vulnerable to rupture¹².

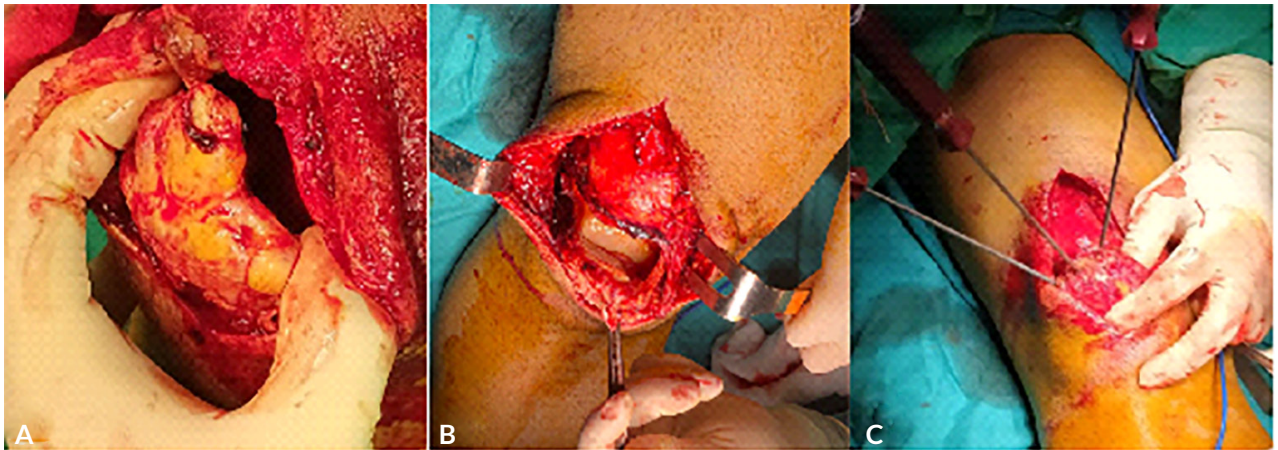


Figure 3. A. Intraoperative finding of quad tendon injury, subacute or chronic rupture appearance. B. Intraoperative right knee photograph with an acute complete quad tendon rupture. C. Photograph taken after placement of the anchors in the right knee (two proximal and two on the sides of the patella).

The quad tendon can rupture at three points: the osteotendinous junction, the musculotendinous junction, or the tendon itself¹³. Of these three locations, the most common is the musculotendinous junction.

Magnetic resonance imaging (MRI) is the gold standard for diagnosis, but ultrasound is also a reliable and less expensive method¹⁴.

Emergency surgical treatment is necessary because, if 72 hours or more elapse without surgical repair, retraction of the quadriceps apparatus may make it harder to obtain apposition of the torn ends and increase tension along the suture lines¹².

Shah reviewed the medical literature and found only 66 reported cases of simultaneous bilateral quadriceps

tendon rupture, and most were spontaneous¹³. In addition, he noted that 57% of patients recovered 100% strength and range of motion after surgery.

We have also searched the literature for other cases of simultaneous and bilateral traumatic (i.e., non-spontaneous) rupture, which we summarize in Table 1.

We believe that the importance of presenting this case lies in the fact that we show a very infrequent injury, and we want to emphasize the importance of prompt diagnosis and early surgical intervention to achieve full recovery of function of both tendons.

Conflict of interests: the authors declare no conflict of interests.

Table 1. Other cases of traumatic and simultaneous bilateral rupture in the literature

Authors	Age	Sex	Country	Contex	Treatment	Recovery of mobility
Neubauer et al. ⁴	52	M	Austria	Fall on flexed knees	End-to-end tendon fixation with sutures through patellar perforations	Decreased mobility and feeling of weakness, leading to the use of a wheelchair.
Neubauer et al. ⁴	30	M	Austria	Fall on flexed knees	Transosseus sutures	Complete
Katz et al. ⁷	46	M	Israel	Tennis practice	End-to-end tendon fixation with sutures through patellar perforations	Complete
Dhillon et al. ¹¹	26	M	India	Weightlifting	End-to-end tendon fixation with sutures through patellar perforations	Complete
Hansen et al. ¹⁵	68	M	Denmark	Fall on flexed knees	End-to-end tendon fixation with sutures through patellar perforations	Death due to pulmonary embolism after discharge, without reaching rehabilitation
Yilmaz et al. ¹⁶	68	M	Turkey	Fall on flexed knees	Surgical tendon lengthening	Complete
Grenier et al. ¹⁷	39	M	Canada	Weightlifting	Open reduction and tibial fixation	Complete
Fenelon et al. ⁸	29	M	Ireland	Weightlifting	Open reduction and tibial fixation	Complete
Lewis et al. ¹⁹	35	M	Great Britain	Weightlifting	Open reduction and tibial fixation	Complete
Liow et al. ²⁰	29	M	Great Britain	Fall on flexed knees	Open reduction and tibial fixation	Minimal lag with flexion up to 60 degrees
Shah y cols. ²¹	39	M	United States of America	Basketball practice	Open reduction and tibial fixation	Complete
Hill et al. ²²	24	M	United States of America	Weightlifting	Open reduction and tibial fixation	Complete
Bikkina et al. ²³	40	M	United States of America	Weightlifting	Open reduction and tibial fixation	Complete
Abduljabbar y cols. ²⁴	24	M	Saudi Arabia	Basketball practice	Open reduction and tibial fixation	Complete

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