

Case Report

Simultaneous Acute Rupture of the Patellar Tendon and the Anterior Cruciate Ligament

Matias Costa-Paz, M.D., D. Luis Muscolo, M.D., Arturo Makino, M.D.,
and Miguel A. Ayerza, M.D.

Abstract: We present 3 cases of simultaneous rupture of the patellar tendon and the anterior cruciate ligament (ACL) and discuss the diagnosis and treatment of this infrequent association. Between 1997 and 2000, 3 patients with a mean age of 37 years were treated with an ACL reconstruction and repair of the patellar tendon. The average follow-up was 3 years. Two of them were initially misdiagnosed. At follow-up, all patients had stable knees and the average Lysholm score was 95. In acute knee injuries with gross anteroposterior instability and a huge hematoma, the occurrence of this complex lesion should be considered. A careful clinical evaluation may be correlated with magnetic resonance imaging findings to provide the orthopaedic surgeon with the appropriate information for planning the timing and surgical treatment. **Key Words:** Anterior cruciate ligament—Patellar tendon—Magnetic resonance imaging.

Simultaneous acute rupture of the patellar tendon (PT) and anterior cruciate ligament (ACL) is a very unusual injury. There are 8 cases reported in the literature related to this rare combination and, in 5 of them, the PT or ACL lesion was misdiagnosed at the initial assessment.¹⁻³ We present 3 cases of patients with simultaneous acute rupture of the PT and ACL and discuss the diagnosis and treatment of this infrequent association.

CASE 1

A 31-year-old man injured his right knee during a motorcycle accident. On examination, the patient

lacked the ability to extend his knee against gravity. He presented a swelling knee with a positive Lachman test and a grade 3 pivot-shift test. Proximal migration of the patella was clinically and radiographically noted. After the clinical evaluation, a complete rupture of the ACL and PT was diagnosed. Magnetic resonance imaging (MRI) showed a complete rupture of the central portion of the PT and an acute tear of the ACL (Fig 1 A and B). In addition a rupture of the medial collateral ligament (MCL) was found. The surgical treatment was performed in 2 stages. First, the PT and MCL were primarily repaired and the patient used a brace with limited range of motion for 5 weeks. After that, the second stage of the procedure included an ACL reconstruction with a contralateral PT graft.

Four years after surgery, the patient had excellent range of knee motion and knee function, having returned to his preinjury activity level. Results of the Lachman and pivot-shift tests were near-normal according to the International Knee Documentation Committee (IKDC). He had a Lysholm score of 100 points and a near-normal final IKDC score. Radiographs showed normal patellar height and MRI revealed a continuous repaired PT and a reconstructed homogeneous ACL graft (Fig 1C).

From the Institute of Orthopaedics "Carlos E. Ottolenghi," Italian Hospital of Buenos Aires, Buenos Aires, Argentina.

Cite this article as: Costa-Paz M, Muscolo DL, Makino A, Ayerza MA. Simultaneous acute rupture of the patellar tendon and the anterior cruciate ligament. Arthroscopy 2005;21:1143.e1-1143.e4 [doi:10.1016/j.arthro.2005.05.028]

Address correspondence and reprint requests to Matias Costa-Paz, M.D., Institute of Orthopaedics "Carlos E. Ottolenghi," Italian Hospital of Buenos Aires, Potosí 4215 (C1199ACK), Buenos Aires, Argentina. E-mail: matias.costa@hospitalitaliano.org.ar

*© 2005 by the Arthroscopy Association of North America
0749-8063/05/2109-4421\$30.00/0
doi:10.1016/j.arthro.2005.05.028*

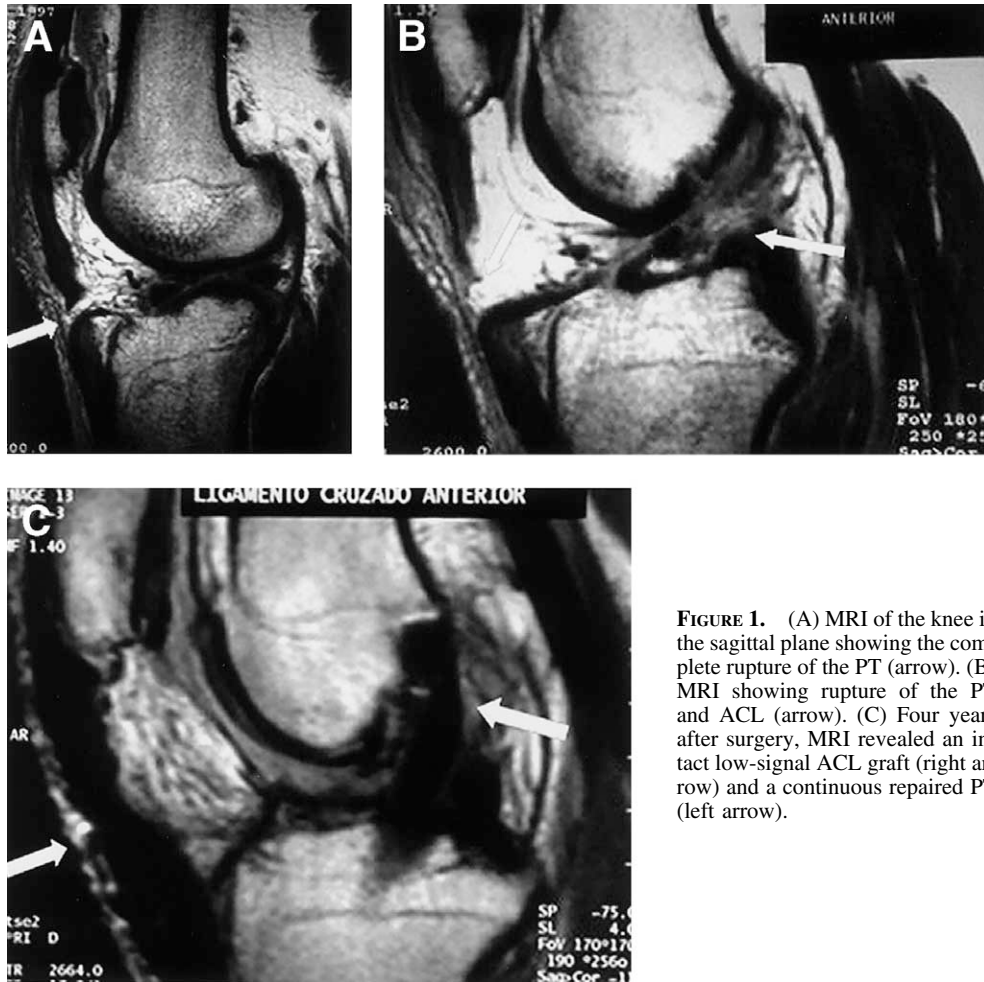


FIGURE 1. (A) MRI of the knee in the sagittal plane showing the complete rupture of the PT (arrow). (B) MRI showing rupture of the PT and ACL (arrow). (C) Four years after surgery, MRI revealed an intact low-signal ACL graft (right arrow) and a continuous repaired PT (left arrow).

CASE 2

A 31-year-old recreational soccer player injured his right knee during a game. On impact, he twisted his knee and fell as he heard a pop and, subsequently, was unable to walk. He was taken to another hospital, where both ACL and MCL ruptures were clinically diagnosed. The patient was referred to our department 20 days after the injury. The clinical examination elicited a positive Lachman test and a grade 3 opening on valgus stress. The extensor mechanism could not be correctly evaluated because of the patient's fear and pain.

An MRI scan was performed that confirmed the ACL and MCL ruptures and showed a PT lesion. The injury to the PT was within the substance so there was mild thinning with increased signal in the distal fibers of the tendon and a slightly curved configuration (Fig 2). The PT and the MCL were repaired. The ACL was reconstructed using a quadriceps tendon at the same surgery.

For the first 4 weeks after surgery the patient was immediately allowed passive flexoextension up to 45 grades while wearing a brace. Quadriceps muscle strengthening was then begun, and the player returned to full competition by 8 months after surgery. At follow-up 3 years after surgery, he reported no signs of instability and presented a full range of motion. Results of the Lachman and pivot-shift tests were normal according to the IKDC. He had a Lysholm score of 96 points and a near-normal final IKDC score.

CASE 3

A 50-year-old man injured his left knee during a bicycle accident. Initial examination of the swollen knee revealed gross anteroposterior instability with proximal migration of the patella, and the patient was unable to straighten his leg. Radiographs showed a

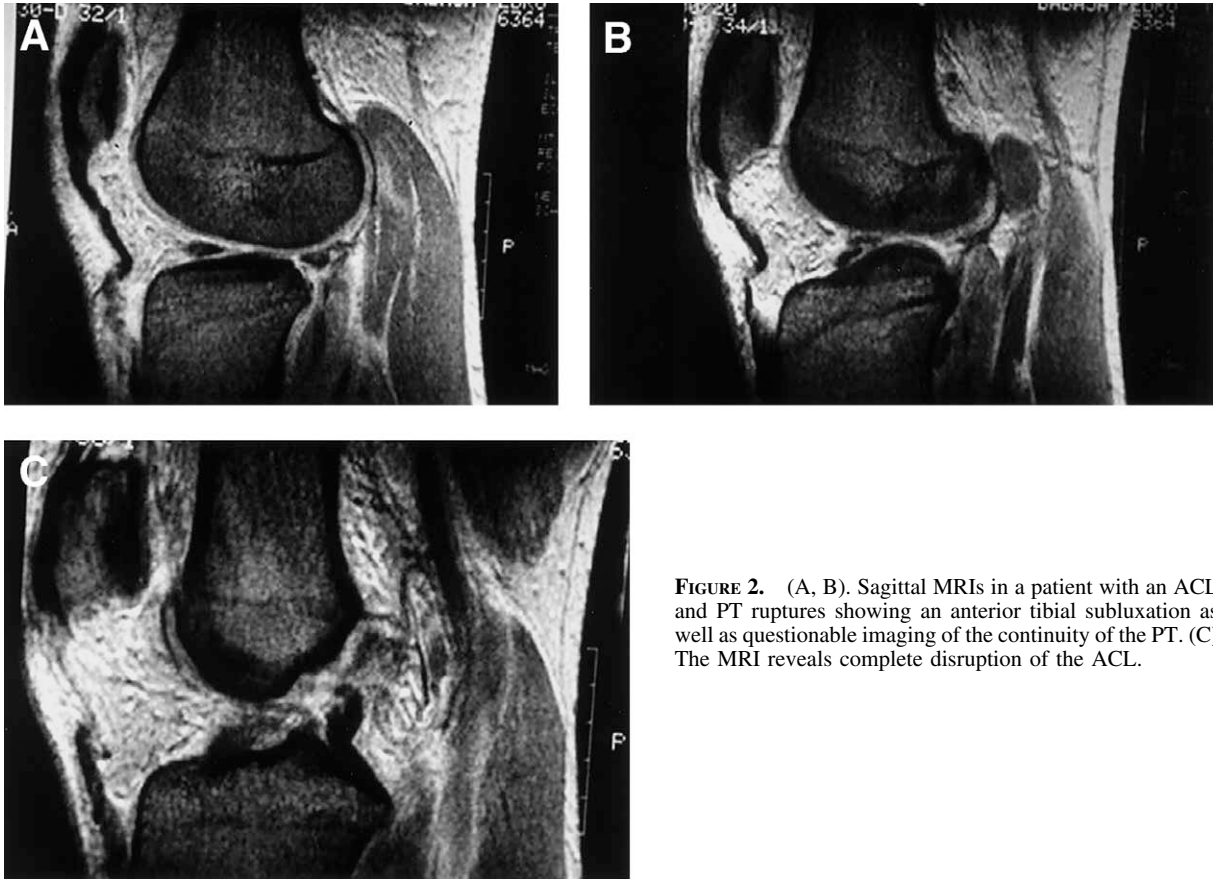


FIGURE 2. (A, B). Sagittal MRIs in a patient with an ACL and PT ruptures showing an anterior tibial subluxation as well as questionable imaging of the continuity of the PT. (C) The MRI reveals complete disruption of the ACL.

high patella. MRI confirmed a complete PT rupture, a clinically missed ACL tear, and a tear of the lateral meniscus. Simultaneous primary repair of the PT, as well as lateral meniscectomy and ACL reconstruction with semitendinosus and gracilis tendons were performed.

Postoperatively, the patient's knee was immobilized in extension with a brace for 4 weeks. After that period, rehabilitation was intensified. At follow-up 2 years after surgery, the patient had an excellent range of knee motion and quadriceps muscle power. This patient had a negative pivot-shift test result but had a feeling of partial giving way. He had a Lysholm knee score of 88 points and a near-normal final IKDC score, related to his subjective assessment.

DISCUSSION

Simultaneous acute rupture of the ACL and the PT is very difficult to diagnose in the initial evaluation of a knee injury, because the PT rupture is often missed.

Neglected, isolated, or combined PT ruptures have been previously reported.^{4,5}

There are 8 published cases of this lesion combination, involving 3 PT ruptures and 2 ACL tears that were initially misdiagnosed. In 1991, Rae and Davies² published a case report describing the same injury combination in which the PT rupture was not initially diagnosed. In a series of 6 cases reported by Levakos et al.,³ some part of the diagnosis was initially missed in 4 patients. Not evaluating the function of the extensor mechanism after an ACL injury or not testing the integrity of the ACL when the PT is obviously torn may lead to an incomplete initial diagnosis.

Our 3 patients presented with gross anteroposterior instability with hemarthrosis, pain, and flexion contracture, making the physical examination difficult. Therefore, MRI was performed in all cases. In case 1, MRI confirmed the initial diagnosis. In Case 2, although the MRIs were not definitive, it was a useful tool to suspect the PT rupture. Finally in case 3, the PT rupture was evident in the physical examination and

the MRI showed the ACL tear. Although MRI studies can evaluate both pathologies, images can be misinterpreted. When ACL rupture occurs, the tibia moves forward creating a loss of tension of the PT. This slightly curved configuration imaging of the PT might be considered as a secondary sign of an ACL injury instead of a primary signal of a PT rupture.⁶⁻⁸

As to the treatment of this lesion, because of the paucity of reporting in the literature, there is no definite protocol. It was described that early diagnosis and suturing of the PT provide the best results in these cases.^{9,10} We deem it convenient to perform the ACL reconstruction in the same surgery, taking into account graft availability, soft-tissue status, the patient's activity level, and the surgeon's experience.

In 2 of 3 cases, the semitendinosus and gracilis tendons were also compromised. In this case, the surgeon should be prepared to deal with different grafts and types of reconstruction. In our 3 cases, we used different techniques to restore a torn ACL: in case 1, we used the contralateral central third of the PT; in case 2, the quadriceps tendon; and in case 3, the semitendinosus and gracilis tendons were available.

The mean follow-up was 3 years and all patients had a stable knee and average Lysholm score of 95, similar to patients who underwent an isolated ACL reconstruction, even though this is a more severe lesion.¹¹⁻¹³

Diagnosis of the rupture of the PT is mandatory because immediate surgical treatment of this lesion is more favorable than a neglected injury treated later.^{14,15} On the other hand, if there is a failure in the initial diagnosis of the ACL rupture, the physician may not be adequately prepared during the surgery to treat this complex injury satisfactorily. These factors may also bring medico-legal implications.

In conclusion, in acute knee injuries with gross anteroposterior instability and a huge hematoma, the occurrence of this complex lesion should be considered. A careful clinical evaluation may be correlated

with MRI findings to provide the orthopaedic surgeon with the appropriate information for planning the timing and surgical treatment.

REFERENCES

1. Baker BE. O'Donogue's triad plus patellar tendon rupture. *N Y State J Med* 1980;80:1436-1437.
2. Rae PJ, Davies DRA. Simultaneous rupture of the ligamentum patellae, medial collateral, and anterior cruciate ligaments. A case report. *Am J Sports Med* 1991;19:529-530.
3. Levakos Y, Sherman MF, Shelbourne KD, et al. Simultaneous rupture of the anterior cruciate ligament and the patellar tendon. Six case reports. *Am J Sports Med* 1996;24:498-503.
4. Cooper ME, Selesnick FH. Partial rupture of the distal insertion of the patellar tendon. A report of two cases in professional athletes. *Am J Sports Med* 2000;28:402-406.
5. Shepard GJ, Christodoulou L, Hegab M. Neglected rupture of the patellar tendon. *Arch Orthop Trauma Surg* 1999;119:241-242.
6. Resnick D, Niwayama G. *Internal derangements of joints. Diagnosis of bone and joint disorders*. Philadelphia: WB Saunders, 1988;2899.
7. Mink JH. Pitfalls in interpretation. In: Mink JH, ed. *Magnetic resonance imaging of the knee*. New York: Raven, 1987;141-155.
8. Mink JH, Levy T, Crues JH. Tears of the ACL and menisci of the knee: Magnetic resonance evaluation. *Radiology* 1988;167:769-774.
9. Insall JN, Scott WN. Quadriceps and patellar tendon disruptions. In Insall JN, Scott WN, eds. *Surgery of the knee*. New York: Churchill Livingstone, 2001;1080-1086.
10. Siwek CW, Rao JP. Ruptures of the extensor mechanism of the knee joint. *J Bone Joint Surg Am* 1981;63:932-937.
11. Bach BR, Jones GT, Sweet FA, Hager CA. Arthroscopy-assisted anterior cruciate ligament reconstruction using patellar tendon substitution. *Am J Sports Med* 1994;22:758-767.
12. Buss DD, Warren RF, Wickiewicz TL, et al. Arthroscopically assisted reconstruction of the anterior cruciate ligament with the use of autogenous patellar-ligament grafts. *J Bone Joint Surg Am* 1993;75:1346-1355.
13. Costa-Paz M, Makino A, Muscolo DL. Reconstruction of the anterior cruciate ligament in male soccer players. Two to nine year follow-up results. Proceedings and abstracts of the European Federation of National Associations of Orthopaedics and Traumatology (EFORT), Barcelona Congress, April 1997.
14. Casey MT, Tietjens BR. Neglected ruptures of the patellar tendon. A case series of four patients. *Am J Sports Med* 2001;29:457-460.
15. Marder RA, Timmerman LA. Primary repair of patellar tendon rupture without augmentation. *Am J Sports Med* 1999;27:304-307.