

## Combined rupture of the patellar tendon, anterior cruciate ligament and lateral meniscus. A case report and a review of the literature.

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### Abstract

Simultaneous rupture of both the patellar tendon and the anterior cruciate ligament is a relatively rare injury. Its diagnosis can easily be missed during the initial examination. Treatment options include immediate repair of the patellar tendon with either simultaneous or delayed reconstruction of the ACL. We present the case of a combined rupture of the patellar tendon, the anterior cruciate ligament and the lateral meniscus in a 38-year old recreational martial arts athlete after a direct kick on his left knee. A two-stage treatment approach was performed with an excellent functional outcome. *Hippokratia* 2011; 15 (2): 178-180

**Key words:** patellar tendon, anterior cruciate ligament, rupture, repair

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Knee injuries account for a significant proportion of the total sport injuries in the athletic setting. Isolated ruptures of the anterior cruciate ligament (ACL) are very common, with a reported incidence of 30-60/100000 per year in the general population<sup>1</sup>. On the other hand, patellar tendon (PT) rupture is relatively rare during sports, and its peak incidence is recorded during the third and fourth decade<sup>2</sup>. Consequently, it seems reasonable that combined ruptures of both the PT and the ACL are among the types of lesions that are very rarely encountered in the emergency room. In such combined injuries, there is a strong possibility of misdiagnosis of one of the lesions<sup>3,4</sup>. In addition, because of their rare occurrence, a definite treatment protocol has not yet been established. We present the case of such an injury in a recreational athlete that was successfully treated with a two-stage reconstruction procedure and we discuss the diagnostic and treatment alternatives.

### Case report

A 38 year-old male recreational martial arts athlete presented with a severe injury on his left knee. He had received a direct kick to his knee, directed from posterolaterally to anteromedially, as a result of which he felt an excruciating pain and was unable to ambulate. On clinical examination, a tense effusion had developed immediately after the injury and the knee's range of motion was severely restricted. The patient was unable to raise straight his leg. A palpable gap was then observed over the patellar tendon. Due to excessive joint effusion and the severity of pain, any further clinical examination was impossible. Plain radiographs revealed a superior displacement of the

patella as well as a visible discontinuity of the tendon's trace, with no other bone lesions. The patient reported no history of patella tendinitis or intra-articular injection of steroids for any reason.

Since the diagnosis of PT rupture had been established through clinical examination, the patient was led to immediate surgical reconstruction of the ruptured tendon. Evaluation under anesthesia was performed in the operating room. There was a positive Lachman test (+2) as well as evidence of a medial collateral ligament tear. Intra-operatively, a complete tear at the upper third of PT and of the adjacent retinacula was confirmed. Through the lesion's gap, an inspection of the intra-articular structures was performed. The ACL was completely torn. The lateral meniscus had also suffered a combined radial and horizontal tear.

Partial meniscectomy was performed and ACL remnants were resected. The PT was repaired using interlocking No 5 Ethibond sutures placed through two parallel holes through the patella and one transverse hole drilled through the tibial tuberosity. Postoperatively, the knee was placed in a hinged functional brace. Full weight bearing was allowed after the fourth week with the knee brace locked in extension. Active flexion was initiated from the fourth postoperative day followed by strictly passive extension. Gentle isometric ipsilateral quadriceps exercises were started the third postoperative week while straight-leg raises without resistance were allowed only after the sixth week.

By the third postoperative month, the patient had regained full range of motion and adequate quadriceps

strength and ACL reconstruction was performed with a four-strand autologous hamstrings graft. At the latest follow-up, eleven months after the injury and eight months after the second procedure, the patient had no functional deficit and had returned to full everyday activities and moderate recreational sports.

### Discussion

Simultaneous rupture of the PT and the ACL is an uncommon injury. A total of thirteen cases have been presented previously in no more than six published reports (Table 1)<sup>3-8</sup>. There seems to be an increased incidence of this injury during sport activities, as ten of the reported cases have occurred in recreational or professional athletes probably because a significant force is needed for both ligaments to rupture along with a more complex injury pattern. Pre-existing pathology on the patellar tendon, like tendinitis or "jumper's knee" which is common in athletes, has also been found to predispose to the tendon's rupture<sup>9</sup>.

As the number of reported cases in the literature has risen recently, there seems to be a consensus regarding the mechanism of injury. A sudden anterior tibial translation followed by an eccentric quadriceps contracture with the knee partially flexed and with various degrees of varus or valgus torque seems to be the commonest injury pattern. With the knee flexed, stresses on the extensor mechanism are greater on the patellar than the quadriceps tendon, and a force up to 17.5 times the body weight may cause the tendon to rupture at that moment<sup>10</sup>. In our case the lesion

was caused by a direct impact on the knee, which led to forceful anterior tibial translation combined with valgus torsion. The same result may occur after a non-contact deceleration injury with the foot planted. Varus and valgus forces are usually responsible for the associated meniscal tear or medial collateral ligament rupture.

There is an increased incidence of misdiagnosing the ACL or the PT rupture during the initial assessment<sup>3,4,6</sup>. Patient guarding, early tense hemarthrosis and the rarity of combined ACL and PT lesions are thought to contribute to the frequent failure of an accurate initial diagnosis. For isolated PT ruptures, clinical examination is usually enough to set the diagnosis along with plain radiographs and ultrasonography. An MRI examination is commonly reserved for cases with atypical features, where clinical and radiographic signs are inconclusive or in cases of partial PT tears. However, when a concomitant intra-articular lesion is suspected, MRI presents a clear advantage in evaluating both pathologies. In all the reported cases where the diagnosis of one of the lesions was missed, the patients did not undergo an MRI scan, at least from the beginning. In our case, a decision was made to immediately operate on our patient without performing an MRI scan. Although the possibility of a concomitant ACL tear was discussed from the beginning, it was decided that we would not, in any case, proceed to immediate ACL reconstruction.

Due to the number of reported cases, the optimal treatment protocol remains controversial. Immediate repair of the ruptured patellar tendon is mandatory to re-

**Table 1:** Reported cases of combined ACL and PT ruptures.

(PT: patellar tendon, ACL: anterior cruciate ligament, MM: medial meniscus, LM: lateral meniscus, MCL: medial collateral ligament].

Author	Year of publication	No of cases	Sex	Age	Activity involved	Concomitant lesions	MRI	Diagnosis	ACL repair	Complications
Baker	1980	2 cases	M	24	basketball	MM, MCL	no	immediate	not reported	
Rae et al	1991		F	25	trampoline	MCL	no	missed (ACL]	not reported	
Levakos et al	1996	6 cases	M	36	soccer	LM, MM, MCL	no	missed (ACL]	simultaneous	
			F	15	long jump	-	no	missed (ACL]	delayed	
			M	33	skiing	MM, LM	no	immediate	simultaneous	
			M	20	football	LM, MCL	yes	immediate	not reported	wound breakdown
			M	23	motorcycle accident	MM, LM, MCL	yes	missed (ACL]	not reported	patella baja, flexion lag
			M	23	football	MCL	yes	immediate	delayed	
Costa-Paz et al	2005	3 cases	M	31	motorcycle accident	MCL	yes	immediate	delayed	
			M	31	soccer	MCL	yes	missed (PT]	simultaneous	
			M	50	bicycle accident	LM	yes	missed (ACL]	simultaneous	
Chow et al	2005	1 case	M	23	basketball	ML, LM	no	immediate	not reported	
Futch et al	2007	1 case	M	19	football	MM	yes	immediate	simultaneous	arthrofibrosis

store the knee's extensor mechanism. A good functional outcome has been strongly related to the time interval between the injury and the repair<sup>2</sup>. ACL reconstruction, on the other hand, has been long considered a more elective procedure. Recently, however, its indications have expanded in fear of delayed meniscal and chondral degeneration induced by chronic knee instability<sup>11</sup>. Surgical reconstruction of the ruptured ACL is currently considered the treatment of choice for most active individuals. The main concern, in cases of combined PT and ACL lesions, involves the timing of the ACL reconstruction in relation to the patellar tendon repair and the potential risk of postoperative arthrofibrosis, when a simultaneous repair of both ligaments is preferred, which may result to a delay in rehabilitation or even to a permanent functional deficit<sup>12,13</sup>. It is believed that the environment of acute inflammation and the effect of blood in the joint predispose the patients to this complication<sup>14</sup>. A period of three weeks has been proposed as the minimal safe time for primary reconstruction of an acute ACL injury<sup>15</sup>, although this has been argued by several authors<sup>16</sup>. The incidence of arthrofibrosis may be reduced by a faster rehabilitation protocol. However, in the case of a co-existing patellar tendon rupture, a more conservative approach in the rehabilitation strategy is inevitable, in order not to jeopardize the integrity of the repaired tendon.

The outcome of both patellar tendon and ACL reconstruction has been reported in only eight cases (Table 1). A fair to excellent postoperative result has been reported in most cases, with either treatment alternative. Most recently though, Futch et al<sup>5</sup> presented a case of simultaneous repair of both structures following an acute sport injury. Rehabilitation was complicated by arthrofibrosis, which necessitated arthroscopic lysis of adhesions and repeated closed manipulation. Return to full contact sports was finally achieved 22 months after the initial injury. We therefore believe that our patient's fast rehabilitation and good functional result provide a strong argument in favor of two-stage repair of these combined injuries.

In conclusion, a simultaneous PT and ACL rupture is an uncommon lesion resulting from the application of a significant force, usually over preexisting asymptomatic pathology. A high index of suspicion is essential in achieving a successful diagnosis. Delayed reconstruction of the ACL, after the immediate PT repair, is believed to provide a safer pathway to a more satisfying functional outcome.

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