Multiligamentous Knee Injury Concomitant With a Patellar Tendon Rupture

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**Abstract:** Multiligamentous knee injuries with simultaneous patellar tendon ruptures are rare. Surgeons must be prepared to address injured structures of the knee to allow return of knee function. Restoring motion while protecting repairs is important. The authors present 2 cases and discuss treatment strategy for preoperative evaluation, surgical intervention, and postoperative care. [Orthopedics. 2015; 38(1):45-48.]

Multiligamentous knee injuries can be devastating and life changing. Fortunately, they are not common. Even more rare is a multiligamentous knee injury concomitant with a patellar tendon rupture or extensor mechanism disruption. There have been a few case reports of simultaneous anterior cruciate ligament (ACL) and patellar tendon ruptures.1-6 The current authors present 2 cases of a multiligamentous knee injury with a patellar tendon rupture that highlight a treatment algorithm for these complex cases.

During an initial examination of an individual with gross knee laxity, one must have a high index of suspicion for possible knee dislocation to avoid the potential for catastrophic results. It is estimated that more than 50% of knee dislocations spontaneously reduce. A knee dislocation places all of the structures surrounding the knee at risk for injury, but by definition at least 2 of the 4 primary ligamentous stabilizers must be disrupted. The structures most commonly injured from a knee dislocation are the ACL and the medial collateral ligament (MCL).

A concern with this injury is a missed diagnosis of the extensor mechanism. Examination of the knee may be difficult. Occasionally in a trauma patient, other distracting injuries may take precedence and a thorough knee examination may initially be overlooked. Once an evaluation is performed, focus may be drawn toward one injury and a simultaneous injury may be overshadowed. A few published case reports demonstrate how easy it is to miss a patellar rupture or a knee ligament tear when these injuries occur simultaneously. Tsarouhas et al6 reviewed 13 cases from the literature and found that 5 ACL tear diagnoses and 1 patellar tendon diagnosis were initially missed. However, associated knee pathology with a patellar tendon rupture may be more common than what is routinely identified. Patellar tendon ruptures have an associated injury 30% of the time.7 The most common injuries are an ACL tear and a meniscus tear, both occurring 18% of the time. It was also found that approximately 1 of every 4 patellar tendon ruptures has more than 1 associated injury.

**Case Reports**

**Patient 1**

A 32-year-old man was involved in a low-speed (approximately 10 to 15 mph) dirt bike crash, sustaining an isolated right knee injury. He was taken to the Emergency Department, where he reported right knee pain. His right knee was positioned at 120º and he was unable to flex or extend it. He was neurovascularly intact, and his ankle-brachial indexes were above 0.90 throughout hospitalization. Radiographs were obtained (Figure 1), showing a tibiofemoral joint dislocation. The knee was reduced with longitudinal traction under conscious sedation. An examination performed...
after reduction showed laxity on the Lachman test, grade 3 opening with valgus stress at 0° and 30°, a positive result on the posterolateral drawer test, and inability to fully extend the knee. Magnetic resonance imaging was subsequently performed, revealing ruptures of the patellar tendon, ACL, and MCL (tibial-based avulsion: superficial and deep) and injury to the posterolateral corner (PLC) (Figure 2).

Seven days following the injury, the patient underwent MCL and patellar tendon repairs. The MCL was repaired by placing 3 Super Anchors (DePuy Synthes, Raynham, Massachusetts) just distal to the joint line in the tibial plateau. The 4 suture strands of each anchor were used to repair portions of the posterior oblique ligament and the superficial/deep MCL as well as the coronary ligament of the medial meniscus. Next, the patellar tendon was repaired with #5 FiberWire (Arthrex, Naples, Florida) and the retinaculum was repaired with #2 Ti-Cron (Covidien, Jersey City, New Jersey).

Postoperatively, the patient was toe-touch weight bearing in a total range of motion (TROM) knee brace locked at 30°. He immediately began using a continuous passive motion machine. For the first 2 weeks, he was limited to 0° to 30°. At 2 weeks postoperatively, sutures were removed and he started physical therapy, being allowed to progress his motion up to 90°. At 4 weeks, the patient transitioned to full weight bearing with the brace locked at 0° and was allowed unlimited motion in a non-weight bearing position. By 12 weeks, he had regained full ROM.

Four months after the index surgery, the patient underwent an ACL reconstruction with a hamstring autograft, a posterolateral corner reconstruction with a hamstring allograft, and a medial meniscus repair. The postoperative protocol included toe-touch weight bearing with the brace locked at 0° for the first 6 weeks. At 3-month follow-up, his motion was 0° to 140°. At 9 months after the injury, the patient had returned to pre-injury levels of employment and activity.

**Patient 2**

A 27-year-old man presented to the sports medicine clinic with left knee pain and swelling 1 day following an injury while playing soccer. He reported being slide tackled from behind, which caused a forced twisting of his knee. He had been treated in another Emergency Department and, after negative findings on radiographs, was placed in a knee immobilizer due to concerns of a partial tear of the patellar tendon. An examination led to concern over a ligamentous injury, due to a positive result on the Lachman test and grade 2 opening with valgus stress. He also lacked terminal 15° of extension. Magnetic resonance imaging confirmed an ACL tear, an MCL tear, a lateral meniscus completely displaced bucket tear, and a patellar tendon tear (Figure 3).

Two weeks from the date of the injury, the patient underwent a patellar tendon repair as described above. During the repair, the displaced lateral meniscus was reduced under direct visualization through the arthrotomy. Because there was no ligamentous repair, he was allowed to bear weight as tolerated with a knee brace locked at 0° and will follow a patellar tendon rupture rehabilitation protocol. Once he regains full motion of the knee, he will undergo ACL reconstruction, lateral meniscal repair, and possible MCL repair.
DISCUSSION

Due to a paucity of reported cases of simultaneous extensor mechanism rupture and knee ligament tear, there is no defined treatment protocol that applies to all cases. The concern in determining treatment is being able to regain full ROM of the knee while protecting the patellar repair. Functional outcomes improve when the patellar tendon is repaired in the acute setting, whereas ACL reconstruction benefits from regaining full ROM prior to surgery. The postoperative protocol for a ligament injury stresses the importance of early ROM. Patellar tendon protocols are often less aggressive with early ROM. Futch et al. presented a case of simultaneous repair of a patellar tendon and an ACL. Despite early motion therapy, the rehabilitation was complicated by arthrofibrosis requiring surgical lysis of adhesions and a manipulation under anesthesia 3 months after surgery. This patient returned to contact sports at 22 months. Although Patient 1 of the current study did not play contact sports, he did return to construction work 9 months after injury.

Some case reports advocate repair of the meniscus or the ACL in the acute setting due to concern over meniscal and chondral damage in an unstable knee. However, the current authors believe that if the knee is protected in a brace to prevent instability or rebuckling, there is a low risk for further meniscal or cartilage damage. Once the patellar tendon is repaired, the goal is to reconstruct the knee ligaments 3 to 6 months later, provided full ROM has been re-established. After repair of the extensor mechanism, if the patient develops arthrofibrosis or loses significant motion (particularly extension), ligament reconstruction is not indicated because laxity is not a problem. This approach reduces the risk for development of a stiff knee, which is poorly tolerated by and unacceptable to most patients.

Most published case reports discuss simultaneous rupture of the patellar tendon and the ACL. The current cases involve collateral structures as well. This requires further consideration of the timing of surgery and rehabilitation for each injured structure. In Patient 1, the patellar tendon and MCL were repaired in the acute setting. Repair of the PLC was delayed for a reconstruction at the time of the ACL reconstruction. The authors believed that adding the PLC during the first procedure would be too much surgery for the knee. It would have required prolonged tourniquet time and tourniquet-less sequences of the procedure. Adding a second collateral repair would have created almost circumferential soft tissue disruption on the knee. Increased soft tissue swelling and surgical time lead to increased complications, postoperative pain, and difficulty with rehabilitation. The decision to delay the PLC was supported by literature showing better functional outcomes and decreased failure rates with reconstruction vs repair of the PLC.

Another concern in the immediate postoperative period is protecting the repair. If a repair of a collateral ligament is performed, the authors recommend non-weight bearing or toe-touch weight bearing for 6 weeks to allow the repair to heal. Maintaining these restrictions can be difficult, if not impossible, in a patient who is overweight. In patients weighing more than 300 lb or with a body mass index greater than 35 kg/m², the authors recommend placement of an external fixator across the knee joint for 4 to 6 weeks to protect the repair or reconstruction (Figure 4).

CONCLUSION

Simultaneous multiligamentous knee injury and pa-
Patellar tendon rupture is rare. Diagnosis may be difficult in the acute setting, and there are reports of an injury being missed during diagnosis. Each case is unique. Restoration of the extensor mechanism is the priority in these complex knee injuries. Simultaneous repair of the medial or lateral structures may be performed in the knee that is grossly unstable in full extension. Knees that are unstable in a brace, as well as obese patients, require external fixation for 4 to 6 weeks. Once full motion is obtained, reconstruction of the cruciate ligaments may be performed. This injury requires 9 to 12 months of rehabilitation.

When determining treatment, the benefits of one surgery vs a staged approach must be weighed against the risk of arthrofibrosis developing.

REFERENCES