Bilateral Metachronous Rupture of the Patellar Tendon

George Yeh, MD, and Joseph Bernstein, MD, MS

ABSTRACT
We present a case of a 37-year-old man who sustained a rupture of his left patellar tendon approximately 48 hours after rupturing his right patellar tendon. This temporal pattern illustrates two important aspects of patellar tendon injury—that rupture of the degenerated patellar tendon may occur without any prodromal warning and that it may elude detection even if the patient is examined by several physicians.

Rupture of the extensor mechanism of the knee often occurs in the setting of tendon degeneration. The rupture site typically depends on age. Younger patients tend to rupture the patellar tendon, whereas older patients tend to rupture proximally. At both sites, however, the failure point is typically the tendon-bone attachment, not within the tendon itself.1

Cases of simultaneous bilateral rupture of the patellar tendon have been reported.2-9 As tendinopathy is thought to cause such rupture, it is not surprising that both tendons can fail in a patient, as bilateral degenerative processes are not rare. What makes simultaneous bilateral injuries uncommon is that the mechanism of rupture is forced knee flexion against an active quadriceps contraction, and it is unusual for both quadriceps to be contracting simultaneously.3-9 Under most circumstances (eg, during gait), at the instant the right knee is extending, the left is flexing, and vice versa. Thus, almost always, only 1 of the 2 tendons would be at risk for rupture at any given moment. Simultaneous bilateral rupture of the patellar tendon thus represents an injury of interest.

In this report, we present a case of bilateral patellar tendon rupture in which the traumas were separated in time by 48 hours (the patient sustained the second rupture while awaiting surgery for the first). We label these ruptures metachronous because the time between injuries is too long for them to be considered simultaneous (or synchronous), but not long enough for them to be considered distinct events.6 We believe that metachronous rupture is an entity apart from simultaneous bilateral rupture and that the inferences allowed from such a case are likewise distinct.

CASE REPORT
The patient was a 37-year-old prison guard who was the restrained driver of a slow-moving vehicle that was struck from behind. The patient reported that, at the moment of impact, his foot was on the brake, and when he was hit, his foot forcefully pressed the pedal further. He felt an immediate pain in his knee. He denied making contact with the steering wheel or the dashboard. He was taken to the emergency department, where he was examined by an attending emergency medicine physician as well as by a resident in orthopedic surgery. On examination, he was noted as being unable to actively extend his right knee; he had pain at the inferior pole of the patella; and radiographs failed to reveal any fractures. A closed rupture of the right patellar tendon was diagnosed. As part of the trauma evaluation, the absence of signs and symptoms in the contralateral lower extremity or in any other body part was noted. The patient was offered an immediate surgical repair, but he declined in order to attend to personal affairs. He was discharged from the emergency department with crutches and a knee immobilizer and was instructed to follow up with an orthopedic surgeon the next day.

The patient was then seen in the orthopedic department approximately 36 hours after the initial injury. Physical examination showed that he was unable to actively extend the right knee and that pain was localizing to the patellar tendon. Examination of the contralateral knee showed no fluid in the joint, no tenderness in the anterior aspect of the knee, and normal strength. The patient was prepared for outpatient admission later in the week, when the patellar tendon would be repaired.
Later that evening, approximately 48 hours after the initial injury, the patient was walking outside his home. His right knee was in an immobilizer and he was using both crutches. He stated that, at one instant, with his left knee slightly bent and bearing most of his body weight, he felt intense pain on that side and fell to the ground. He was unable to actively extend his left knee and he was taken to the emergency department. The examination there confirmed a rupture of the left patellar tendon. He was then admitted to the hospital for bilateral repairs.

The patient was seen by the medical service in preoperative consultation. No abnormalities of the medical history or examination were found. There were no known risk factors for tendonopathy, such as endocrine disorders, excessive alcohol use, or steroid ingestion or injection. The patient reiterated that he had no history of knee problems. A magnetic resonance imaging scan was obtained of each knee (Figure 1) to document the absence of intra-substance tendonopathy. Findings were typical of an isolated unilateral patellar tendon rupture. The tendon itself was avulsed off the distal pole of the bone. There was hemorrhage in the proximal aspect of the tendon but no evidence of any pathology distal to the rupture.

Sequential repair of the tendons was performed the next day. The ruptures were exposed through midline incisions. In both knees, the rupture was at the distal pole of the patella, with no bone fragments attached to the proximal aspect of the tendon. There were small tears in the retinaculum, coursing medially and laterally for approximately 2 cm. A small sample of the distal pole of the patella of both knees was sent for histologic analysis to rule out avascular necrosis. Such necrosis was not seen; microscopic findings were typical for unilateral ruptures.

An identical operative technique was used on both knees. Sharp débridement of the proximal tendon was performed a few millimeters from the edge, thereby excising the torn fibers. A curette was used to clear the distal pole of the patella; this area was then burred to a bleeding bed. Next, 2 double-armed, heavy, nonabsorbable sutures were woven through the tendon, with the 4 free strands of suture exiting at the proximal stump. These were passed through longitudinal drill holes in the patella and were tied. The retinacular tears were repaired with interrupted sutures, and the wounds were then closed in layers.

After surgery, the patient was placed in bilateral locking knee braces. These braces were held in full extension for ambulation, but the patient was permitted to flex his knees while seated. He began gentle extension of the knee after postoperative week 6 and progressed to active strengthening exercises at week 12. Final range of motion was from nearly full extension to more than 135° of flexion bilaterally. The patient returned to his job as a prison guard approximately 3 months after injury. He was symptom-free at the latest office visit, 2 years after injury.

**DISCUSSION**

We have presented the case of a healthy, previously asymptomatic 37-year-old man who sustained bilateral ruptures of the patellar tendon, approximately 48 hours apart. This pattern of injury is not...
merely a curiosity but rather may serve to illustrate important aspects of patellar tendon rupture—specifically, that an impending rupture can elude detection, even if the patient is examined by 3 different doctors on 2 separate occasions. At no time between the initial injury and the second injury did the patient complain of any symptoms in the left knee and the physical examinations did not show any deficits. The attending orthopedic surgeon examined the patient almost 2 days after the original injury, and the patient was not using any pain medication. Despite this normal "tertiary survey," the patient's left patellar tendon was sufficiently degenerated that it was indeed poised to rupture. One can conclude, not unreasonably, that rupture of the degenerated patellar tendon may indeed occur without any prodromal warning and that it may elude detection even if the patient is examined by a battery of physicians.

In their retrospective review of almost 900 tendon ruptures, Kannus and Joza noted that all had signs of internal degeneration, yet only 1 in 3 subjects had any prerupture symptoms. This suggests that degeneration antecedent to failure is a silent condition. The case presented here confirms that, on a prospective basis, the patient was examined and indeed found clinically normal just hours before tendon failure. Thus, this case supports the notion that rupture of the patellar tendon can occur without warning, and it can occur despite "passing" a physical examination.

The inability to detect impending patellar tendon rupture may have implications for medicolegal issues, preparticipation clearing physical examinations, and decisions whether to inject painful tendons. Simply, we may not be able to detect an impending tendon rupture. In the case presented, the left knee was examined, and there were no findings to suggest pathologic changes in the patellar tendon on that side. Nonetheless, this asymptomatic tendon failed without high-energy trauma.

REFERENCES