CASE REPORT

Spontaneous bilateral patellar tendon rupture: case report and review of fluoroquinolone-induced tendinopathy

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Key Clinical Message
The present case emphasizes the importance of adhering to strict indications when prescribing fluoroquinolones. Although rare, drug-induced tendinopathy is not confined to fluoroquinolones. The patient’s and physician’s awareness should be increased to reduce fluoroquinolones-associated morbidity, particularly in patients with previously described risk factors.

Keywords
Bilateral, fluoroquinolones-induced, patellar tendon, spontaneous rupture, tendinopathy.

Case presentation
A 47-year-old male amateur runner (five miles per day) without preexisting medical comorbidities presented to our emergency department with bilateral knee pain and inability to walk. He reported to have fallen suddenly while walking downstairs, developing acute knee pain. Subsequently, he was unable to stand up. Two weeks before presentation, the patient was treated for a community-acquired pulmonary infection with ciprofloxacin (nonadjusted dose of 500 mg every 12 h).

The physical examination showed swollen knees, a high riding patella, a gap below the inferior poles (Fig. 1), and an inability to actively extend the knees. X-ray showed a patella alta (Fig 2) and an Insall-Salvati ratio >1.5, bilaterally. The diagnosis of bilateral patellar tendon rupture was made.

Operative repair was performed the following day. A straight midline longitudinal incision was made, extending from the superior pole of the patella to the tibial tubercle. Thick medial and lateral subcutaneous flaps were observed. Intraoperative observation confirmed an intrasubstance rupture, and the tendons were torn just beneath the inferior pole of the patella (Fig. 3A). The torn end of the patellar tendon was then mobilized and minimally debrided of friable tissue. Nonabsorbable fiber wire sutures were then inserted with a Krackow stitch into each half of the tendon (Fig. 3B). Three parallel tunnels were placed through the patella. The inner limbs of each stitch were passed through the central tunnel; then, the outer limbs were passed through the outer tunnels (Fig. 3C). A drill hole was then created transversely through the tibial tubercle, and an additional Dall-Miles cable was passed through this hole. This cable was then passed superiorly, within the quadriceps tendon, along the superior pole of the patella, in a figure of eight (Fig. 3D). Once the correct position was obtained, the repair sutures were tied, and the knee was carefully reexamined to assess the degree of knee flexion that could be obtained without causing excessive tension on the repair.

Results
After the repair, the patient began a postoperative rehabilitative program with these follow-up care goals: 3–5 days – adequate pain control, decrease in swelling, wound...
check, no weight-bearing, and immobilization with long leg casts in extension; 2 weeks – immobilization with a hinged knee brace, active flexion to 45°, full passive extension, and toe touch with crutches; 4 weeks – active flexion to 90°, maintenance of full passive extension, and progressive weight-bearing as tolerated; 6–8 weeks – full active flexion; 3 months – straight leg raise with no extension lag, no immobilization, and full weight-bearing; and 6 months – symmetric quadriceps size and strength. At 1 year follow-up, the patient was able to walk without crutches, including nearly full return of knee motion (0° of extension to 155° of flexion), quadriceps strength, and preinjury activity levels. No quadriceps atrophy was noted.

Discussion

Bilateral rupture of the patellar tendons is an extremely rare lesion in healthy individuals and is usually associated with systemic diseases, such as lupus erythematosus, rheumatoid arthritis, chronic renal failure and other conditions that weaken tendinous tissues [1,2,3,4,5,6]. In addition, long-term microtrauma and corticosteroid use may also be present [2,7]. Fluoroquinolones are increasingly being recognized as a cause of tendinitis and tendon rupture [8], but the specific pathophysiological mechanisms involved in drug-induced tendinopathies remain unknown. Several risk factors have been identified, including advanced age (>60 years), corticosteroid use, renal failure, female sex and non-obesity [9]. The most common sites of involvement are the lower limb tendons, more frequently the Achilles tendon [8,10]. Fluoroquinolones are widely used antibiotics that are indicated in the treatment of wide range of urinary, gastrointestinal, pulmonary, and even bone infections. They have excellent gastrointestinal absorption, superior tissue penetration, and broad-spectrum activity [10]. Although well tolerated and relatively safe, numerous side effects have been reported, including a spectrum of tendinopathies, gastrointestinal disorders, cutaneous eruptions, neurological signs, myalgia, elevated serum transaminases, and arthralgia [11]. The presumptive diagnosis of fluoroquinolone-induced tendinopathy rests on a converging set of arguments as well as on the absence of any other obvious cause, such as trauma-induced injuries. While our patient was 47 years old, he had no known systemic disorder or risk factor for tendon rupture other than recent fluoroquinolone use.

The first reported case of fluoroquinolone-associated tendinopathy was described in 1983 in renal-transplant patient, treated with norfloxacin, who developed Achilles tendinopathy [12]. Since then, fluoroquinolone-induced tendinopathy has been the subject of many articles and case reports in the medical literature [13]. Spontaneous patellar tendon rupture is an extremely rare pathology, and it is even rarer for it to present as bilateral, without any systemic pathological conditions, and in the absence of long-term corticosteroid use. To the best of our knowledge, after literature review, we could only find one case of an atraumatic bilateral patellar tendon ruptures following a treatment course of fluoroquinolone medication [14].
Still, tendinopathy is a rare side effect, with an estimated incidence of 0.14–0.4% among patients treated with fluoroquinolone therapy [11]. It usually occurs within the first 2 weeks, but cases have been described up to 6 months after therapy termination [11]. The Achilles tendon is the most common site of involvement (90%) [15]. The mean age for affected patients is 64 years, with a male-to-female ratio of 2:1, and there is 27% bilateral involvement. Ciprofloxacin is the most common fluoroquinolone associated with tendon disorders [11].

The mechanism by which fluoroquinolones cause tendinitis and tendon rupture remains relatively unknown, but it is known that they decrease fibroblastic metabolism and increase matrix degradative activity, causing disorganization of the paratenon and degenerative changes in tendon cells [15]. The following fluoroquinolone-induced effects have been proposed: reduced expression of extracellular matrix proteins [16, 17], noncytotoxic inhibition of tendon cell proliferation and migration [18], and enhanced matrix metalloproteinase expression [16, 17]. At the molecular level, aging could also play a role, affecting the metabolic activity of senescent tenocytes as well as rendering them more prone to the deleterious effects of fluoroquinolones [16].

Patients with tendinopathy should be investigated about antibiotic use in the preceding 90 days. The diagnosis is usually clinical, which is sometimes corroborated by musculoskeletal ultrasound or magnetic resonance imaging. In cases of tendinopathy, treatment should include discontinuation of fluoroquinolone therapy, rest, use of anti-inflammatory drugs, and an alternative nonquinolone antibiotic should be considered [11].

Tendon rupture should be treated operatively as soon as possible [19]. The goal of surgical treatment is to achieve a strong repair enough to allow for early movement and weight-bearing, granting a more rapid gradual rehabilitation. When early surgical repair is undertaken and the normal patellar tendon length is restored, the long-term results are excellent [20].

**Conclusion**

The present case emphasizes the importance of adhering to strict indications when prescribing fluoroquinolones. Although rare, drug-induced tendinopathy is not confined to fluoroquinolones. The patient’s and physician’s awareness should be increased to reduce fluoroquinolones-associated morbidity, particularly in patients with the previously described risk factors.

**Conflict of Interest**

None declared.
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