

Achilles Tendon Rupture: A Challenging Diagnosis

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Since the 1950s the incidence of spontaneous complete rupture of the Achilles tendon has risen steadily, possibly as a result of increased sedentary lifestyles and intermittent participation in recreational sports.¹ Today the Achilles tendon is the second most frequently ruptured tendon,² and no other tendon suffers complete rupture more often.³ Up to 25% of all cases are misdiagnosed,⁴⁻⁶ with serious consequences for the patient. Family physicians must be able to recognize acute Achilles tendon ruptures to initiate expedient treatment and referral. The overwhelming majority of cases can be diagnosed using only findings from the history and physical examination. The following case illustrates common pitfalls encountered when evaluating Achilles tendon injuries.

Case Report

An otherwise healthy 60-year-old man complained of increasing swelling and pain in his left foot and leg and numbness and burning on the plantar surface of his left heel. The patient had fallen down his basement stairs 4 months earlier and initially sought treatment from an orthopedic surgeon for pain in his left calf, foot, and ankle. A partial tear of the Achilles tendon was diagnosed by sonography, and the patient was advised that the injury would heal on its own. Four months later the patient came to us complaining of worsening gait, now requiring a cane, and unbearable pain in his left foot, ankle, and heel.

On physical examination, the patient had pitting edema (2+) from his left foot to mid calf. Pain was elicited on palpation of the Achilles tendon to mid-calf. He had good plantar flexion and dorsiflexion,

both passively and against resistance. When the tendon was palpated, it was unclear whether there was a gap in the tendon; however, several lumps of fibrous tissue were felt approximately 5 cm above the tendon insertion. The Thompson calf squeeze test showed a considerable decrease in plantar flexion of the left foot compared with the right. Ankle reflex on the left was absent, but there were no other neurologic deficits. The patient had no heel rise when walking and seemed to lack the normal rocking motion in the heel during his gait. He was unable to lift up completely on his toes. Findings from the knee examination were normal.

A sonogram was ordered, which showed a complete tear of the left Achilles tendon 3 to 4 cm above the insertion with a small amount of fluid and fatty herniation in the gap between the torn ends.

Discussion

The increased incidence of Achilles tendon rupture is distributed unequally in the population. In findings consistent with other studies, Jozsa et al⁷ report that the mean age for patients with Achilles tendon rupture is 35.2 years and that the incidence is four times greater among men than women. They also found that 62.3% of Achilles tendon ruptures occur in professional and white-collar workers.⁷ Achilles tendon ruptures often occur in sports requiring abrupt, repetitive jumping or bursts of sprinting. Ball sports, such as soccer, basketball, and tennis, and fast-twitch sports, such as gymnastics and track and field, are associated with a higher incidence of rupture.⁷ Achilles tendon ruptures can also occur after falling from a height, after being struck directly on the tendon, after a misstep, or after sudden movements, such as pushing off or dorsiflexion of the foot.⁸

Patients with acute ruptures generally relate a classic history. They typically describe the precipitating incident as feeling like they had been hit or kicked on the back of the leg or heel, and they sometimes report hearing a popping or snapping sound as they fall to the ground.^{2,9} The immediate

Submitted, revised, 28 July 1999.

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pain can soon resolve, leaving only residual calf tenderness.⁹ While palpating the area, the physician might feel a gap or interruption in the continuity of the tendon, and the patient can have increased dorsiflexion on passive range of motion and weakness in plantar flexion of the ankle.^{8,10} These findings are more likely in the acute phase, although they can be present in chronic ruptures. Patients with old ruptures might also have a calcaneus gait,¹⁰ characterized by a lack of push-off at the end of the stance phase as a result of the dysfunction of the gastrocnemius and soleus muscles.

The diagnosis of Achilles tendon ruptures is difficult even for the experienced physician. The differential diagnosis includes acute Achilles tendon peritendinitis, tennis leg (medial gastrocnemius tear), calf muscle strain or rupture, posterior tibialis stress syndrome, ligament injuries, fracture, posterior tibialis tendon injuries, and peroneal injuries.⁹ According to Josza et al,⁷ missed ruptures are most often diagnosed as ankle sprains. There are several widely held fallacies that likely contribute to the high rate of missed diagnosis.

Fallacy 1. The patient walked into the examination room and therefore could not have ruptured the Achilles tendon. The Achilles tendon is the major plantar flexor of the foot, which is the basis of this common misconception. Weakness of plantar flexion, however, can be masked by the force of gravity and the activity of the posterior tibial, peroneal, and plantar muscles.¹⁰ Particularly in the case of old ruptures, it is possible that patients with complete tears could walk.

Fallacy 2. The patient could flex the plantar muscle passively and against resistance and therefore could not have ruptured the Achilles tendon. This misconception overlooks the other muscles that act as flexors at the ankle, as discussed above.

Fallacy 3. The Achilles tendon must be intact because no gap was felt on palpation. Surrounding swelling can disguise the gap in acute ruptures.¹⁰ In ruptures more than 4 weeks old, hematomas produced by tendon ruptures can organize and contribute to reconstitution of the tendon, thus obliterating the gap.³

Fallacy 4. An Achilles tendon rupture is unlikely because the patient did not have increased dorsiflexion with passive range of motion. This clinical finding can be masked by pain in acute ruptures.

Fallacy 5. The patient has no pain in the Achilles tendon, so an Achilles tendon rupture is improbable.

The examiner might tend to regard the injury as trivial if the patient does not complain of much pain. One study, however, reported that roughly one third of patients with complete Achilles tendon ruptures did not complain of pain.¹¹

The practicing physician can best avoid these misconceptions and improve the diagnosis of Achilles tendon ruptures by performing an appropriate clinical examination. Several clinical tests for Achilles tendon ruptures have been developed, but only three will be described here. These tests have the advantage of being inexpensive, noninvasive, and effective when used in combination. Other well-known tests, including the Copeland sphygmomanometer test¹² and the O'Brien needle test,¹³ are excluded from this discussion because of the discomfort they cause to patients.

Palpation: It is important to position the patient so that both Achilles tendons can be observed from behind. Achilles tendon ruptures can often be diagnosed by simply palpating the tendon along its entire length. Maffulli³ reports a sensitivity of only 0.73, however, which reflects the decreasing effectiveness of this test with older ruptures.

*Calf squeeze (Thompson) test:*⁸ This test requires positioning the patient in the prone position with the feet hanging off the table, or with the knees flexed and the feet hanging over the end of a chair. As the examiner squeezes the patient's calf muscle, plantar flexion of the ankle should occur if the Achilles tendon is intact. The test is positive if the foot remains in the neutral position or if there is minimal plantar flexion of the ankle compared with the unaffected side. Maffulli³ reports a sensitivity of 0.96 for this test. False negative results, however, are more likely in older injuries, where organization of a hematoma can cause some reconstitution of the tendon.³

*Knee flexion (Matles) test:*¹⁰ In this test, the patient is asked to actively flex the knee through 90 degrees while in the prone position. The examiner observes the feet and ankles throughout the movement. With an intact tendon, the foot should display slight plantar flexion; rupture is probable if the foot falls into the neutral position or the movement results in dorsiflexion. Maffulli reports a sensitivity of 0.88. Unlike the Thompson test, the Matles test should be positive even in older ruptures, because the tendon will lengthen with hematoma formation and tendon reconstitution.³

A positive finding in two of the three tests is good evidence of an Achilles tendon rupture.³ If the diagnosis is still in question, sonography or magnetic resonance imaging (MRI) is warranted. These studies, as do any other, have their disadvantages. Sonography is operator dependent. It can be hard to differentiate a partial tear from a complete tear using ultrasound imaging.⁹ A complete tear might be mistaken for a partial tear if the intact plantaris tendon (which rarely, if ever, tears¹⁴) or an organized hematoma is mistaken for a partially intact Achilles tendon. Based on this limitation of sonography, it is unclear whether the patient described above actually had a partial tear when he was first seen by the orthopedic surgeon. The tear might have been complete and the physician misled by the sonographic interpretation. Although MRI is non-invasive and has superior soft tissue contrast, it is costly, time consuming, and not always readily available.

The goal of treatment is to restore normal length and tension of the Achilles tendon.¹⁵ This goal can be achieved by either surgical or nonsurgical means, and no one method is ideal for all cases. Landvater and Renström¹⁵ recommend surgery for patients who are young and athletic and in all cases where there has been a delay of more than 1 week in diagnosis and treatment. Surgery assures the correct apposition of the tendon ends, thus allowing patients to regain full strength, endurance, power, and an early return to athletic activities. Nonathletes or low-end recreational athletes whose tendon rupture has been diagnosed early (less than 48 hours) may undergo conservative treatment with a short leg cast for 8 weeks (first 4 weeks in maximum plantar flexion). They then should have 2 months of supervised physical therapy. Patients should be advised that there is a longer recovery period and a higher incidence of re-rupture with conservative management.¹⁵ Because of the permanent disability that can result from mismanagement of the injury, Achilles tendon ruptures are best referred to an orthopedic surgeon.

When evaluating a patient with a swollen, tender ankle, physicians must be particularly alert for an Achilles tendon rupture, or the diagnosis might be missed. A thorough history and clinical exami-

nation can substantially improve the diagnosis of Achilles tendon ruptures. The Thompson and Matles tests, along with palpation of the tendon, are simple, inexpensive means to arrive at the correct diagnosis in most cases. The consequences of overlooking this injury can be severe: chronic pain and swelling, poor gait, and inability to return to sporting activities. Early diagnosis and referral are essential for a full and successful recovery.

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