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Case Reports and Series

Triple Achilles Tendon Rupture: Case Report

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ABSTRACT

We present a case report with 1-year follow-up data of a 57-year-old male soccer referee who had sustained an acute triple Achilles tendon rupture injury during a game. His triple Achilles tendon rupture consisted of a rupture of the proximal watershed region, a rupture of the main body (mid-watershed area), and an avulsion-type rupture of insertional calcific tendinosis. The patient was treated surgically with primary repair of the tendon, including tenodesis with anchors. Postoperative treatment included non-weightbearing for 4 weeks and protected weightbearing until 10 weeks postoperative, followed by formal physical therapy, which incorporated an "antigravity" treadmill. The patient was able to return to full activity after 26 weeks, including running and refereeing, without limitations.

The Achilles tendon is the strongest and largest tendinous structure in the body. It is defined anatomically as the distal confluence of the gastrocnemius and soleus muscles (1). The gastrocnemius musculotendinous junction is approximately 15 cm from its insertion on the calcaneus, although the soleus muscle belly extends distally. The Achilles tendon is unique in that it is not surrounded by a synovial sheath like most tendons in the lower extremity but, rather, is enveloped by a paratenon. The paratenon was thought to be responsible for a significant portion of the tendon's blood supply. However, the paratenon is contiguous with the deep fascia, which is avascular, and that concept is debatable. Investigators have termed this dysvascular area the "watershed band" (2). The tendon has less blood flow approximately 2 to 6 cm proximally to the Achilles tendon's insertion on the posterior calcaneus. This area is known as the vascular watershed region. This vulnerable area of the tendon is likely to be ruptured in the midportion watershed region, aka the "main body," approximately 75% of the time. Furthermore, ruptures can occur in the distal insertion, with an incidence of 10% to 20%, and at the myotendinous junction, with an incidence of 5% to 15% (3).

The Achilles tendon is the most commonly ruptured tendon in the human body (4). Various predisposing factors and mechanisms of injury can contribute to Achilles tendon ruptures. Such influences include oral and topical corticosteroids (5), fluoroquinolone antibiotics (6,7), exercise-induced hyperthermia (8,9), a pathologically degenerated tendon (10), a decrease in tendon elasticity with aging (11), and mechanical abnormalities of the foot (12). Acute ruptures occur most often in men in the third and fourth decades of life who participate in sports intermittently (13).

Treatment of acute Achilles tendon ruptures can be conservative (cast immobilization or cast-boot walker) or surgical (open or percutaneous technique). Both open and percutaneous techniques have been shown to be successful. More than 80 of 100 persons who undergo surgery for an Achilles tendon rupture will be able to return to all their activities they did before the injury, including returning to sports (14). We present the case of a soccer (European football) referee during a game, who sustained an Achilles tendon rupture at 3 levels ("triple rupture") and his successful return to his sport.

Case Report

A 57-year-old male collegiate soccer referee, with a body mass index of 28.50 kg/m^2, sustained an Achilles tendon injury during a game. He had a remote history of an Achilles tendon injury but denied any recent symptoms and corticosteroid or fluoroquinolone use. The injury had been diagnosed as an avulsion-type rupture of the left Achilles tendon at the emergency department on the day of the injury. The patient presented to the senior author's (A.S.) clinic 2 days later. He was nonweightbearing with bilateral axillary crutches and wearing a posterior splint, which was in an appropriate equinus position.

The physical examination showed the neurovascular structures and skin were intact without any evidence of compartment syndrome. Tenderness and pain was present at the Achilles tendon insertion and at the watershed area, with ecchymosis at the posterior heel. He was unable to weight bear or perform a single limb heel raise and had 2 palpable defects in the watershed region, with a firm portion between

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Fig. 1. Lateral radiograph showing calcification within the tendo Achilles and at the insertion. Note the lack of equinus in this non-weightbearing view.

these 2 regions. The Thompson test (15) and Matles sign (16) results were positive.

Radiographic imaging showed calcific tendinitis and calcification within the tendon (Fig. 1). Magnetic resonance imaging was performed to determine whether sufficient tendon remained or a tendon transfer would be required for reconstruction. The imaging study showed the remaining tendon morphology was reasonable, without evidence of degeneration. The magnetic resonance imaging scan confirmed a complete tear of the Achilles tendon within the main body and proximal to the watershed region. It also confirmed insertional calcific tendinosis with an avulsion type rupture from the Achilles tendon's insertion at the posterior calcaneus (Fig. 2). The imaging findings correlated directly with the clinical examination findings.

Surgical Technique

The patient was placed in a prone position. Monitored anesthesia care was administered in conjunction with local anesthesia. A tourniquet was not used. A curvilinear incision was made along the posterior aspect of the heel starting inferolaterally, coursing within the skin lines posteriorly, and extending proximally along the medial aspect of the medial border of the Achilles tendon. Dissection was carried down to the Achilles tendon using blunt and sharp dissection. The surgical incision was extended proximally to the gastrocnemius myotendinous junction. The proximal portion, calcific tendinosis, and midportion of the watershed region were identified and further explored to verify the extent of the injuries (Fig. 3). The tendon was debrided of nonviable hematoma and frayed ends. Superior to the calcified mid-portion of the Achilles, there was a transverse rupture. Attention was then directed inferiorly. A significant portion (approximately 65%) of the Achilles tendon was not attached to the posterior calcaneus. Additionally, a longitudinal tear was present, extending proximally from the insertion of the Achilles tendon and terminating at the calcified portion of Achilles. The insertional calcifications within the Achilles tendon and the prominent bone noted along the superoposterior aspect of the calcaneus were removed with a curved osteotome and the edges smoothed with a reciprocating rasp. Pathologic hypertrophic retrocalcaneal bursae due to the retrocalcaneal prominence were excised. Bone wax was then applied to the superior noninsertional portion of the calcaneus to prevent ectopic bone formation.

The Achilles tendon was repaired and tenodesed to the calcaneus with one 5.5-mm bioabsorbable anchor and two 5.5-mm knotless bioabsorbable anchors. The tendon was repaired in a Krakow fashion starting with the rupture proximal to the watershed region, continuing distally to the central segment, and then to the insertion

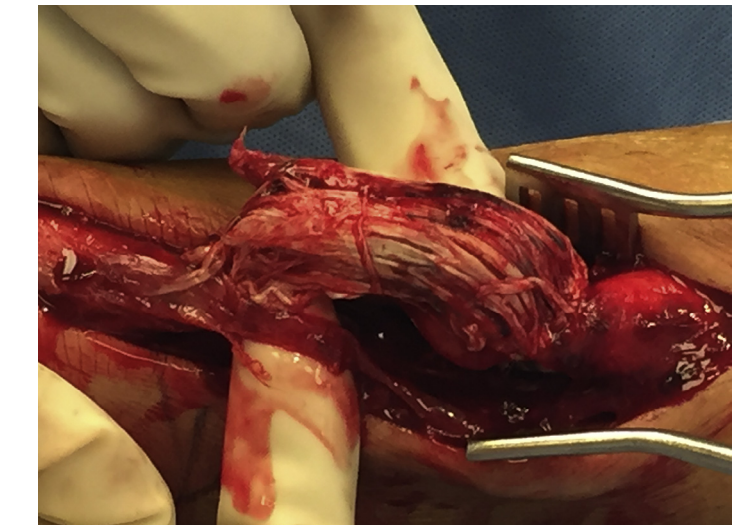

Fig. 3. Intraoperative view showing the watershed region ruptures. Calcification within the main body was palpable.

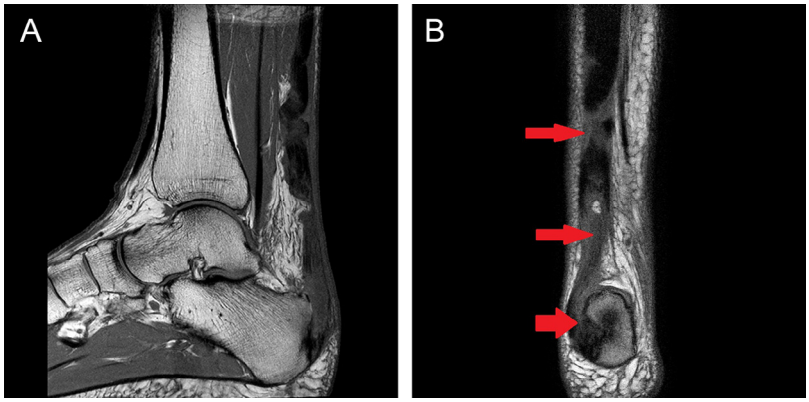

Fig. 2. *(A)* Lateral T1 magnetic resonance imaging scan showing avulsion and distal and proximal ruptures in the watershed region with central calcification. *(B)* Coronal magnetic resonance imaging scan showing same findings seen on lateral view and mid-substance calcification.