SPOTLIGHT ON soft tissue

Ossific Tendonitis of the Achilles with Tendon Fracture: A Case Report and Literature Review

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Ossific tendonitis has been described in numerous anatomic sites, occasionally involving the Achilles tendon. Although the first reported cases of Achilles tendon ossification appeared in the 1930s,[1,2] fracture of an ossified Achilles tendon is a rare event, having been reported in the English literature <15 times.[3-5] This article reports a patient with massive ossification of his Achilles tendon, presumably related to a trauma from 25 years prior to presentation, who remained asymptomatic until a second minor trauma resulted in fracture through the ossified tendon. Pain relief and full function were restored with tendon resection and reconstruction with flexor hallicis longus tendon. To our knowledge, this is the first reported use of flexor hallicis longus transfer for the treatment of extensive Achilles tendon ossification with fracture.

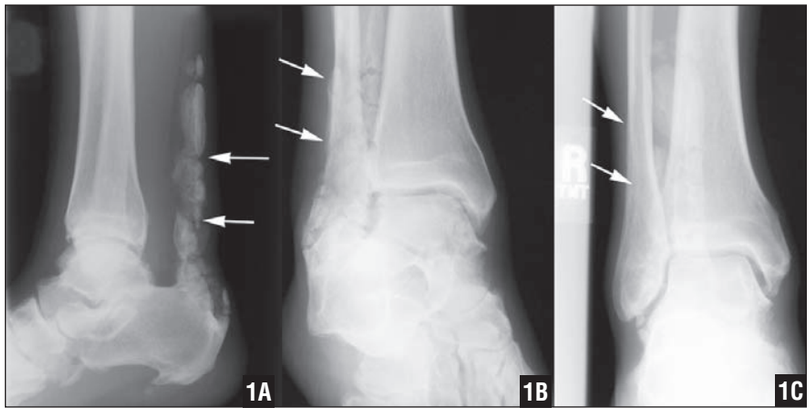

Figure 1: Lateral (A), mortise (B), and AP (C) radiographs of the ankle demonstrate diffuse ossification of the Achilles tendon with evidence of multiple fractures (arrows).

CASE REPORT

A 55-year-old man presented with a one-week history of right heel pain after straining his Achilles tendon while pruning a tree. Since the injury, he described increasing pain and progressive difficulty with ambulation. His medical history included a previous rupture of the right Achilles tendon from 25 years prior to presentation that had been treated non-operatively and, per the patient, had healed uneventfully with no residual sequelae. Other significant conditions were hypertension and hyperlipidemia, for which he took benazepril hydrochloride and fenofibrate. He did not use tobacco products.

On physical examination, there was fusiform swelling and firmness of the right Achilles tendon extending from the tendon insertion to near the musculotendinous junction. No gross defects or areas of discontinuity were palpable. The left Achilles tendon was normal in appearance and palpation. He was able to perform a single-leg toe rise on the left side, but not on the right side, although Thompson's calf squeeze test was normal bilaterally. Radiographs demonstrated extensive ossification of the right Achilles tendon, with evidence of multiple fracture lines through the pathologic area (Figure 1). Blood analysis, including renal function tests and calcium level, was unremarkable.

Over the next 3 months, nonoperative treatment was attempted with full-time use of a fixed ankle walker and anti-inflammatories. The patient reported pain relief while wearing the brace, but suffered an immediate return of

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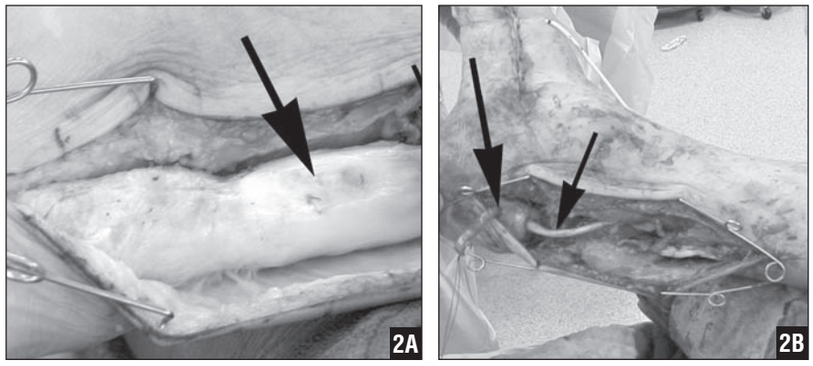

Figure 2: Intraoperative photographs of the extensively ossified Achilles (large arrow) with more normal tendon tissue seen adjacently (small arrow) (A) and transfer of the flexor hallicis longus tendon (small arrow) through a drill hole in the calcaneus (large arrow) after Achilles resection (B).

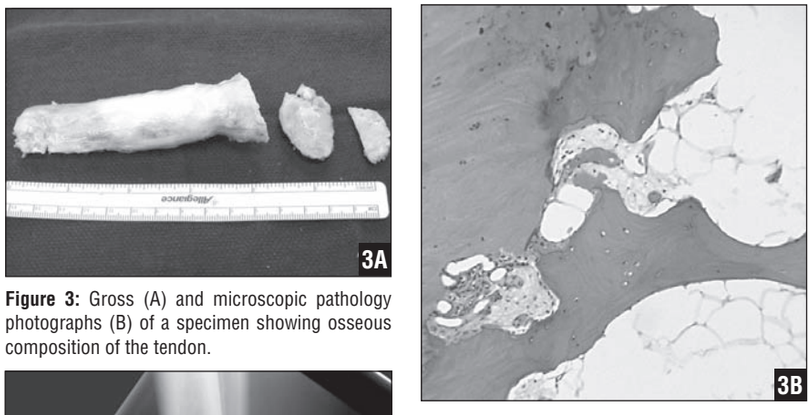

Figure 3: Gross (A) and microscopic pathology photographs (B) of a specimen showing osseous composition of the tendon.

Figure 4: Postoperative radiograph demonstrating complete removal of the ossific portion of the Achilles tendon.

symptoms when the brace was weaned. Ultimately, he was offered the option of tendon debridement and reconstruction using flexor hallicis longus tendon. This was performed 6 months after initial presentation. Intraoperatively, a large portion of the tendon was found to be completely ossified (Figure 2), with evidence of a partially healed fracture in its midsubstance. The abnormal section was resected and reconstruction was performed by transferring the flexor hallicis longus tendon to the calcaneus as previously described by Wapner et al[6] (Figure 3). Pathologic examination of the specimen confirmed extensive ossification of the tendon (Figure 4). A postoperative radiograph is shown in Figure 5.

Postoperatively, the patient was cast in equinus and maintained on strict non-weightbearing precautions. His wound healed uneventfully, and at 5 weeks he was transitioned to a short-leg walking cast. His ankle did not reach neutral dorsiflexion at this point, and he was immobilized in approximately 5° of equinus. Two weeks later, he was re-cast at neutral. Nine weeks postoperatively, the cast was discontinued and he was placed in a fixed ankle walker with an adjustable heel lift that he wore at all times except for daily ankle range of motion (ROM) exercises. At 14 weeks postoperatively, he reported no pain and reached 7° of ankle dorsiflexion. The boot was discontinued and he was advanced to full weight bearing with activity restrictions.

At 6-month follow-up, the patient was pain-free but still unable to perform a single-leg heel rise. Formal physical therapy was prescribed, and by one year postoperatively, ankle ROM was equivalent on the right and left, and the patient was able to perform a painless single-leg heel rise. At 18 months postoperatively, the patient reports no pain or functional limitation.

Discussion

Extra-articular calcifications can be found around many joints in the body, most commonly the shoulder, elbow, wrist, hip, and knee.[3,7] Calcific tendonitis has been described in nearly every tendon site, including the quadriceps muscles, wrist flexors, spinal accessory muscles, pectoralis, trapezius, biceps, gluteus, piriformis, popliteus, and peroneals. Calcific tendonitis, however, must be distinguished from true ossific tendonitis. Calcification refers to the deposition of amorphous calcium phosphate or carbonate, and occurs more frequently in males between aged 25 to 60 years.[8] Nearly all calcific tendon deposits become absorbed or disappear over time.[8] Ossification, however, refers to the formation of hydroxyapatite crystals in a histologic pattern consistent with (and with the biologic behavior of) mature lamellar bone.[9] Like calcific tendonitis, ossific tendonitis is also more prevalent in men, but has no known age predilection.[10] The Achilles tendon is often calcified but rarely ossified,[3] and only occasional reports of ossific Achilles tendonitis appear in the literature.

Most cases of Achilles ossification are associated with a medical history of surgical intervention or trauma.[7,11] Other causes of tendon ossification may include neoplasm, chronic infection (such as syphilis, abscess, or osteomyelitis), renal disease, Reiter's syndrome, and crystal arthropathies.[7,11-13] Two distinct patterns of ossification may be seen. The first involves one or more large segments of mature bone with well-organized trabeculae and distinct cortex, as often is seen after trauma or in Wilson's disease, renal failure, ochronosis, and spondyloarthropathies. The second pattern consists of multiple tiny foci or linear deposits within the tendon substance and is more common in pseudogout and hemochromatosis.[3,5,7] It is hypothesized that ectopic endochondral ossification results from fibroblast migration into areas of damage with subsequent bone deposition in response to tissue hypoxia.[14] On magnetic resonance imaging, the signal characteristics of involved tendon are compatible with lamellar bone.[5] Ossific Achilles tendonitis usually presents as a firm mass, but is often nontender and nonpainful until tendon rupture or fracture occurs.[10] Although some authors[13] have recommended surgical treatment for all Achilles fractures, multiple reports exist describing successful nonoperative treatment.[4,11,12,15] Nonoperative management probably is most appropriate if the tendon ends are not widely separated.[4]

Despite well-approximated tendon ends, a three-month period of immobilization for this patient failed to produce clinical relief. Accordingly, we proceeded to surgical intervention. One surgical option includes direct repair and fixation of the ossified fragments, but the extent of tendon involvement led us to recommend excision of the diseased segments with tendon reconstruction. Numerous soft-tissue options, including fascia lata, plantaris, flexor digitorum longus, and peroneus brevis, have been described for Achilles reconstruction.[3,11-13] Here, however, we used the flexor hallicis longus transfer as described by Wapner et al[6] for the treatment of chronic Achilles rupture. To our knowledge, this is the first reported instance of flexor hallicis longus transfer to treat fracture of an ossified Achilles tendon. The flexor hallicis longus tendon is stronger than the flexor digitorum longus or peroneus brevis, and its excursion, strength, and contractile axis most closely approximate the gastrocnemius-soleus complex.[16] Despite potential complications, including loss of great toe interphalangeal flexion and medial plantar nerve injury during harvest, most studies report excellent outcomes after flexor hallicis longus transfer for other Achilles tendonopathies. In this case, our patient ultimately regained painless ROM and full function. We believe that, after failure of nonoperative management, the flexor hallicis longus transfer is also an effective treatment in cases of fracture of an ossified Achilles tendon.

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