

Pilon Fracture with Associated Achilles Tendon Rupture: Case Report and Review of the Literature

Samuel T Hovland^{1,2}, Zachary Yates^{1,2}, Michael Barnum¹, Genna Thompson¹, Mohamed K Shaath¹

Learning Point of the Article:

In high-energy ankle trauma, clinicians should consider concomitant Achilles tendon rupture, as careful examination and advanced imaging can prevent missed diagnosis and guide timely operative management.

Abstract

Introduction: Ankle fractures and Achilles tendon ruptures most commonly occur as isolated injuries. The simultaneous occurrence of an ankle fracture with an Achilles tendon rupture is rare. It may be overlooked during initial evaluation, particularly in elderly patients or in the presence of distracting injuries. Previous reports have described Achilles tendon rupture in association with medial malleolar, bimalleolar, trimalleolar, and distal tibial fractures. To our knowledge, this is the first reported case of an Achilles tendon rupture occurring in conjunction with a pilon fracture. Reporting this case is important to raise awareness of this uncommon injury pattern and to emphasize the need for comprehensive clinical assessment in ankle trauma.

Case Report: A 78-year-old male with a history of Parkinson's disease sustained a right ankle injury after falling from a ladder. He initially presented to the emergency department with ankle pain and superficial lacerations. Radiographs were obtained, but no fracture was diagnosed. Upon follow-up with an orthopedic surgeon, advanced imaging and physical examination revealed a fracture of the tibial plafond with an ipsilateral Achilles tendon rupture. The patient subsequently underwent open reduction and internal fixation of the pilon fracture and surgical repair of the Achilles tendon.

Conclusion: This case highlights an exceptionally rare injury combination that can be easily missed during initial evaluation. It underscores the importance of maintaining a high index of suspicion and performing thorough physical examination and appropriate imaging when assessing ankle trauma, particularly in elderly patients. This report contributes a novel injury pattern to the orthopedic literature and demonstrates that concurrent operative management of both injuries can be safely performed in selected patients. Increased awareness of this association may help prevent delayed diagnosis, reduce complications, and improve functional outcomes in future cases.

Keywords: Pilon fracture, Achilles rupture, ankle trauma.

Introduction

Tibial pilon fractures and Achilles tendon ruptures, in isolation, are common and potentially devastating injuries [1]. The simultaneous occurrence of an ankle fracture with an ipsilateral Achilles tendon rupture is exceedingly rare and may be overlooked during initial evaluation [2,3]. Failure to recognize

this combined injury pattern can significantly alter surgical planning, increase technical complexity, and potentially worsen outcomes [4,5,6,7].

Although combined osseous and tendon injuries about the ankle have been described, prior reports have largely involved fracture patterns around the malleoli or distal tibial metaphysis [8,9].

Author's Photo Gallery



Dr. Samuel T Hovland



Dr. Zachary Yates



Dr. Michael Barnum



Dr. Genna Thompson



Dr. Mohamed K Shaath

Access this article online

Website:
www.jocr.co.in

DOI:
<https://doi.org/10.13107/jocr.2026.v16.i08.7824>

¹Department of Orthopedics, Orlando Health Jewett Orthopedic Institute, Orlando, Florida, United States,

²Department of Medical Education, University of Central Florida College of Medicine, Orlando, Florida, United States.

Address of Correspondence:

Dr. Samuel T Hovland,
University of Central Florida College of Medicine, Orlando, Florida, United States.

E-mail: sam_hovland@ucf.edu

Submitted: 17/05/2026; Review: 23/06/2026; Accepted: July 2026; Published: August 2026

DOI: <https://doi.org/10.13107/jocr.2026.v16.i08.7824>

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Figure 1: Pre-operative radiographs.

Cases in the literature include Achilles tendon rupture associated with medial malleolar, lateral malleolar, bimalleolar, and trimalleolar fractures, as well as open distal tibia and fibula injuries [8,9,10,11,12,13,14,15,16,17,18,19,20,21]. In addition, malleolar fractures with associated superior peroneal retinaculum (SPR) disruption and peroneal tendon instability have been reported [22,23,24]. The mechanisms of injury and patient demographics from these cases are summarized in Table 1.

We present a ladder-related fall resulting in a displaced tibial pilon fracture with a simultaneous acute Achilles tendon rupture. This case underscores the importance of maintaining a

high index of suspicion for associated tendon injury in high-energy ankle trauma. It highlights the need for careful clinical examination and imaging review to avoid missed diagnoses and optimize operative management.

Case Report

A 78-year-old male with a history of Parkinson's disease (PD) presented to the emergency department after a fall from a ladder, reporting right ankle pain and superficial lacerations. Radiographs were obtained, and no fracture was diagnosed (Fig. 1). He was discharged with crutches for a suspected ankle

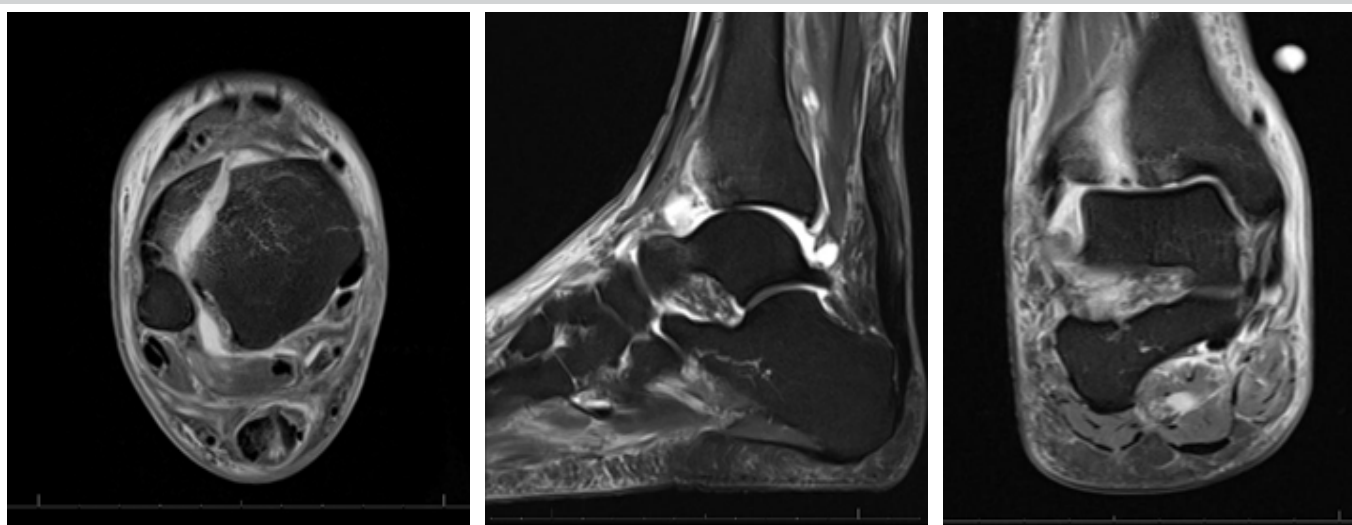


Figure 2: Pre-operative magnetic resonance imaging (MRI): Pre-operative MRI demonstrating recent non-insertional Achilles tendon rupture as well as syndesmotic and deltoid ligament ruptures with associated malalignment.

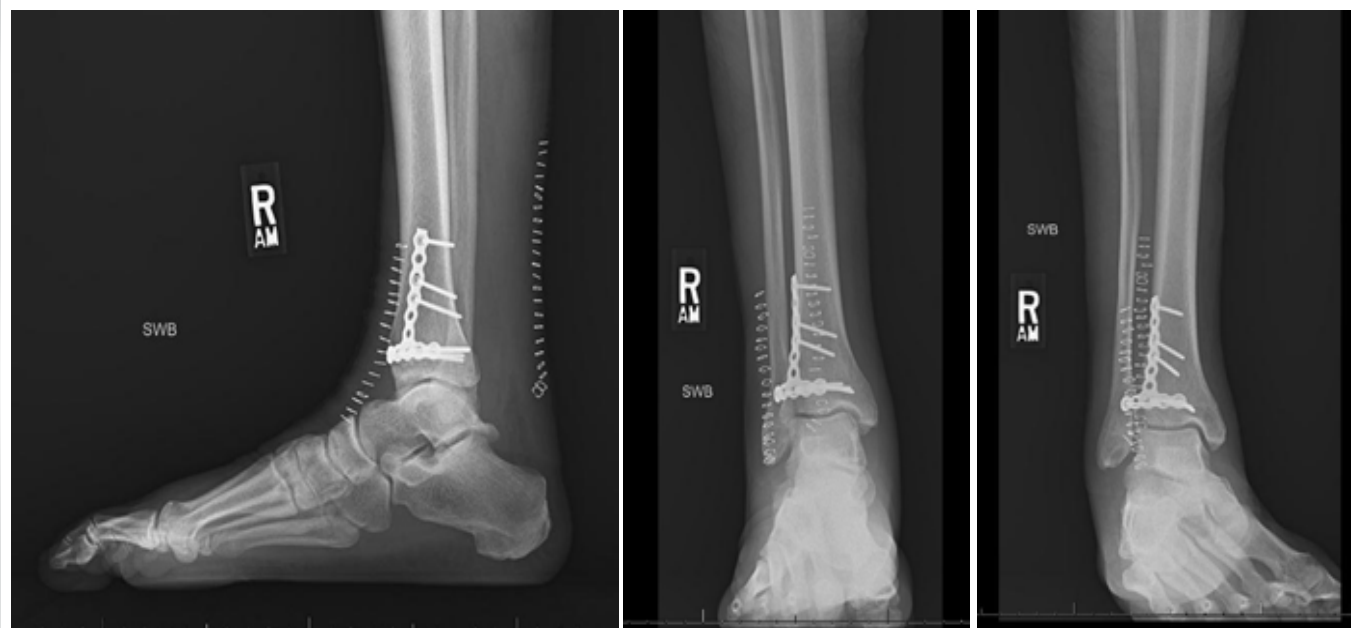


Figure 3: 2 Week post-operative radiographs: 2 week post-operative X-rays showing a healing fracture and intact hardware.

sprain.

On presentation to our clinic 2 weeks after initial injury, physical examination demonstrated moderate swelling of the right ankle and scattered healing scabs along the anterior tibia without signs of infection. There was tenderness to palpation of the medial malleolus, lateral malleolus, and anterior ankle. He had moderate swelling throughout the right ankle, and the right

Achilles tendon had a palpable defect. Thompson test was positive. Active and passive ankle range of motion was preserved but limited secondary to pain.

Given the high-energy mechanism of injury and concern for soft-tissue injury, magnetic resonance imaging (MRI) of the ankle was performed. The MRI demonstrated a combination of an acute non-insertional Achilles tendon rupture (Fig. 2) and



Figure 4: Four month post-operative radiographs: 4-month post-operative X-rays demonstrating a well-healing fracture and intact hardware.

Table 1: Patient demographics: Patient demographics, injury, and mechanism of injury of the reported case reports of similar injuries found upon literature search

Author (year)	Age	Gender	Injury	Cause of injury
Nakajima <i>et al.</i> (2016)	45	M	L Achilles tendon rupture w/concomitant ipsilateral medial malleolar fracture	Futsal
Elmajee <i>et al.</i> (2017)	30	F	L Achilles tendon rupture w/concomitant ipsilateral medial malleolar fracture	Rock climbing
Jadib <i>et al.</i> (2024)	44	M	L Achilles tendon rupture w/concomitant ipsilateral trimalleolar fracture and peroneal dislocation of the ankle	Snowboarding
Bowers <i>et al.</i> (2021)	35	M	L Achilles tendon rupture w/concomitant ipsilateral medial malleolar fracture, cortical avulsion fracture of distal fibula, disruption of Kager's fat pad triangle, and peroneal tendon dislocation	Snowboarding
Assal <i>et al.</i> (2002)	35	M	R Achilles tendon rupture w/concomitant ipsilateral medial malleolar fracture	2-meter fall from ladder
Pieper <i>et al.</i> (1998)	45	M	R Achilles tendon rupture w/concomitant ipsilateral medial malleolar fracture	Basketball
Hill <i>et al.</i> (2011)	27	M	L Achilles tendon rupture w/concomitant ipsilateral transverse fracture of the distal tibial diaphysis, and oblique fracture of the distal fibula	Motorcycle collision
Lubin <i>et al.</i> (2000)	40	M	Achilles tendon rupture w/concomitant ipsilateral medial malleolar fracture	
Maffulli and Richards (2006)	38	M	R Achilles tendon rupture w/concomitant ipsilateral medial malleolus	6 m fall from a tree
Martin and Thompson (1986)	61	M	Achilles tendon rupture w/concomitant ipsilateral medial malleolar fracture	Motor vehicle collision
Barron and Yocum (1993)	30	F	R Achilles tendon rupture w/concomitant ipsilateral medial malleolar fracture	Gymnastics
Sarrel and Girard (2021)	20	M	R Achilles tendon rupture w/concomitant ipsilateral bimalleolar fracture dislocation	Motorcycle collision
Türkmensoy <i>et al.</i> (2013)	42	M	R Achilles tendon rupture w/concomitant ipsilateral medial malleolar fracture	Fall down 4 stairs
Garneti <i>et al.</i> (2005)	42	F	L Achilles tendon rupture w/concomitant ipsilateral medial malleolar fracture	Fall down stairs
Lu and Holledge (2016)	59	M	L Achilles tendon rupture w/concomitant medial malleolar fracture	Fall down 60 cm high step
Fontecilla <i>et al.</i> (2018)	57	M	L Achilles tendon rupture w/concomitant ipsilateral medial malleolar fracture	Motorcycle collision
Mattos E Dinato <i>et al.</i> (2010)	39	F	L Achilles tendon rupture w/concomitant lateral malleolar fracture	Jumping during exercise
Pyle <i>et al.</i> (2020)	53	M	R Achilles tendon rupture w/concomitant ipsilateral lateral malleolus fracture	Fall down 3 concrete stairs
Brueton and Javid (2018)	49	M	R Achilles tendon rupture w/concomitant ipsilateral trimalleolar fracture, anterior tibio-fibular ligament tear and anterior talo-fibular ligament partial tear	Slalom skiing

M: Male, F: Female

Given the displaced intra-articular fracture pattern and malreduction of the fibula, operative fixation of the tibial plafond was recommended. Non-operative and operative management were discussed at length with the patient regarding his Achilles tendon rupture. After shared decision-making, the patient elected to proceed with operative management of both injuries.

A popliteal and saphenous nerve block was administered for post-operative analgesia, and a thigh tourniquet was applied. The patient was positioned supine for fixation of the pilon fracture. An anterolateral approach to the distal tibia was performed. The superficial peroneal nerve was identified and protected. After division of the retinaculum, dissection was carried to the distal anterior tibia. Fracture hematoma and fibrous tissue were evacuated. There was focal comminution of the articular surface, including a 4 × 6 mm segment of non-viable cartilage, which was excised. The joint was irrigated and the fracture reduced under fluoroscopic guidance.

A mini-fragment T-plate (Stryker) was selected and applied using an antiglide technique. The plate was secured proximally and distally with non-locking screws following contouring. Final fluoroscopic imaging confirmed anatomic reduction and stable fixation. The retinaculum was repaired, and the skin was closed in layered fashion.

The patient was then repositioned prone for Achilles tendon repair. A posterior midline incision was made approximately 8–9 cm proximal to the calcaneal insertion, centered over the palpable defect. The tendon ends demonstrated fibrous tissue and early scar formation without complete healing. The scar tissue was debrided, and the tendon ends were mobilized to allow direct repair. The tendon was then repaired using a standard Krackow suture technique proximally and distally, supplemented with a modified Kessler suture anteriorly. With the ankle held in plantarflexion, the sutures were sequentially tied, achieving satisfactory tension and restoration of tendon continuity. The plantaris tendon was harvested proximally and woven through the repair site for augmentation. The paratenon was closed, followed by layered skin closure. A well-padded posterior splint was applied with the ankle in plantarflexion, and the patient was maintained non-weight-bearing.

At 2 weeks postoperatively, staples were removed, and the patient was transitioned to a controlled ankle motion boot with stacked heel lifts. Partial weight-bearing was

an acute tibial plafond fracture (Fig. 3).



initiated. At 4 weeks, there was concern that Parkinsonian rigidity may affect tendon relaxation and repair tension; therefore, dorsiflexion beyond neutral was restricted. Physical therapy was initiated, focusing on gait training, a gentle range of motion, and progressive strengthening.

At 6 weeks, one heel wedge was removed. He then transitioned to flat-foot ambulation in the boot the following week and gradually out of the boot thereafter. At 10 weeks, the patient was ambulating in regular footwear with mild swelling and residual plantarflexion weakness. Radiographs demonstrated maintained alignment without hardware failure. The Achilles repair demonstrated active gastrocnemius contraction, though weakness persisted. Strengthening was intensified, and dorsiflexion beyond neutral remained restricted for an additional 2 weeks.

At 4 months postoperatively, radiographs confirmed fracture union (Fig. 4). The patient had returned to baseline daily activities, was ambulating independently without pain, and reported overall satisfaction with his outcome.

Discussion

Achilles tendon rupture and fracture are generally seen in isolation due to a traumatic event or a sports-related injury. However, in rare circumstances, these injuries can occur in combination. To date, there have been 13 case reports of Achilles tendon rupture with associated medial malleolar fracture, 2 case reports of Achilles rupture with concomitant lateral malleolar fracture, 1 case report of Achilles rupture with associated bimalleolar fracture, 2 cases of Achilles rupture with associated trimalleolar fracture, and 1 case report of Achilles tendon rupture with concomitant open distal tibia and fibula fracture. There have also been three reports of malleolar fractures associated with apparent SPR interruption and dislocation or subluxation of the peroneus tendons. To the best of the authors' knowledge, our presented case is the first to describe an injury containing the combination of an Achilles tendon rupture with an associated pilon fracture of the tibia.

The injuries resulting in isolated Achilles rupture or ankle fracture are often the result of a low-energy fall or rotational injury. However, the cases that have reported a combination of these injuries illustrate that the mechanism of injury is often due to higher-energy trauma such as a fall from height, motor vehicle collision, or snowboarding accident. These injuries could potentially be explained by an abrupt dorsiflexion force applied to the foot that is followed by axial loading of the hindfoot, with or without a rotational movement. The mechanism of action of the injury presented in this case is in alignment with previously reported mechanisms in the

literature.

Recovery from Achilles tendon repair can be significantly influenced by comorbid conditions such as PD, which may complicate both post-operative management and rehabilitation. PD is a progressive neurodegenerative disorder characterized by bradykinesia, rigidity, postural instability, and gait disturbances. These features can impair the patient's ability to comply with weight-bearing restrictions, participate effectively in physical therapy, and maintain appropriate joint positioning during healing. Furthermore, muscle stiffness and abnormal resting tone may increase mechanical stress on the tendon repair site, potentially elevating the risk of rerupture or delayed healing. Cognitive challenges associated with PD can also hinder adherence to rehabilitation protocols, ultimately compromising functional outcomes. These factors were a concern during the post-operative course of our patient and contributed to a more cautious rehabilitation strategy.

A missed or delayed diagnosis is common in the combination of the injuries described. Of the cases reported in the literature, eight Achilles ruptures were initially missed [14,15,16,18,21,25,26], and three fractures were initially missed [8,13,27]. In the report, we present that the fracture and the Achilles rupture were not diagnosed at the initial visit, and the correct diagnosis was not made until 2 weeks after the injury. This delay in diagnosis may have further complicated the recovery of the patient and contributed to the choice of a more cautious rehabilitation strategy. Moonen et al. attributed diagnostic errors in emergency departments to a lack of history taking and inadequate medical examinations [28,29,30], as was seen in our case.

A delayed diagnosis can result in significant patient morbidity and may cause an increase in long-term consequences [4,5,6,7]. Given these adverse events caused by a delayed diagnosis, physicians should have an increased suspicion for the combination of the injuries described after a high-energy traumatic event to the ankle. If the mechanism of injury and physical examination are concerning, physicians should consider advanced imaging to ensure the proper diagnosis is made and prevent the delayed treatment of injuries.

Conclusion

This case highlights a rare but clinically significant combination of injuries – Achilles tendon rupture with an associated pilon fracture – that has not been previously described in the literature. The initial missed diagnosis underscores the diagnostic challenges posed by complex lower extremity trauma, particularly in elderly patients with comorbidities such as PD. A high index of suspicion is essential when evaluating

patients with high-energy ankle injuries, especially when clinical findings suggest both soft tissue and osseous involvement. Timely imaging and thorough physical examination are critical to avoid delays in diagnosis and management, which can increase morbidity and complicate rehabilitation. By sharing this unique case, we aim to raise awareness of this injury pattern and reinforce the importance of a comprehensive diagnostic approach in similar clinical scenarios.

Clinical Message

In patients presenting after high-energy ankle trauma, clinicians should maintain a high index of suspicion for concomitant Achilles tendon rupture even when a fracture is identified or initial radiographs appear negative. Early recognition through careful physical examination and advanced imaging can prevent missed diagnoses, optimize surgical planning, and improve functional outcomes.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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Conflict of Interest: Nil

Source of Support: Nil

Consent: The authors confirm that informed consent was obtained from the patient for publication of this article

How to Cite this Article

Hovland ST, Yates Z, Barnum M, Thompson G, Shaath MK. Pilon Fracture with Associated Achilles Tendon Rupture: Case Report and Review of the Literature. *Journal of Orthopaedic Case Reports* 2026 August;16(08): 152-158.