Evaluating a Puncture Injury of the Plantaris and Achilles Tendons Using Handheld Point-of-Care Ultrasound: A Case Report

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Published: 2026
Journal of the International Academy of Neuromusculoskeletal Medicine
Volume 23, Issue 1

ABSTRACT

Objective: This report describes the use of point-of-care ultrasound in the evaluation of a traumatic puncture injury to the posterior calf affecting the Achilles and, unexpectedly, the plantaris tendon.

Methods: A 43-year-old male presented three days after sustaining penetrating trauma to the posterior calf from a dropped drill with an attached bit. Initial hospital urgent care evaluation was performed without imaging. The patient subsequently underwent evaluation with handheld point-of-care musculoskeletal ultrasound. Both longitudinal and transverse imaging were performed.

Results: Point-of-care ultrasound showed the majority of the Achilles was intact. Unexpectedly the drill bit had managed to graze the plantaris tendon. Ultrasound was able to evaluate the extent of the injury.

Conclusion: Point-of-care ultrasound can be used to identify injured structures in a puncture injury.

Key Words: Plantaris, Achilles, Point-of-care ultrasound, POCUS, MSK ultrasound

INTRODUCTION

The Achilles tendon is the most commonly ruptured tendon in the body.[1] One of the best ways to evaluate the Achilles tendon for a tear or rupture is via diagnostic ultrasound.[2] The plantaris is typically injured at the level of the posterior proximal calf, near the musculotendinous junction.[3] It is not a typical structure to evaluate at the level of the Achilles tendon except as a pitfall in the context of an Achilles rupture where the plantaris tendon can be mistaken as part of the Achilles tendon resulting in the incorrect diagnosis of a partial tear instead of a full rupture.[4]

The plantaris tendon is found in roughly 9 out of 10 individuals.[5,6] It is rarely injured compared to other leg structures in cases of Achilles tendinopathy or "tennis leg".[7,8] In one study on calf strains, a plantaris tear was detected in only 1.4% of cases.[9]

Musculoskeletal ultrasound requires a high frequency linear probe.[4] Handheld ultrasounds have improved greatly in recent years with multiple models that meet this criterion.[10-13] These units are affordable and portable increasing patient access to point-of-care ultrasound (POCUS) in outpatient settings.

CASE PRESENTATION

The patient was carrying a drill with an attached bit on a belt clip. As he was ascending stairs, it fell, bit first, onto the midline of the right posterior calf, puncturing the Achilles tendon. The drill bit was dislodged immediately by the weight of the drill. He was taken to the emergency department where he received stitches and a boot brace.

He reported to a chiropractic clinic 3 days later where ultrasound was used to determine the extent of the Achilles injury. Ultrasound imaging was performed with a handheld Clarius L7HD3 (Clarius Mobile Health Corp., Vancouver, BC, Canada). Some of the initial images can be seen in Figures 1 and 2. The Achilles tendon is split longitudinally with the majority of the tendon fibers still intact. It was only on inspecting the images and recorded cineclips after the visit, that the plantaris injury was detected. The plantaris was hypoechoic (darkened) at the injury site. A hypoechoic tendon could indicate an imaging artifact (anisotropy), a tendinitis, a tendinosis, a partial tendon tear, or the absence of the tendon, as would be the case in a full rupture.[4] On the cineclips, it is clearer that there are some signs of continuous fibers and there is a lack of clear tendon stumps; both of these findings help rule out a complete rupture. A partial tendon tear is the most likely diagnosis.

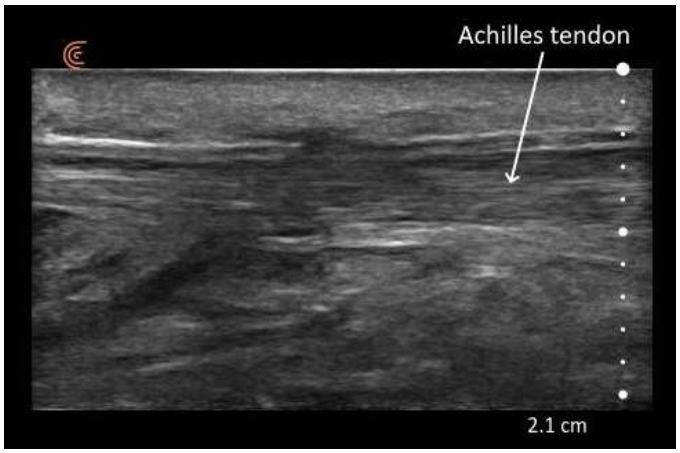

Figure 1: Longitudinal images of the injury site. Note the discontinuity of the fascia superficial to the tendon. Hypoechoic fluid was seen tracking along the paratenon. The extent of the injury was unclear based solely on the longitudinal image.

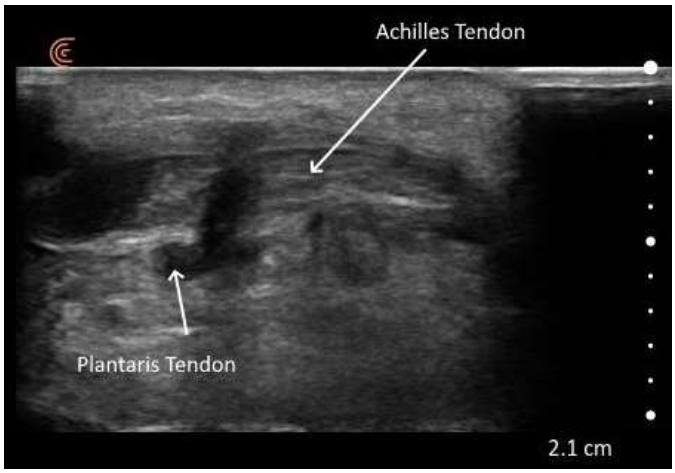

Figure 2: Transverse view of the injury site. Note the puncture passed by the location of the plantaris. The plantaris was thickened and hypoechoic in the vicinity of the injury site.

DISCUSSION

Puncture injuries to the calf are most commonly caused by bicycle spokes and depending on the severity, a surgical consult could be appropriate.[14] Since imaging was not done at the hospital, having access to diagnostic ultrasound to determine the extent of the tear can be useful to guide management. Another advantage of having access to POCUS is that progress can be easily monitored and the imaging device can also be used in ultrasound guided injections should they be indicated.

A puncture of the Achilles tendon was expected considering the location of the puncture injury, but the plantaris was not at the forefront of the clinician's mind. The plantaris is typically injured at the level of the knee and not at the level of Achilles tendon.[4] This case serves as a reminder of the path of the tendon and that the tendon should be kept in mind in cases with significant Achilles injury.[4] It can be difficult to locate and identify without

following the tendon with dynamic imaging. The exact distal attachment can vary but it attaches superficial, lateral, and/or deep to the Achilles tendon on the lateral side.[15] As an ultrasound transducer moves proximally, you should see the tendon move from lateral to medial deep to the Achilles tendon.

This case also shows the importance of imaging in two planes and in taking cineclips. The initial clinician, understandably, had not seen an injury like this, and correctly took cineclips of the region in two axes. Ultrasound imaging can be a dynamic imaging modality, and a moving image gives more information than a static one. A hypoechoic circular structure could be a blood vessel, a hematoma, an injured tendon, a ruptured tendon, or even an injured nerve.[4] By following a structure and/or by using compression, the answer may become clear. In this case, tendon stumps were not seen, and we could see normal tendon appearance proximal and distal to the injury site.

CONCLUSION

Point-of-care ultrasound can be used to identify injured structures in a puncture injury. In this case it identified the extent of damage to the Achilles tendon and identified an injury to the plantaris tendon.

LIMITATIONS

A single case design is inherently limited and does not demonstrate the reliability of identifying a plantaris injury. Since the plantaris is not present in 100% of the population, there may be no tendon to identify.

CONSENT

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

COMPETING INTERESTS

One of the authors offers ultrasound educational courses and consultations. The other offers injection therapy educational courses. The authors declare that they have no other competing interests.

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