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Case Report

Diagnosis and Management of an Atypical Plantaris Tendon Injury in a Division I Football Player: A Case Report -

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ABSTRACT

A Division I football athlete experienced acute posterior leg pain while pushing off on the line of scrimmage. Ultrasound (US) showed a midsubstance plantaris tendon rupture, an injury that, to our knowledge, has only been described once before in the medical literature [1]. US was also used to assist with rehab progression and return to previous level of activity, which was achieved three weeks after the injury. While there currently are no guidelines regarding return to sport after this injury, this case demonstrates that once pain is controlled and ROM restored, progression through rehabilitation and return to elite level sport is simply based on symptoms.

Keywords: Ultrasound; Plantaris; Rehabilitation

INTRODUCTION

Posterior lower leg pain is a common complaint in the athletic population. The differential diagnosis is broad and includes gastrocnemius muscle injury, Achilles tendon injury, plantaris rupture and even DVT [2,3]. In a previous case study, plantaris rupture was attributed to 1.4% of cases of posterior leg pain [4]. Isolated plantaris tendon rupture, while uncommon, most commonly occurs at the myotendinous junction [5]. A rupture at the tendon midsubstance is an exceptionally uncommon injury, one that has not been seen in the senior author's six years of clinical experience. In our review, there is only one case of midsubstance plantaris rupture described in the literature [1]. Furthermore, there are no guidelines to guide return to play, especially in elite-level athletes. This case is unique in that it describes not only the sonographic appearance of a midsubstance plantaris rupture but also the utility of ultrasound in monitoring and guiding return to play in an elite level athlete.

CASE REPORT

A 22-year-old male Division I NCAA football athlete experienced acute onset of left medial calf pain. He was playing the tight end position and in a three-point stance when he pushed off the ground with his left foot in a slightly dorsiflexed position. He felt a "pop" in calf which was associated with sharp pain and weakness, limiting his ability to ambulate. Upon immediate evaluation in the athletic training room, he was exquisitely tender to palpation over the muscle belly of the medial gastrocnemius muscle. He had full passive and active plantarflexion and dorsiflexion, albeit with discomfort. Thompson test was negative. Due to concern for Achilles tendon or gastrocnemius muscle injury, diagnostic ultrasound examination was performed.

Ultrasound evaluation

Sonographic evaluation approximately 2 hours following the injury was performed using a high-frequency, linear transducer. The distal plantaris tendon was identified medial to the Achilles tendon insertion at the calcaneus. It was then followed proximally as it coursed through the fascial plane between the medial gastrocnemius and soleus muscles. Evaluation demonstrated an intact Achilles tendon but showed complete rupture of the plantaris tendon midsubstance (Figure 1a). The distal tendon remained intact (Figure 1b). The injury was associated with a small, focal hematoma within the gastrocnemius/soleus aponeurosis and mild hyperemia at the zone of injury (Figure 1c). There was no evidence of medial gastrocnemius muscle injury. The athlete was placed in a compressive sleeve and was progressed through two days of gentle ROM exercises and treatment modalities in the athletic training room. We refrained from significant soft tissue manipulation to prevent further injury.

Approximately 72 hours following his injury, a follow-up ultrasound examination showed interval hematoma organization

(Figure 2) as well as initial scar tissue formation within the plane of residual plantaris stump. Due to stable sonographic appearance of the injury, the patient progressed to active ROM and gentle lower limb strengthening with modalities as needed. Over the next two weeks, he was progressed through rehabilitation as tolerated and began linear running activities.

Two weeks following the date of injury, he returned for routine follow up examination. Ultrasound demonstrated resolution of hematoma and interval progression of heterogeneous scar tissue along the course of the ruptured tendon. The patient continued to progress and returned to his previous level of activity as a Division I tight end that week without incident.

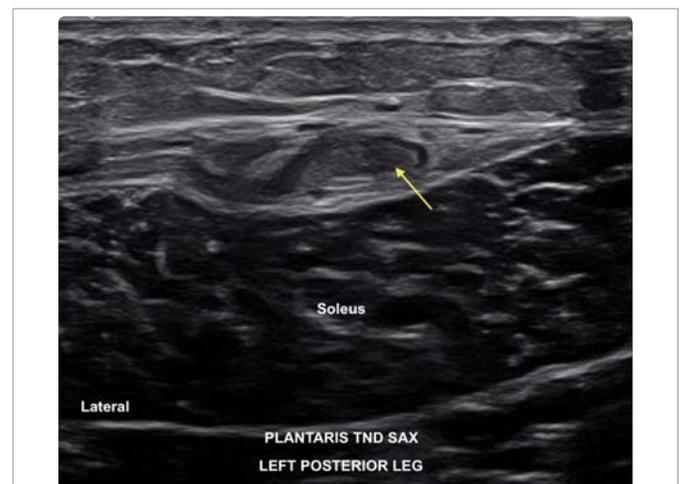


Figure 1A: Sonographic evaluation of the plantaris tendon 2 hours post-injury
A: Complete rupture of the tendon midsubstance (arrow).



Figure 1B: Intact distal plantaris tendon (arrow).



Figure 1C: Focal hematoma within the medial gastrocnemius/soleus aponeurosis at the site of injury (star).



Figure 2: Focal hematoma within the medial gastrocnemius/soleus aponeurosis at the site of injury (star).

DISCUSSION

The plantaris muscle/tendon is an accessory plantar flexor of the foot and also has a role in proprioception and balance [6]. Acute rupture of the plantaris tendon can mimic Achilles tendon rupture, muscle injury of the gastrocnemius or soleus, and even DVT [2,3]. Recent studies have shown that medial gastrocnemius injury is far more common than plantaris rupture as the cause of medial calf pain [7]. In a retrospective review of patients with posteromedial calf pain, Delgado et al showed that rupture of the plantaris occurred in only 1.4% of their sample compared to 66.7% with gastrocnemius muscle injury [8].

Important to note is that the current literature describes distal tendon injuries or proximal myotendinous injuries⁸. Based on our review of the literature, a midsubstance plantaris tendon injury has been described only once before, making this case rather unique [1].

There is scant literature documenting diagnosis and rehabilitation protocols for acute plantaris tendon rupture in the elite level athlete. Analogue, et al. [9] showed that plantaris tendon injuries may allow for accelerated return to play in elite basketball athletes compared to alternative causes of posterior leg pain. In our athlete, initially a period

of rest and compression was important to prevent development of a large hematoma. We started with gentle strengthening exercises focusing on calf and gluteal musculature. Once ROM and strength was symmetric compared to the contralateral side, the athlete was quickly progressed to linear running and finally explosive lateral movements. Rehabilitation also focused on eccentric loading, neuromuscular control and proprioception exercises of the lower extremity. We utilized the eccentric exercises as described by Alfredson, et al. [10] to guide the initial rehabilitation. Throughout the protocol, the athlete was advanced purely based on symptoms.

While plantaris tendon rupture is a rare diagnosis, it can be accurately diagnosed by multiple imaging modalities. Delgado, et al. [4] demonstrated that MRI and ultrasound allowed for differentiation of the musculotendinous unit of the plantaris from the remaining muscles of the posterior compartment of the lower leg. The prior reported case of a midsubstance plantaris tendon rupture highlighted the utility of MRI in making the diagnosis [1]. Though MRI can provide valuable information, it comes with well-described limitations. In our case, ultrasound was used to promptly identify and characterize the injury and subsequently follow it to evaluate for healing and hematoma development. Diagnosis was made within hours of the injury and treatment was initiated immediately. No additional resources were needed for sonographic evaluation outside of the physician covering the game. In the event of future hematoma formation, ultrasound could have been used to drain the hematoma under direct needle guidance.

RESULT

At a two month follow up appointment, the athlete was still performing at full, unrestricted activity without any pain or complications. He was able to finish the season without any complaints.

CONCLUSION

Ultrasound provided immediate and accurate diagnosis of a rare form of plantaris tendon injury. If the athlete had been clinically diagnosed as having an inaccurate diagnosis such as gastrocnemius muscle tear, the amount of resources used and also return to play may have been significantly greater. The ease and availability, cost effectiveness, as well as diagnostic accuracy of ultrasound in this case allowed for rapid diagnosis and return to Division 1 football within three weeks.

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