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Accessory Tibionavicular Muscle: An Unusual Cause of Medial Ankle Pain

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Abstract

Accessory or anomalous muscles around the ankle are not uncommon and are usually asymptomatic. They are traditionally encountered during imaging undertaken for evaluation of ankle pain. We reported the first case of a new accessory muscle in the anteromedial part of the ankle with associated partial thickness tear in an 18-year-old football player presenting as symptomatic pathology. In this article, we described the role of cross-sectional imaging in its diagnosis including successful management of the condition with ultrasound-guided platelet-rich plasma therapy and review-associated literature.

Keywords

- ankle
- accessory muscles
- ultrasound
- magnetic resonance imaging
- platelet-rich plasma
- dry needling

Introduction

A wide spectrum of accessory or anomalous or supernumerary muscles has been described in literature.[1] Usually asymptomatic, around the foot and the ankle, they are usually visualized on imaging undertaken to evaluate this region.[2] From a clinical point of view, these accessory or anomalous muscles may become symptomatic and present as other more common pathologies such as tarsal tunnel syndrome, compressive neuropathy, chronic ankle pain, impingements, or mimic soft tissue tumors.[3,4] Anomalous muscles traveling along similar path of established anatomical muscles or tendons in the region of clinical interest may provide a diagnostic challenge. Recognition and identification of these symptomatic anomalous muscle are key to effective patient management. Cross-sectional imaging with magnetic resonance imaging (MRI) and dynamic ultrasound (US) are investigations of choice in accurate diagnosis of the condition.[5,6]

The commonly described accessory or anomalous around the ankle and foot include the flexor digitorum accessorius longus, the accessory soleus, the peroneocalcaneus internus, tibiocalcaneus internus, the tibioastragalus anticus of Gruber muscle, and the accessory peroneal muscles (►**Table 1**).[1,7–12]

We describe a case of dorsomedial ankle pain in a patient arising due to partial thickness tear of a new accessory muscle at the ankle in an 18-year-old male football player. We highlight the clinical presentation, role of MRI in its accurate diagnosis including its successful management with US-guided platelet-rich plasma (PRP) therapy, and review-associated literature.

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Table 1 Summary of commonly described accessory muscles around the ankle joint

Name of accessory muscle (abbreviation)	Origin	Insertion	Relationship with flexor retinaculum | deep Aponeurosis of ankle	References
Flexor digitorum accessorius longus (FDAL)	Variable Any posterior compartment components such as tibia, fibula, soleus, flexor hallucis longus (FHL), or flexor retinaculum	Flexor digitorum longus (FDL) or quadratus plantae (QP)	Deep	2–5,7–9
The accessory soleus (AS)	Posterior part of tibia, soleal line or fibula or anterior surface of soleus muscle	Achilles tendon, upper calcaneum, or medial calcaneum via a muscular or tendinous insertion	Superficial	2,5,8
The peroneocalcaneus internus (PCI)	Medial, distal fibula, distal to origin of flexor hallucis longus (FHL)	Medial calcaneum, distal and inferior to the sustentaculum tali	Deep	2,5,6,10
Tibiocalcaneus internus (TCI)	Lower third of tibia–medial crest	Anterior to the Achilles tendon on the medial surface of the calcaneum similar to AS	Deep	2,5,8
The tibioastragalus anticus of Gruber muscle (TAAG)	The lower third of the anterolateral tibia and the interosseous membrane	Anterior superolateral neck of the talus	Deep	2,5,11

Case Description

An 18-year-old male football player presented to our fracture clinic with subacute onset of anteromedial right ankle pain of 3 weeks duration. This followed a training session without any specific incident or twisting mechanism that resulted in the injury. The pain was localized to the anteromedial part of the ankle with visual analogue scale of 6/10. He had self-managed the pain at home with rest, elevation, ice, and an elastic bandage without much improvement. There was no history of surgery or trauma to this site previously.

He walked with a slight limp. Clinical examination revealed mild swelling and focal tenderness over the anteromedial aspect of ankle, anterior to the medial malleolus. The ankle, subtalar, and midfoot joint range of movements were equivalent to the opposite, left side. The ankle joint was stable with a negative Drawer test.

The neurovascular examination was normal with congruent ankle radiographs.

With a suspicion of deltoid ligament injury, an US was performed to evaluate the pain further. This demonstrated a linear muscle extending the from the medial malleolus, anterior to the origin of the tibionavicular component of deltoid ligament extending anteriorly and inserting on the dorsomedial aspect of the navicular bone. There was a 5×5mm hypoechoic focus in the mid-substance of this muscle in keeping with a low-grade partial thickness tear (►**Fig. 1**, ►**Video 1**). The deltoid ligament, anterior tibiofibular ligament, tibialis posterior, tibialis anterior, and flexor digitorum longus tendons in particular were normal.

Video 1

Video showing accessory tibionavicular muscle with small tear. Online content including video sequences viewable at: https://www.thieme-connect.com/products/ejournals/html/10.1055/s-0043-1769472.

MRI was performed subsequently that confirmed the sonographic finding of an accessory muscle originating from the medial malleolus and inserting at the dorsomedial aspect of navicular bone. There was marked edema of this accessory muscle with a 5×5 mm partial thickness tear (►**Figs. 2**, **3**). The superficial and deep components of deltoid ligament and lateral ligament complex were intact (►**Fig. 4**) The medial tendons, specifically the tibialis posterior and tibialis anterior tendons, were discrete, uninjured, and intact without features of tenosynovitis. The bone marrow signal was normal without osseous edema.

He had failed to respond to physiotherapy and conservative treatment for 8 weeks. Hence, the symptomatic strain of the accessory muscle was managed with one session of US-guided PRP injection (2 mL prepared using double spin method) into the partial thickness tear along with dry needling (►**Fig. 5**).

He had significant improvement in symptoms at 6 weeks clinical follow-up with supervised, gradual return to sports.

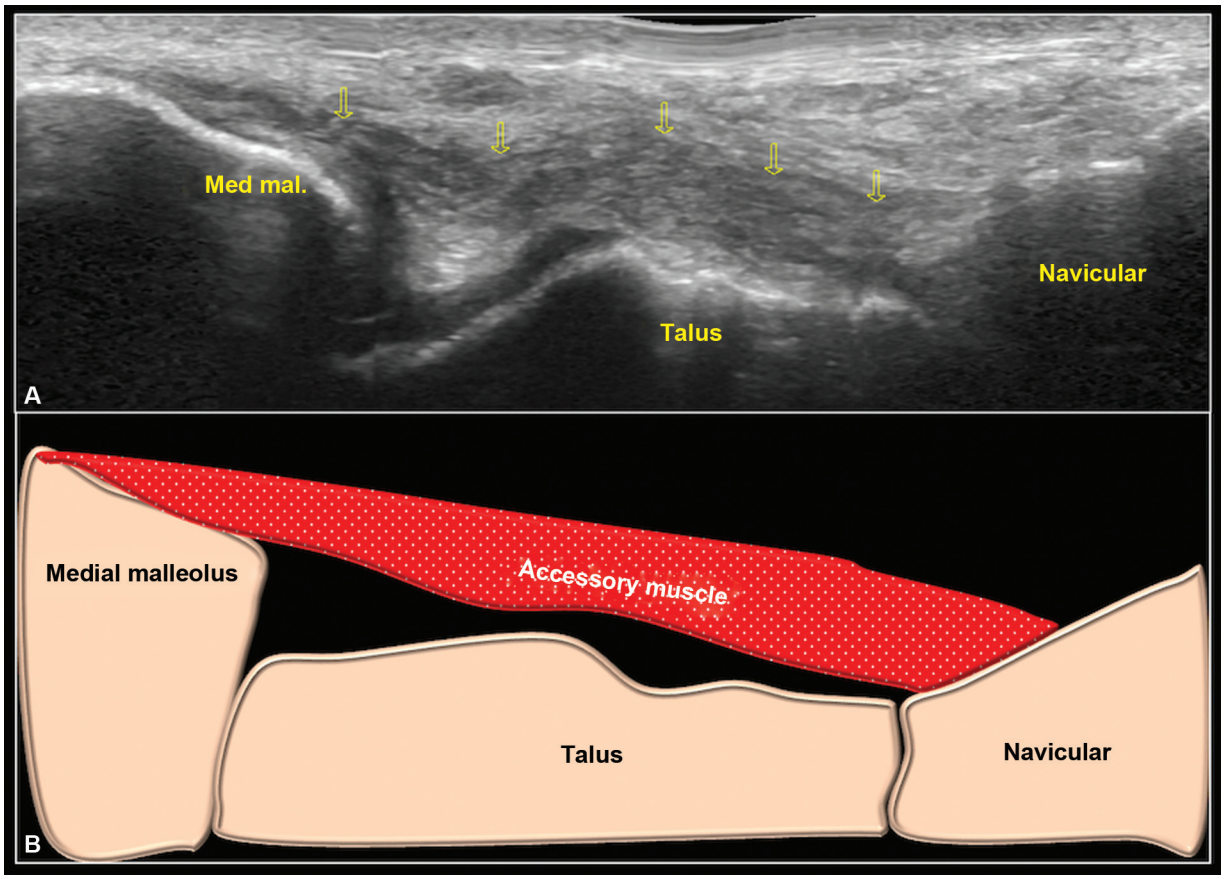

Fig. 1 Longitudinal ultrasound (**A**) and schematic (**B**) showing the accessory tibionavicular muscle arising from medial malleolus and inserting on the navicular.

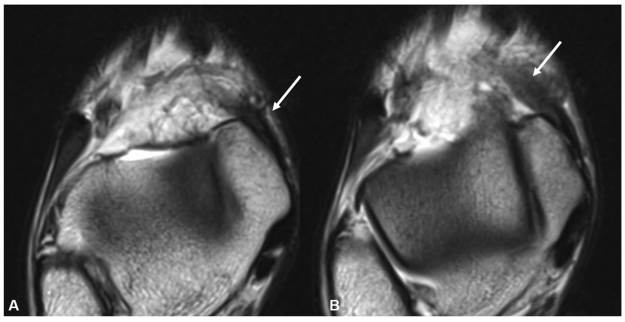

Fig. 2 Proton density axial magnetic resonance images (**A** and **B**) showing the accessory tibionavicular muscle (arrow).

Discussion

Ankle pain can present as a clinical quandary since a multitude of pathologies can be attributed to these symptoms. These can be either traumatic injuries or nontraumatic conditions. Common causes of medial ankle pain include injuries to the ankle bones, capsuloligamentous structures, tendons, arthritis, degenerative tendinopathies particularly of the tibialis posterior tendon, compressive neuropathy (tarsal tunnel syndrome), or soft tissue tumors.[13–15]

One of the rare causes of ankle pain can be due to accessory muscle or its pathological presentation.[4] Though accessory, anomalous or supernumerary muscles around the ankle are well described, these can rarely cause symptoms of pain due to tears of the accessory muscles, paraesthesia due to compressive neuropathy, and rarely as a soft tissue tumor mimic.[2,3,5,9,12]

Our patient presented with typical injury that can happen due to impact during kicking in football. A preliminary injury to deltoid ligament was suspected, since it has been reported even individual components of the deltoid ligament (either superficial or deep) can present as medial ankle pain without features of ankle instability and normal radiographs.[14]

Variation in muscular anatomy can complicate interpretation of cross-sectional imaging. Our patient benefited from the senior author's experience and high index of suspicion on the US performed to evaluate the pain further. A new accessory muscle (tibionavicular muscle) was found coursing on the anteromedial aspect of the ankle with an associated partial thickness tear in its substance. This muscle arose from the medial malleolus anterior to the origin of the tibionavicular component of the deltoid ligament. It was approximately 3 cm in length and 0.7 cm in width with a relatively broad insertion on the dorsomedial part of the navicular bone. We hypothesize that the mechanism of injury is due to direct impact of muscle by football during kicking. The force of the impact had been enough to cause a partial tear but not enough to cause a complete tear or injury to adjacent capsuloligamentous or tendinous structures.

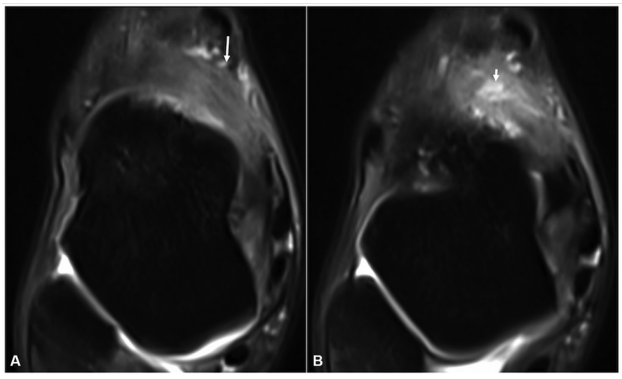

Fig. 3 Fat-saturated proton density axial magnetic resonance images showing the accessory tibionavicular muscle (arrow) (**A**) with a small tear (small arrow) (**B**).

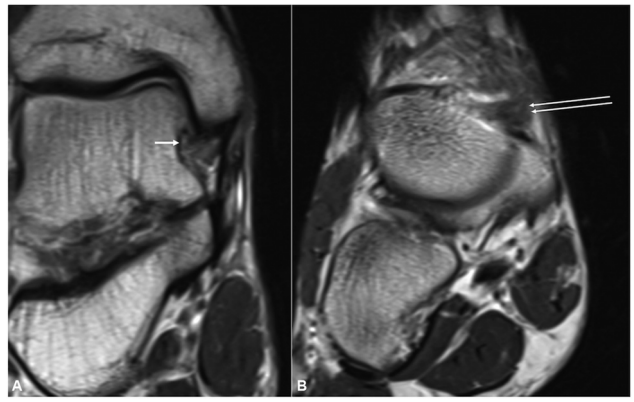

Fig. 4 Coronal T2-weighted magnetic resonance images showing normal deltoid ligament (**A**) (short arrow) and accessory tibionavicular muscle (**B**) (long arrows).

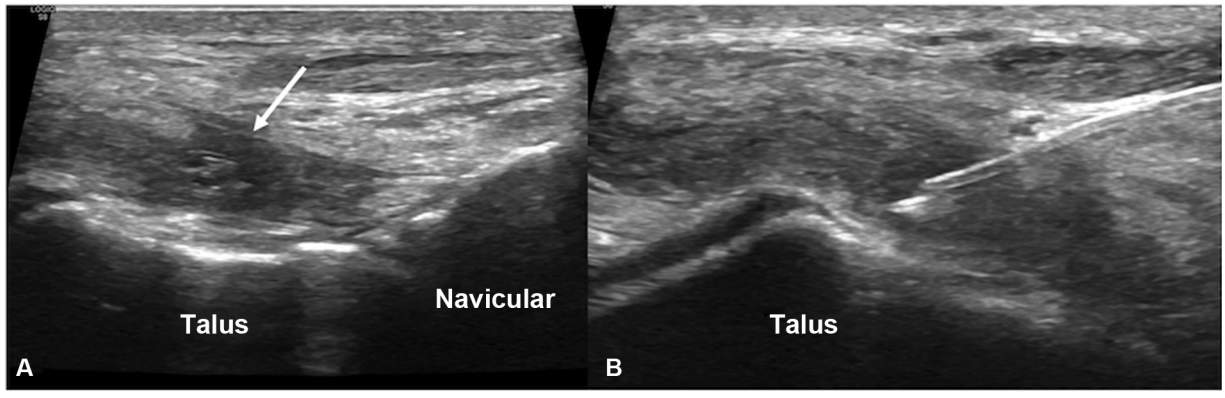

Fig. 5 Longitudinal ultrasound showing the small tear the accessory tibionavicular muscle (**A**) treated with ultrasound-guided platelet-rich plasma injection (**B**). Arrow in (**A**) is showing tear in the Accessory Tibionavicular muscle.

Various studies have examined clinical outcomes of the advantage of PRP in the management of muscle strain injuries with promising results.[16] PRP injection therapy into the muscle tear can result in quicker healing, which decreases recovery time, hence reducing the time of return to sport.[17] US-guided PRP injection therapy along with dry needling led to significant improvement in symptoms and assisted in effective return to sports in our patient.

This case report highlights that tear of this previously undescribed muscle should be included in the differential of medial ankle pain in particular sprain of the deltoid ligament (especially the tibionavicular and tibiospring components). The management process strengthens the need to identify such accessory muscles, leading to symptomatic pain around the ankle and the utility of complementary imaging and US-guided intervention in successful patient treatment.

Conclusion

Though accessory muscles around the ankle are typically asymptomatic and incidental findings on ankle evaluation, our case report highlights the need of a high index of suspicion, recognition, and identification of symptomatic, accessory muscle injury such as the described new accessory tibionavicular muscle. This can lead to effective patient management. Complementary imaging with MRI is crucial in accurate detection of such accessory muscles and US-guided interventions are helpful in targeted treatment.

Pathologies of the new accessory tibionavicular muscle should be considered in the differential diagnosis of patient presenting with medial ankle pain.

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None.

Conflict of Interest
None declared.

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