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Case Report

Diagnostic Ultrasound of Stenosing Tenosynovitis of the Flexor Hallucis Longus Tendon Successfully Treated with Ultrasound-Guided Injection: A Case Report

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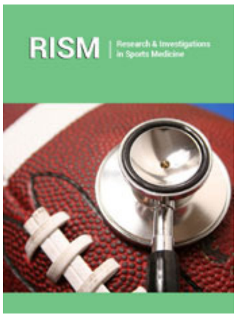

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Abstract

Stenosing tenosynovitis occurs due to a constrictive effect on a tendon. Causes include anatomical, mechanical, and hormonal. In the ankle, the most commonly affected tendon is the flexor hallucis longus as it travels from the deep posterior compartment of the leg to the hallux. Diagnostic ultrasound allows for direct visualization of the site of constriction and localized treatment using ultrasound guidance. We report a case of stenosing tenosynovitis of the flexor hallucis longus tendon diagnosed with dynamic ultrasound evaluation. Ultrasound guidance was later used to inject the area of constriction with a corticosteroid which resolved the patient's pain and triggering.

Keywords: Stenosing tenosynovitis; Flexor hallucis longus; Diagnostic ultrasound; Ultrasound-guided injection; Hallux saltans

Introduction

Stenosing tenosynovitis of the flexor Hallucis Longus (FHL) tendon is caused by constriction at various sites, most commonly at the fibro-osseous tunnel under the sustentaculum tali but can occur adjacent to a bony prominence such as an os trigonum or a Stieda process [1]. Diagnostic ultrasound, specifically dynamic evaluation, allows for direct visualization of the area of constriction and can direct appropriate treatment.

Case Report

A 40-year-old tactical athlete presented with a 2-month history of medial right ankle pain and triggering of the hallux with flexion. Symptom onset was gradual with no history of a traumatic event. He denied any recent changes to his physical activity. The pain was described as sharp and stabbing and a 4/10 at rest but could increase to a 10/10 with painful triggering during activity. On physical examination, there was palpable triggering of the hallux with active flexion that would remain flexed without forceful extension from the patient. The patent reported pain at the hallux as well as at the medial malleolus.

Foot and ankle radiographs were performed and there was no evidence of osseous pathology in the foot. Sonographic evaluation was performed using a linear array transducer. The FHL tendon was evaluated from the myotendinous junction to its insertion on the plantar hallux (Figure 1). Evaluation at the medial ankle showed a focal fusiform thickening of the tendon at the area of the subtalar joint. The tendon was thickened and hypoechoic, consistent with tendinopathy. At the fibro-osseous tunnel there was thickening of the fibrous band. There were no signs of tendon tearing or fluid within the tendon sheath. Dynamic exam under ultrasound showed abrupt displacement of the tendon (triggering) past the fibrous band with flexion and subsequent triggering distally with extension.

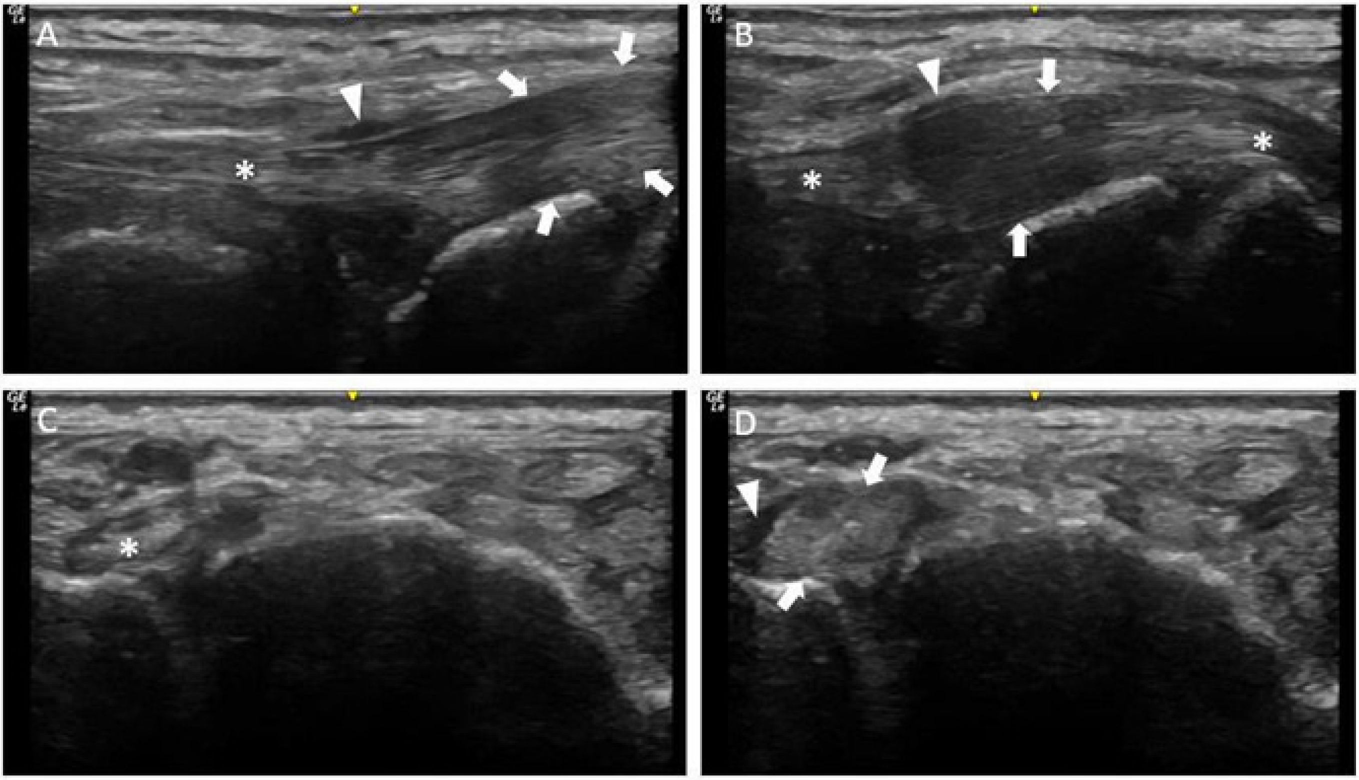

Figure 1: A Long axis image of the FHL tendon at the medial ankle in neutral position. (*) Normal appearance. Arrows thickened, hypoechoic FHL tendon. Arrowhead: Thickened fibrous band causing constriction on FHL tendon. **B** Long axis image of the FHL tendon flexed and in triggered position. **C** Short axis image of the FHL tendon in a neutral position just proximal to the thickened fibrous band. **D** Short axis image of the FHL tendon in the triggered position. Note the thickened and hypoechoic appearance of the FHL tendon.

The patient completed one month of conservative management including physical therapy with minimal improvement of the pain or triggering. At that time, an ultrasound-guided Corticosteroid Injection (CSI) was performed at the area of the fibrous constricting band. A supine position with the hip, knee, and ankle externally rotated was utilized (Figure 2.a). An in-plane needle approach was used with the tendon in a short axis plane to adequately visualize and avoid the nearby neurovascular bundle (Figure 2.b). The needle was visualized entering the tendon sheath at the area of constriction and injectate was seen flowing into the tendon sheath, creating a target sign around the tendon. Follow up at one month post injection showed complete resolution of pain and triggering with continued resolution at one year.

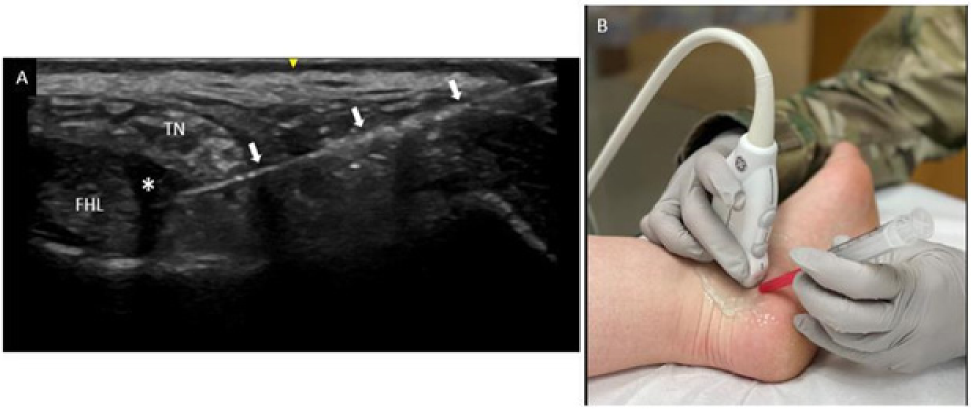

Figure 2: A. Ultrasound-guided injection into the FHL tendon sheath. FHL: Flexor Hallucis Longus Tendon; TN: Tibial Nerve; (*): Injectate; Arrows: 25g needle. **B**. Set-up of patient, ultrasound, and needle to perform the procedure.

Discussion

Stenosing forms of tenosynovitis are an uncommon entity, typically due to a site of entrapment along the path of a tendon. Factors that contribute to a site of constriction can be mechanical, anatomical, or hormonal [2]. Stenosing tenosynovitis of the FHL, also known as hallux saltans, is most commonly due to entrapment of the FHL at the fibro-osseous tunnel under the sustentaculum tali [1]. However, there are several areas for possible entrapment and pathology as the tendon traverses from the deep posterior compartment of the leg to the base of the 1st phalanx. Sites of entrapment from proximal to distal are as the FHL tendon passes through the lateral and medial tubercle of the talus due to an os trigonum or a Stieda process, at the fibro-osseous tunnel at the sustentaculum tali, at the knot of Henry as it crosses paths with the flexor digitorum longus, or as it traverses through the sesamoid bones and the distal pulley systems of the toes [2,3,4]. Less common causes of ntrapment are accessory muscles or tendons and neoplasms [2,3,4].

The pathognomonic presentation of a triggering tendon often leads to minimal imaging studies being conducted. While ultrasound evaluation of hallux saltans has only been reported in a few cases, the real time evaluation of ultrasound paired with the ability to dynamically evaluate structures allows for the area of constriction to be localized and treated appropriately. Ultrasound features of stenosing tenosynovitis of the FHL are thickening and hypoechogenicity of the tendon proximal to the site of constriction. At the site of constriction, triggering can be visualized with active flexion and extension of the FHL tendon. Tenosynovitis, tendon tears, and neovascularization can be seen as well; however, these were not visualized in our patient.

Current research shows surgical release as the curative treatment for stenosing tenosynovitis [3,4]. However, in one of the first studies of FHL stenosing tenosynovitis, Gould et al. showed successful treatment of stenosing tenosynovitis of the FHL at the level of the sesamoids with 1% lidocaine in 3 of 9 patients [5]. Studies assessing triggering of other tendons, such as stenosing De Quervain's tenosynovitis and trigger finger, have shown improvement in constriction and resolution of triggering with CSI [2]. Bodor et al. demonstrated significant improvement in trigger finger symptoms when implementing ultrasound-guided injection techniques. A localized injection at the A1 pulley demonstrated complete resolution of symptoms at 1 year with a 90% success rate [6]. Other research on trigger finger treatment has evaluated A1 pulley and tendon thickness pre and post CSI and showed significant improvement after injection [7]. CSI is currently the first line treatment for trigger finger and De Quervain's stenosing tenosynovitis [8]. While additional research is necessary to evaluate the role of CSI for the treatment of stenosing tenosynovitis of the FHL tendon, it may be a reasonable alternative, or a consideration prior to, surgical release. Our patient had resolution of pain and triggering lasting at least one year after a single ultrasound-guided CSI [9,10].

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