Sonographic Finding of Medial Ankle Subcutaneous Edema and its Association with Posterior Tibial Tenosynovitis: Could this be an Early Sign of Posterior Tibial Tendon Dysfunction?

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Introduction:

Posterior tibial tendon dysfunction (PTTD) is the most common cause of adult acquired pes planus and most commonly occurs in middle-aged to elderly women. PTTD refers to a spectrum of abnormalities of the posterior tibial tendon (PTT) resulting in decreased tendon functionality. The one end of the spectrum includes posterior tibial tenosynovitis (PTTS) and on the other end, complete rupture of the PTT with a marked clinical deformity. If not diagnosed and treated early, it can result in significant pain, disability and a hindfoot pes planovalgus deformity requiring invasive and complex surgical treatments. The evaluation for PTTD includes both clinical and imaging findings. The clinical finding of pitting subcutaneous (subQ) edema at the medial ankle along the course of the PTT, named the posterior tibial edema sign, was associated with PTTD and validated utilizing magnetic resonance imaging (MRI). The purpose of this study is to evaluate for the association of the sonographic finding of medial ankle subQ edema and PTTS to help determine if this US finding could be an early indicator of PTTD. This simple sonographic finding, if detected early, could allow prompt intervention to prevent further complications and healthcare costs related to the progression of PTTD.

Methods:

This retrospective study had a target population including all adult patients from July 2015 to March 2020 found by chart review and review of the radiology information system database to have had an ankle US with the reported diagnosis of either PTTS or a normal PTT. Exclusion criteria by search of these US reports and chart review consisted of those patients with a prior PTT repair, a history of ankle or foot trauma or cellulitis within 3 months, or other causes of subQ edema including a history of lymphedema, generalized edema, anasarca, congestive heart failure, chronic venous insufficiency, hepatic disease, ascites, renal disease or dialysis. Sonographic images of the medial ankle soft tissues from 40 patients with PTTS and 37 patients with a normal posterior tibial tendon (PTT) were randomized and independently evaluated by 2 musculoskeletal radiologists for the presence or absence of subQ edema. Both radiologists were blinded to the images and status of the PTT and the patient's history. Statistical analyses included the chi-square test and Cohen Kappa statistics for inter-observer agreement.

Results:

A statistically significant association was seen for the presence of medial ankle subQ edema and PTTS among both radiologists' findings. Of the 42 found positive by the first radiologist for medial ankle subQ edema, 33 (78.6%) also had PTTS while only 7 of the 35 (20%) found negative for subQ edema had PTTS ($P < 0.001$). Similarly, the second radiologist found that 33 of the 46 (71.7%) positive for medial ankle subQ edema had PTTS while only 7 of 31 (22.6%) found negative for subQ edema had PTTS ($P < 0.001$). There was also substantial inter-observer agreement between the 2 radiologists (κ-value = 0.79; 95% CI: 0.65, 0.93).

Conclusions:

A statistically significant association was present for the association of the sonographic finding of medial ankle subQ edema and the presence of PTTS. This suggests that when medial ankle subQ edema is seen by US, this should signal further interrogation of the PTT. This is especially the case in those having ankle US examinations for reasons other than evaluating the PTT, for example in those performed for the evaluation of tarsal tunnel syndrome or tibial neuropathy or a dedicated Doppler vascular study. Furthermore, with the increasing use of point-of-care ultrasound, if subQ edema is clinically suspected at the medial ankle, US can be a simple method for imaging confirmation and given this study's findings, suggests further evaluation for the diagnosis of PTTD. In conclusion, the sonographic finding of medial ankle subQ edema, not associated with other underlying causes, is significantly associated with the presence of PTTS and therefore stage 1 PTTD. Further studies could evaluate if this simple sonographic finding is an early indicator of PTTD which if detected early, could potentially help prevent further complications and healthcare costs related to progression of the disease.