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Bilateral Achilles tendon ossification: diagnosis with ultrasonography and Single Photon Emission Computed Tomography/Computed Tomography. Case report.

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Abstract

Ossification of the Achilles tendon is a rare clinical condition characterized by the presence of one or more segments of variable sized ossified mass within the tendon. The cause of the condition is obscure. We present the case of a 41 year-old male patient with pain in the Achilles tendon due to bilateral ossification of the tendon near the calcaneus insertion. The case was evaluated by ultrasonography, single photon emission computed tomography, and transmission computed tomography. In this case, we regarded repetitive microtrauma as the cause of the ossification based on the bilateral occurrence.

Keywords: Achilles tendon, ossification, ultrasonography, SPECT/CT.

Introduction

Ossification of the Achilles tendon is a rare clinical condition characterized by the presence of one or more segments of variable sized ossified mass within the substance of the tendon [1]. The cause of the condition is obscure. The aim of this paper is to report a case of Achilles tendon ossification evaluated through plain radiographs, power Doppler ultrasonography, single photon emission computed tomography, and transmission computed tomography findings (SPECT/CT).

Case report

A 41 year-old male patient presented for pain in both Achilles tendons and recent inappropriate footwear usage. No history of direct trauma, previous surgery of the Achilles tendon or any personal or family history of musculoskeletal or systemic disorders was found. He had a story of martial art training during his adolescence. His body mass index was 29.7 and no laboratory abnormalities were found.

Plain radiography revealed a 1.8×0.7 cm sized ossification near the left Achilles tendon insertion and a 3.2×2.4 cm sized ossification in the right Achilles tendon insertion (fig 1).

Ultrasonographic examination of the left foot showed fragmented an intratendinous ossified mass with abnormally increased vascularity on power and color Doppler ultrasonography. On the right foot intratendinous ossification was more evident (fig 2).

Tc-99m methylene diphosphonate (Tc-99m MDP) whole body scintigraphy in the anterior posterior position demonstrated bilateral increased uptake corresponding to Achilles tendon area (fig 3a). The findings of scintigraphy were correlated with SPECT-CT (GE Infinia Hawkeye GE Medical Systems). Bilateral ossifications of the Achilles tendons were observed on axial and coronal-reconstructed CT and fused-CT section (fig 3b). The patient was managed conservatively.

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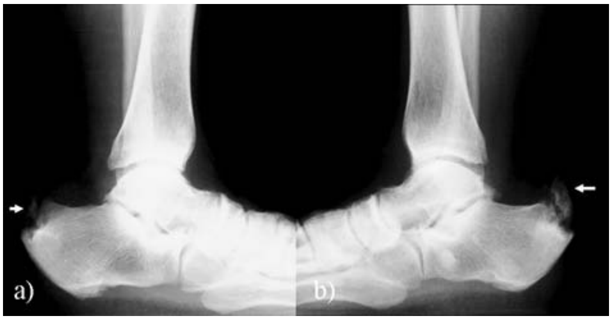

Fig 1. Lateral radiographs: a) a 1.8×0.7 cm sized ossification near the left Achilles tendon insertion; b) a 3.2×2.4 cm sized ossification in the right Achilles tendon insertion

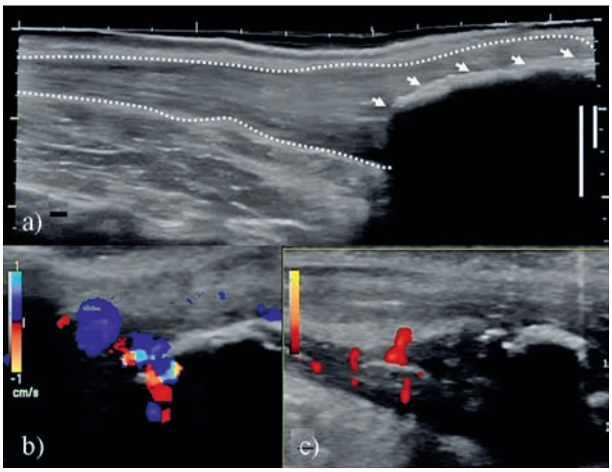

Fig 2. Ultrasonography of the right Achilles tendon, longitudinal scan: a) gray scale- area of intratendinous ossification (arrows) and the increased thickness of the tendon (dotted lines); b) Doppler and c) power Doppler demonstrates the increased vascularity within the intratendinous and peritendinous area.

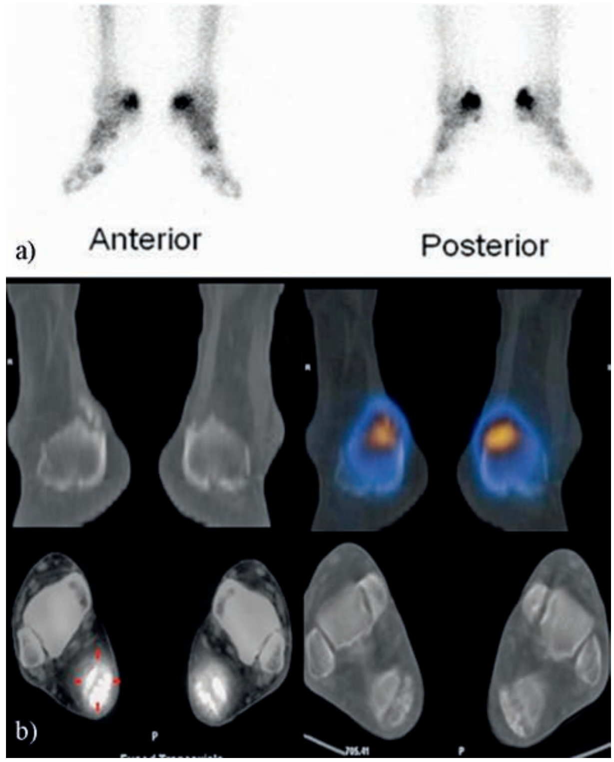

Fig 3. Bilateral ossification of the Achilles tendons is observed on the whole body scan (a) and axial, coronal-reconstructed CT and fused-CT section (b).

Discussions

Achilles tendon ossification was first described by Horing in 1908 [2] The true incidence of Achilles tendon ossification is unknown [3,4] but it is twice as common in males than in females with no age predilection [5].

The mechanism of Achilles tendon ossification has been debated. Ghormley, first to review this condition in 1938, observed that over 50% of the cases of Achilles tendon ossification were associated with either prior trauma or surgery to the tendon [6]. Some of the explanations for ossification were (a) osteogenesis from circulating osteoblasts, (b) bone growth from a torn or injured periosteum, or chronic infection, and (c) bone formation by fibroblasts or osteoblasts that have originated from fibroblasts [3].

Fisher reported that calcification and ossification are probably a consequence of degenerative changes in collagen, the etiology of which may be related to vascular insufficiency [7]. Uhthoff et al hypothesized that persistent lowering of the tissue oxygen tension causes the transformation of tendon into regions of fibrocartilage in which chondrocytes mediate the deposition of calcium at multiple foci, developing as a bony mass [8]. Uhthoff's assumption may explain the increased incidence of tendinous ossification among patients over 40 years of age.

Several other predisposing conditions have been described: diabetes, fluorosis, Wilson's disease, ochronosis, diffuse idiopathic skeletal hyperostosis, seronegative arthropathies, renal failure, gout and retinoid therapy (acitretin) [1,3-12].

Ossification of the Achilles tendon may occur within the body of the tendon or at its insertion into the calcaneus. Plain radiologic imaging findings are characteristic, with ossification readily identified. Morris et al classified Achilles tendon ossification into 3 types based upon the site of the ossification on radiographs: type 1 lesions are located at the tendinous insertion at the upper pole of the heel, type 2 lesions are localized 1–3 cm from the tendon insertion whereas type 3 lesions are localized up to 12 cm from the tendon insertion [13]. The lesion is further described according to the degree of ossification: (a) for partial ossification, and (b) for total ossification of the tendon. It may be developed by endochondral and intramembranous ossification. Our case was Morris type 2 bilaterally and the ossification was enchondral.

Ultrasonography is a non-invasive tool for visualizing the size and extent of intratendinous ossification as demonstrated in our case. The gray scale examination showed the fragmented intratendinous ossified modifications and color and power Doppler evidenced the presence of intratendinous flow. This finding should be regarded as a pathological finding (hyperemia) [14]. Doherty demonstrated that vascular pericytes possess the ability to differentiate into both chondrocytes and osteoblasts which can explain the ongoing process of ossification [15].

SPECT / CT imaging can contribute to the diagnosis by obtaining functional and anatomical detail. Tc-99m MDP whole body scan gives us the opportunity to localize and reveal all the calcifications in the body at one time. SPECT/CT combines the advantages of both techniques: the high spatial resolution of CT and the high sensitivity of SPECT. SPECT show morphological appearance of the lesion and CT may identify artifacts.

SPECT/CT contribute to the diagnosis by giving detailed information about a small lesion that was missed on radiographs or specify the location of a hot spot reflecting an abnormal reaction without detectable structural damage. Thus, SPECT/CT is used in our case for differential diagnosis from other metabolic conditions that may lead to Achilles ossifications [16].

In conclusion Achilles tendon ossification is a very rare condition, etiologically multifactorial. In the current case, we regarded repetitive microtrauma to the Achilles tendon as the cause of the ossification based on the bilateral occurrence.

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