Accessory navicular as a cause of medial foot pain: Evaluation with MRI

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Patient: 35 years, female

Clinical History:

Accessory navicular is an important cause of medial foot pain. Magnetic resonance imaging (MRI) is useful in evaluating the cause of foot pain. This article describes the MRI findings in a symptomatic case of type 2 accessory navicular bone.

Imaging Findings:

A 46 year old female presented with long standing history of left foot pain, localised to the medial aspect. It was constant but aggravated by physical activity. There was no history of preceding trauma. Clinical examination revealed tenderness over the medial aspect of the foot with mild soft tissue swelling. She did not have any other systemic findings. Laboratory investigations were within normal limits.

She underwent MRI of the left foot on a 3Tesla MR scanner using a dedicated single channel transmitter receiver quadrature extremity coil. Images were obtained in the axial, coronal and sagittal planes, using spin echo (SE) T1 and fat saturated proton density (PD) weighted sequences; using frequency selective chemical presaturation technique. Post contrast fat saturated SE T1 images were also obtained after intravenous administration of 10ml of gadodiamide [0.5mmol/ml].

The examination revealed a type 2 accessory navicular bone measuring 10x9mm, located immediately posterior to the navicular tuberosity. An ill defined synchondrosis was noted between it and the navicular [Figure1]. No marrow continuity was seen between the two bones. This accessory bone depicted an area of T1 hypointensity [Figure 1] and T2 hyperintensity [Figure 2] consistent with marrow oedema. Enhancement was noted in this area on administration of contrast [Figure 3 and Figure 4]. The overlying soft tissue also depicted oedema. The tendon sheath of tibialis posterior passing posterior to this bone had mild fluid within it with normal tendon morphology [Figure 5 and Figure 6]

Discussion:

The accessory navicular is a commonly occurring accessory ossicle of the foot, being present in 4-14% of the population [1, 2]. In most instances, it causes no symptoms [3]. There are three subtypes of accessory navicular [5]. Type 1 is a true sesamoid fully incorporated within the distal posterior tibialis tendon. Type 2 is described as a larger ossicle, triangular or heart shaped up to 12mm in size. It is considered as a secondary centre of ossification in the cartilaginous analge of navicular [5] with a cartilaginous or fibrocartilaginous synchondrosis between it and the main bone. It accounts for about 50% of all accessory navicular bones [6]. Type 3 is considered to be a prominent navicular tuberosity representing a completely fused type 2 accessory navicular [6].

Accessory navicular causing medial foot pain is almost always the type 2 [6], typically occurring in a female patient in the second decade [5].

The cause of pain in a symptomatic type 2 accessory navicular is thought to be repetitive tension and shearing
stress, across the synchondrosis as a result of the pull of the tibialis posterior tendon [7]. Histological studies of resected type 2 accessory navicular bone have shown reactive new bone formation and granulation tissue at the bone-cartilage interface of the synchondrosis [5, 7] and in some cases chronic osteonecrosis [4]. Associated inflammation of the overlying soft tissues has also been described [8].

MRI is of value in demonstrating both bone marrow and soft tissue oedema [8] which in a symptomatic patient represents the cause for pain. The marrow oedema represents either osteonecrosis or bone remodelling due to shear stress [4].

Plain radiographic evaluation of the cause for pain is limited by its inability to depict soft tissue or bone oedema. Bone scintigraphy has a high sensitivity but lacks specificity [3].

In conclusion, accessory navicular is a common asymptomatic normal variant. Recognition of bone marrow oedema pattern on MRI within it helps to identify it as the cause of pain in a symptomatic patient.

**Differential Diagnosis List:** Type 2 accessory navicular bone

**Final Diagnosis:** Type 2 accessory navicular bone

**References:**


Description: Axial T1W image shows the synchondrosis between the navicular and accessory navicular [arrow] and an area of subarticular hypointensity in the latter. Origin:
Description: Axial proton density fat suppressed image depicts marrow edema [arrow] in the subarticular regions of the synchondrosis with overlying soft tissue edema. Origin:
**Description:** Axial [Figure 3] and coronal [Figure 4] post contrast T1W images show increased enhancement within the areas of marrow edema [arrow] and overlying soft tissues [arrowhead]. **Origin:**
Description: Axial [Figure 3] and coronal [Figure 4] post contrast T1W images show increased enhancement within the areas of marrow edema[arrow] and overlying soft tissues[arrowhead]. Origin:
Description: Sagittal T1W image shows the synchondrosis and the tibialis posterior tendon [arrow] inserting partially at the accessory navicular. Origin:
Description: Axial proton density fat suppressed image at the level of talar dome shows fluid within the sheaths of tibialis posterior [arrow] and flexor digitorum longus [arrowhead] tendons with overlying soft tissue edema. Origin: