

Rare Case Report: Radiologic Findings of Stress Fracture and Avascular Necrosis of the Type 2 Accessory Navicular Bone

Bayramov R¹, Sultan M^{1*}, Aghamaliyeva A², Gasymova N³

¹Radiology Department of Azerbaijan Medical University, Baku, Azerbaijan

²Azerbaijan State Advanced Training Institute for Doctors named after A.Aliyev, Baku, Azerbaijan

*Corresponding Author

Sultan Malakhata, Radiology Department of Azerbaijan Medical University, Baku, Azerbaijan.

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Abstract

The accessory navicular bone (ANB) is one of several accessory ossicles of the foot and is considered as a normal anatomic and radiographic variant (1). It occurs due to failure of fusion of a secondary ossification centre within the navicular bone. Fewer than 1% of ANBs are symptomatic, and most of symptomatic ANBs are type II ANBs. Stress fracture of the type II ANB is a rare cause of symptomatic accessory navicular syndrome. We report a case of stress fracture and avascular necrosis of the type II ANB on radiographs and magnetic resonance images in a 23-year-old male.

Keywords: Avascular Necrosis, Stress Fracture, Accessory Navicular bone, MRI, X-Ray, Pain

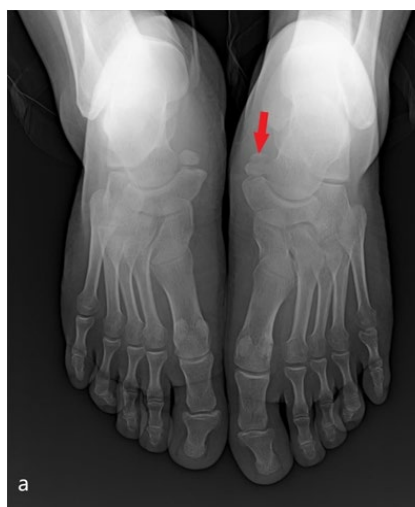
Abbreviations ANB: accessory navicular bone MRI- magnetic Resonance Imaging

1. Introduction

The ANB is the second most common ossicle of the foot, with an incidence ranging 4-21% (2). It is more common in females and it may be bilateral 50-90% of the cases (3). The tibialis posterior tendon often inserts with a broad attachment into the ossicle. Medial side foot pain is the most common presenting feature of the ANB. The pain is aggravated by physical activity. In our case we confirmed a rare cause of symptomatic type 2 ANB- a stress fracture and avascular necrosis of this ANB with characteristic

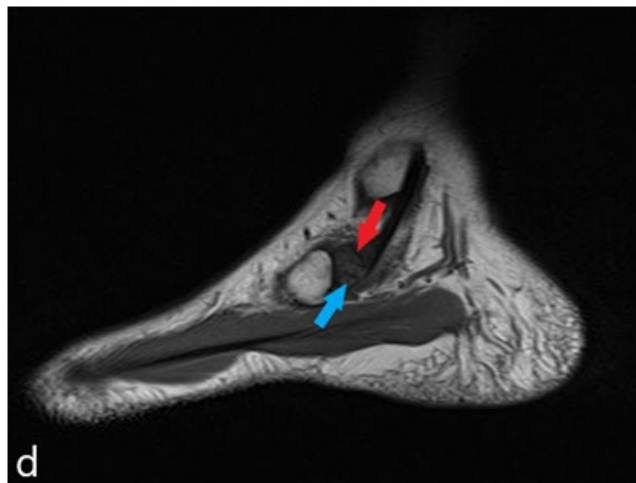
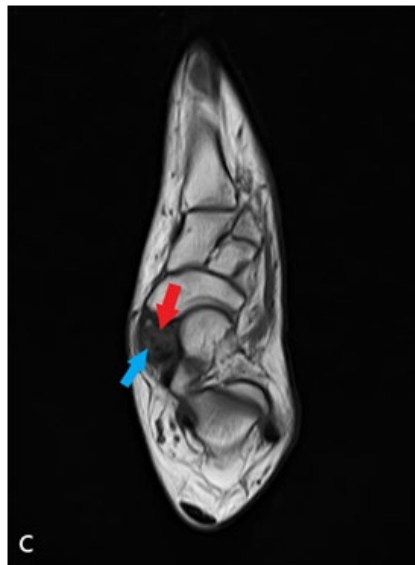
radiographic and magnetic resonance imaging (MRI) findings. Case presentation:

A 23-year-old male presented to our hospital with complaint of pain in the medial aspect of the foot for 9 months, which was increased with the physical activity. No significant injury was reported at the time. X-ray and MRI was performed. In our case there is stress fracture in the ANB and bone marrow edema due to repetitive microinjury.

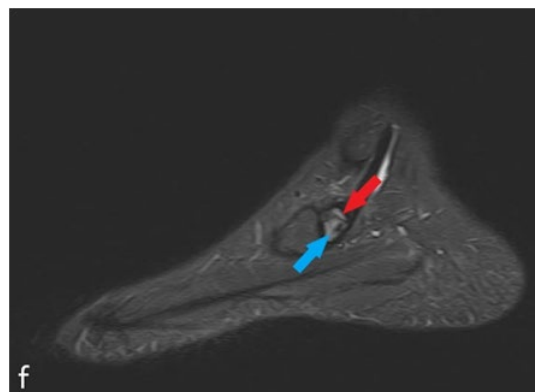
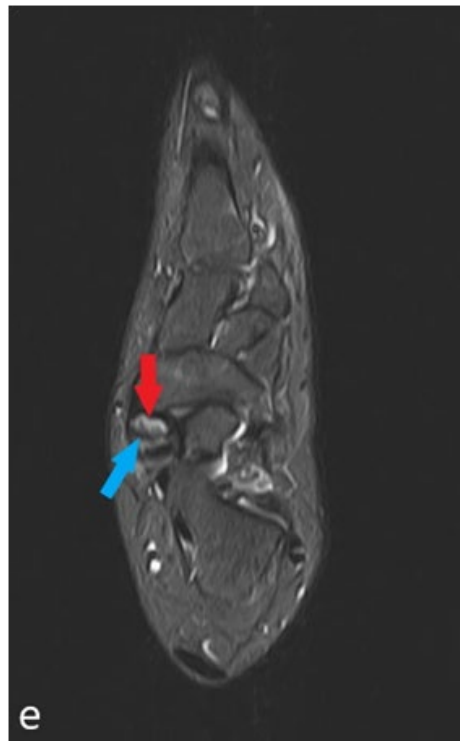




Bilateral AP Ankle Radiography (a) and AP Ankle Radiography (b) Shows that there is Stress Fracture (red arrow) in the Type II ANB.



Axial T1W (c) and Sagittal T1W (d) MRI Shows that Hypointense Stress fracture line (blue arrow) and Hypointense Avascular Necrosis in the Type II ANB (red arrow).



Axial STIR (e) and Sagittal STIR (f) Shows that Hypointense stress Fracture line (blue arrow) and Hyperintense Avascular Necrosis (red arrow)

2. Discussion

The foot and the ankle are sites of frequent variant anatomy, of which the most commonly seen relate to the accessory ossicles. The most common accessory ossicles in the foot and ankle are the os trigonum and accessory navicular bone. ANB is located adjacent to posteromedial tuberosity of navicular bone. ANBs are classified (Geist classification) into three types based on their morphology and location (4). Type I (os tibiale externum) is 2-3 mm sesamoid bone embedded distal portion of posterior tibial tendon. It accounts for 30 % of ANBs and there is no cartiliginous connection to the navicular tuberosity. This type is usually asymptomatic. Type II ANB (prehallux) is triangular or heart shaped and accounts for 50-60 % of ANBs. This type is connected to navicular tuberosity by either fibrocartiliginous or hyaline cartilage. Eventually osseous fusion to the navicular tuberosity may take place. Type III ANB is an prominent navicular tuberosity and is considered as fused variant of type II ANB.

Majority of the cases are asymptomatic, but in symptomatic patients type II is the most common and causes medial foot pain (5). Most common clinical symptoms are visible bony prominence on the medial aspect of the foot, erythema and swelling increased by physical activity. The cause of the pain was thought to be repetitive tension and shear stress across the synchondrosis as a result of the pull of posterior tibial tendon (6). Repetitive shearing force can cause osteonecrosis and stress fracture of this ANB. Stress fracture is a rare cause of symptomatic type 2 ANB cases.

Plain radiograph of the foot showed medial navicular eminence of ANB. The ANB appears as a smooth, well corticated density. In the symptomatic type II ANB there is reactive sclerosis which may represent edema or avascular necrosis. MRI is useful in demonstrating both bone marrow and soft tissue edema. The marrow edema represent either osteonecrosis or bone remodelling due to shear forces (7). Tendinosis or thickening of posterior tibial

tendon, or tear may also be seen.

Acute pain is usually treated with oral non-steroidal anti-inflammatory drugs and ice application. For refractory cases surgical management, involving excision of the bone and repair of posterior tibial tendon may be considered.

3. Conclusion

Most ANBs are detected incidentally on radiographic examinations. In a patient with localized pain in medial foot without trauma, ANB must be suspected. Presence of ANB should not be disregarded as an incidental radiological variant in a symptomatic patient.

Conflict of Interest: The authors state that there is no conflict of interest.

Acknowledgements: The consent form was filled out by the patient.

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