Case Report

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# Os Navicular Syndrome: A Symptomatic Accessory Ossicle of the Foot

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## ABSTRACT

Accessory navicular bone occurs due to failure of fusion of a secondary ossification center with the navicular. It is the second most common ossicle of the foot, with majority of them being identified incidentally on imaging studies. We report a case of 45-year-old female who presented with complaints of pain and localized redness over the medial aspect of the right foot which was aggravated on walking. This brief review aims to describe the pathophysiology, radiographic findings and management of Os naviculare syndrome. We also wish to highlight to the physicians that it must be suspected in patients with localized pain over the medial aspect of the midfoot without obvious trauma. The presence of accessory navicular should not be disregarded as an incidental radiological variant in a symptomatic patient.

## Introduction

Os Navicular bone is an autosomal dominant congenital anomaly due to the failed fusion of a secondary ossification center with the navicular [1]. It is the second most common ossicle of the foot, with an incidence ranging from 4 - 21% [2]. It is more common in females and it may be bilateral in 50 - 90% of the cases [3]. It was first described by Bauhin in 1605, also known as Os tibiale externum, Os navicularum, accessory navicular or Naviculare secandarium. It is often discovered incidentally on imaging studies.

With the exception of tibialis posterior tendon dysfunction in elderly patients, midfoot pain in young patients is not a common presentation in the emergency department. The current study presents a case of a young female who complained of pain and localized redness over the medial aspect of her right foot. This case and the brief literature review aim to describe the pathophysiology, radiographic findings and management of Os Naviculare syndrome, while simultaneously highlighting the importance of considering its diagnosis in patients presenting with non-traumatic midfoot pain.

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## Case presentation

A 45-year-old female, with no past medical history, presented to the Emergency Department (ED) with complaint of pain over the medial aspect of the right foot for 2 days, which was aggravated on walking. She noted some redness over the site since the night before and hence came for evaluation. She denied fever, trauma or any other complaints. She had similar complaints about 2 months ago, which resolved spontaneously. Her work involved excessive walking, often when she wore heels. But she denied any inversion or eversion injury of her ankle or foot. Her vital signs were stable and examination revealed localized erythema and tenderness over the medial aspect of the right mid-foot (Fig. 1A). Range of movement of the right ankle joint was normal. X-ray of the right foot revealed an accessory navicular bone (Fig. 1B). She was diagnosed to have Os naviculare syndrome and given an oral dose of diclofenac 50mg tablet with adequate pain relief. She was then discharged with non-steroidal anti-inflammatory medications, ice application and an outpatient follow-up with orthopedic surgeon. The patient had an uneventful recovery.

## Discussion

The most common accessory ossicles in the ankle and foot are the Os trigonum and the accessory navicular, resulting from unfused ossification centers. Os navicular bone is located adjacent to the postero-medial tuberosity of the navicular bone, and the tibialis posterior tendon may insert with a broad attachment into the ossicle. Geist classification describes three types of accessory navicular based on its morphology [4].

Type I is a sesamoid bone located within the insertion of the tibialis posterior tendon. With an incidence of about 30%, it is classically known Os tibiale externum. It is oval or round in shape, measures about 2-3mm in size and is usually asymptomatic. Type II is the most common, with an incidence of about 50-60%. It is called Os naviculare and measures about 10-12mm in size. Os naviculare occurs as a result of lack of fusion of the secondary ossification center presented adjacent to the navicular bone. It is triangular or hemispherical in shape and is bilateral in 50 to 90% of the cases [4]. It is located at the insertion site of the posterior

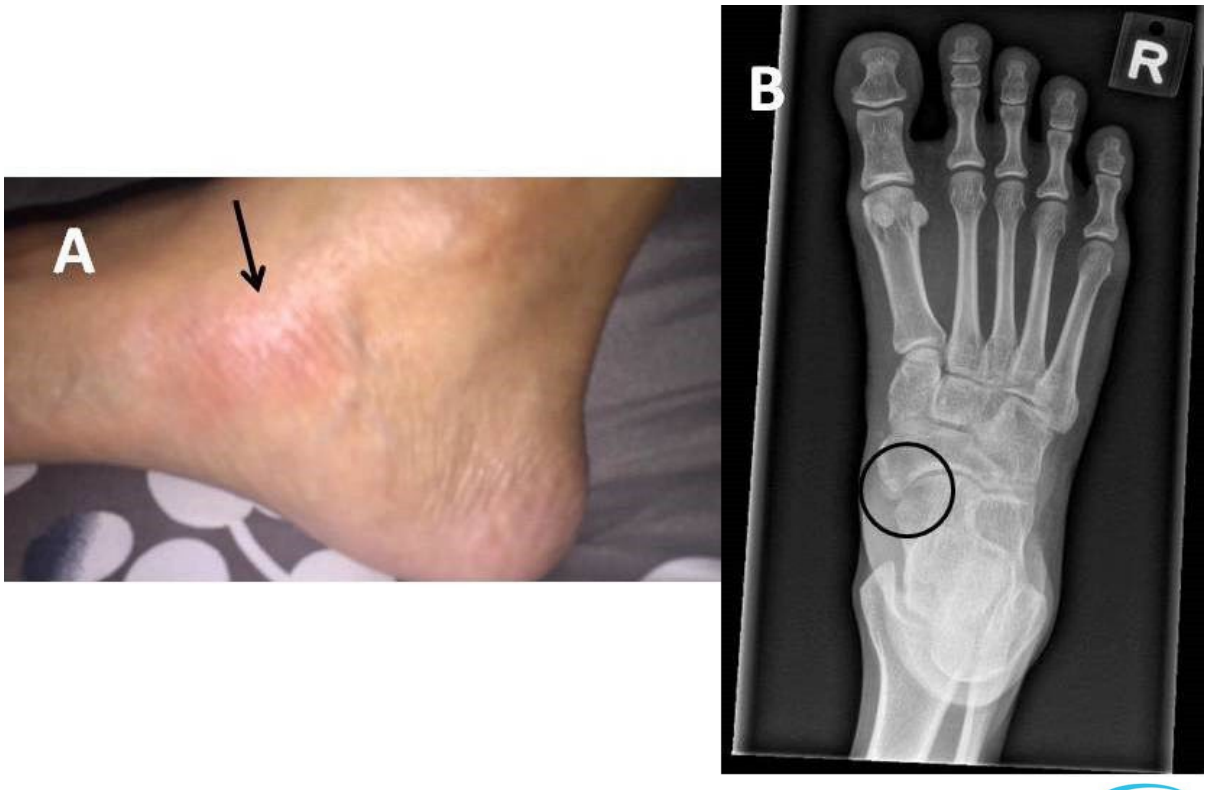


**Fig. 1.** (A) Image of right foot showing localized erythema and swelling over the medial aspect of the right mid-foot (arrow) and (B) X-ray of right foot showing accessory navicular bone (circle)

tibialis tendon, and is connected to the tuberosity of navicular bone by a 1-2mm synchondrosis. Type III consists of a prominent tuberosity called cornuate navicular. It is the least common type, with an incidence of around 20% and occurs due to fusion of the secondary ossification center with the navicular bone.

Majority of the cases with an accessory navicular bone are asymptomatic. But in patients who are symptomatic, Type II is most common and results in pain over the medial aspect of the midfoot [5]. Many patients experience symptoms of Os naviculare syndrome in adolescence, but some manifest in adulthood, especially middle-aged females. The common symptoms are a visible bony prominence on the medial aspect of the midfoot, just above the medial longitudinal arch. Erythema and swelling of the bony prominence along with localized pain is noted during or after a period of activity like walking or running.

During ankle dorsiflexion, the distal portion of the tibialis posterior tendon undergoes repeated traction between this accessory ossicle and the navicular resulting in tendinosis or eventually a tear of the tendon [2]. When it is large in size, its protuberance over the medial foot rubs against the footwear causing pain. The pain is exacerbated during walking or physical exercise, and even when the patient wears inappropriate footwear or heels. Painful Os naviculare occurs due to continuous movements, trauma or degenerative changes at the synchondrosis. Histopathology usually reveals inflammatory changes secondary to stress injuries. Failure to recognize this condition will lead to delayed diagnosis or misdiagnosis, which leads to persistent pain for the patient. Repetitive shearing forces can cause the accessory navicular to suffer from osteonecrosis [4]. When tibialis posterior tendon inserts on the accessory navicular bone, it can lead to loss of maintenance of the medial longitudinal arch of the foot, eventually leading to pes planus deformity, although this causal relationship is not confirmed. Clinically, patients will present with chronic pain and reduced mobility of the tibialis posterior and Achilles tendons, flat foot deformity or hindfoot valgus deformity.

The most common differential diagnosis is an avulsion fracture of the tuberosity, due to acute eversion injury of the foot. A history of trauma and an irregular separation line of the ossicle from the tubercle will suggest a fracture [2, 6]. Other differential diagnosis for symptomatic accessory navicular syndrome includes tibialis posterior tendon rupture, arthritis, stress fracture of tarsal bones, degenerative changes at the synchondrosis, local soft tissue inflammation around the Os navicular bone and rarely bone tumor or Kohler's disease.

Plain radiograph of the foot, especially the lateral-oblique view, show a medial navicular eminence of Os navicular ossicle, and occasionally, surrounding soft tissue swelling. The ossicle appears as a smooth, well corticated density, and is often detected bilaterally. Ultrasound can be used to demonstrate the ossicle as well as fluid around the synchondrosis and insertion site of posterior tibialis tendon [7]. Tc-99m bone scan will show a 'hot spot' due to increased radioisotope uptake in symptomatic patients. Magnetic Resonance Imaging (MRI) is the imaging modality of choice for accurate diagnosis of Os naviculare syndrome. It is indicated in symptomatic patients with Type II or III accessory navicular bone who present with medial foot pain and/or flat foot. Accessory navicular bone marrow edema as well as edema of the articulating navicular tuberosity and surrounding soft tissues. Tendinosis or thickening of the posterior tibial tendon, as well as signs of tenosynovitis or a tear may also be seen [5, 8, 9, 10].

Effectiveness of non-operative treatment varies based on factors such as age and baseline activity level. Acute pain is usually treated with oral non-steroidal anti-inflammatory drugs and ice application. Shoe gear modification and padding for 2-3 weeks alleviate the pressure and rest the affected area, thus helping in reducing inflammation. Furthermore, activity modification to reduce or stop strenuous activities is recommended. Corticosteroid injection may be used to reduce pain and inflammation. Physical therapy with exercises helps to strengthen the surrounding muscles can decrease pressure at the inflammation site. Our patient's symptoms resolved with conservative treatment and adoption of shoe gear modification. She was asymptomatic during the outpatient orthopedic follow-up.

Even after successful conservative treatment, symptoms can reappear in some patients. Regular exercise and use of appropriate footwear, comfortable shoes which alleviate the pressure on the medial side of the foot, can also help prevent the recurrence of symptoms. For refractory cases, surgical management, involving excision of the accessory bone and repairing the posterior tibial tendon, can be considered.

## Conclusion

Most accessory ossicles are detected incidentally on radiographs. In a patient presenting with localized pain over the medial aspect of the midfoot without

obvious trauma, Os naviculare syndrome must be suspected, and clinical correlation with appropriate history and imaging will play an important role. Presence of accessory navicular should not be disregarded as an incidental radiological variant in a symptomatic patient. It is important for the family physicians as well as the emergency physicians to be aware of this condition to avoid misdiagnosis.

## Ethical Considerations

### Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

### Compliance with ethical guidelines

There were no ethical considerations to be considered in this research.

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SP conceived the idea for the manuscript and also contributed to the writing and reviewing of the manuscript. JET contributed to the writing of the manuscript.

### Authors' contributions

All authors equally contributed in preparing this article.

### Conflict of interest

The authors declare that there is no conflict of interest

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