Symptomatic and Asymptomatic Accessory Navicular Bones: Findings of Tc-99m MDP Bone Scintigraphy


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AIM: The accuracy of bone scintigraphy in diagnosing symptomatic accessory navicular bones has not been well studied. We conducted a retrospective study to explore the results and use of scintigraphy in symptomatic and asymptomatic accessory navicular bones.

MATERIALS AND METHODS: Thirteen patients with a total of 13 symptomatic and 10 asymptomatic accessory navicular bones were included in the study. We used a scoring system to grade the scintigraphic abnormalities. The patients' symptoms and scintigraphic findings were recorded.

RESULTS: Though focally increased radiopharmaceutical uptake was observed in all symptomatic accessory navicular bones, half of the asymptomatic accessory navicular bones had the same manifestations. The scoring system was of no value in differentiating symptomatic from asymptomatic accessory navicular bones.

CONCLUSION: Bone scintigraphy is a sensitive but not a specific tool for diagnosing a symptomatic accessory navicular.


Key words: foot abnormalities, skeletal scintigram, normal variant.

The accessory navicular is one of the commonly occurring accessory ossicles of the foot. This is usually an incidental finding. Nevertheless, in a small portion of patients, it causes medial foot pain [1]. To determine whether the accessory navicular is the cause of a patient's symptoms is important. Plain radiography can reveal the accessory navicular and classify it into three types [2]. Type 1 is a 2–3 mm sesamoid bone. Type 2 comprises about 70% of the cases; it is triangular or heart-shaped and is joined to the navicular by a synchondrosis [3]. Type 3 represents fusion of the accessory navicular to the main tarsal navicular, resulting in a prominent 'cornuate navicular'. However, radiographs are unable to determine whether the ossicles are the source of the symptoms. Bone scintigraphy has been reported to be highly sensitive in showing increased radiopharmaceutical uptake in the symptomatic accessory navicular [1,4–6]. However, the incidence of increased radiopharmaceutical uptake in an asymptomatic accessory navicular has not been well studied. The purpose of this study was to explore the bone scintigraphy findings in symptomatic and asymptomatic accessory navicular bones.

MATERIALS AND METHODS

Thirteen consecutive patients, seven women and six men aged 11–32 years (mean 19.1 ± 1.7 years), who underwent bone scintigraphy and had a final diagnosis of a symptomatic accessory navicular were enrolled in the study. The final diagnoses were based on imaging studies, surgery and clinical follow-up. All patients had complained of chronic medial foot pain and were physically active. Six of the patients underwent surgery. The remaining seven patients improved with conservative treatment.

99mTc-methylene diphosphonate (MDP) was injected intravenously at least 2 h before imaging. The dose was 5.7 MBq/kg body weight. We used a camera (Elscint Apex 209MA, Haifa, Israel or Siemens Diacam, Hoffman Estates, U.S.A.) fitted with a low-energy high-resolution collimator. Each image was acquired on a 256 × 256 matrix for 5 min. Dorsal, plantar, medial and lateral views of both feet were obtained.

The scintigrams were interpreted independently by two observers who were blind to the clinical symptoms. We used a scoring system to grade the abnormal 99mTc-MDP uptake in the navicular: 0 = no increase in 99mTc-MDP uptake (normal); 1 = increased 99mTc-MDP uptake with activity greater than the ipsilateral medial cuneiform; and 2 = marked increase in 99mTc-MDP uptake (Fig. 1). The scores of regions of scintigraphic abnormalities were compared with the clinical symptoms.

In addition to skeletal scintigraphy, all patients underwent
type 2 accessory navicular by radiography does not warrant the assumption that this is the cause of foot pain; other pain-causing entities, including tarsal coalitions, plantar fasciitis, tendinitis, stress fractures, high heel cords, osteoid osteomas and other tumours must first be ruled out [10].

Bone scintigraphy has been used to identify the accessory navicular as the cause of painful feet [1,4–6]. Romanowski reported 10 cases with a type 2 accessory navicular and found locally increased radiopharmaceutical uptake in all the symptomatic sides while no abnormality was found in the contralateral feet. They did not perform radiographs of the asymptomatic sides. Considering the high prevalence of bilateral accessory navicular bones (50–89%) [11,12], they assumed that there might be asymptomatic accessory navicular bones that had no increased radiopharmaceutical uptake [4]. In our 13 patients with a symptomatic accessory navicular, radiographs of both feet were obtained and 10 asymptomatic accessory navicular bones were found. We observed that all the symptomatic feet revealed focally high radiopharmaceutical uptake in the accessory navicular bones, while half of the asymptomatic feet showed similar appearances.

Pain in patients with a type 2 accessory navicular is thought to be the result of trauma to the synchondrosis. Previous histology studies have shown new bone formation and granulation tissue at the bone–cartilage interface of the synchondrosis [2,13,14], suggesting a chronic stress reaction [1,4]. It has been well established that bone scintigraphy is very sensitive in showing increased radiopharmaceutical uptake in trauma- and stress-related abnormalities [15]. This suggests that scintigraphy should be able to detect any asymptomatic accessory navicular, but research on false-negative results is needed.

Unexpected increased radiopharmaceutical uptake in the foot is not an uncommon finding. O’Duffy et al. found regions of increased radiopharmaceutical uptake in 24 of their 30 subjects who had no inflammatory arthritis, foot pain, or history of foot trauma or surgery; the increased uptake occurred most commonly in the first metatarsophalangeal joint and the mid-foot [16]. Chisin et al. assessed the great toe sesamoids with bone scintigraphy. In asymptomatic subjects, they observed increased sesamoid radioactivity in 29% of their subjects engaged in demanding physical training, and in 26% of their sedentary population. They concluded that this increased uptake may represent normal physiology and not a physiological or pathological response to excessive stress [17]. We did not perform histological studies on the asymptomatic accessory navicular and could not determine whether there were changes in any of them. However, the presence of increased radiopharmaceutical uptake in asymptomatic cases may not be a sign of risk, as none of these cases became symptomatic during follow-up.

In conclusion, although a negative skeletal scintigram can exclude the presence of a symptomatic accessory navicular, because of the lack of specificity, one should be cautious about interpreting positive scintigraphic findings.

REFERENCES


