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Case report

Fracture of the os trigonum: A report of two cases and review of the literature

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ABSTRACT

We report two cases of acute fractures of the os trigonum. The os trigonum fracture related to the first case was sustained following a hyper-plantar flexion injury during a game of soccer. The second case involved a patient who fell from height and also sustained open fractures of the left distal tibia and lateral malleolus as well as the right calcaneus. In both cases, a preliminary diagnosis of a posterior talar process fracture was made from the initial radiographs of the ankle. The correct diagnosis of an os trigonum fracture rather than a fracture of the posterior talar process was only made following further assessment with CT imaging. Given that the course of treatment is largely determined by imaging findings, CT for further imaging evaluation should be performed in cases of suspected acute bony injuries of the posterior ankle, particularly when the limitations of using radiographs for the assessment of such injuries are expected to be encountered.

1. Introduction

The os trigonum is one of the largest and most common accessory ossicles in the ankle and foot region, with an estimated prevalence of 1–25% of patients [1–3]. It begins to appear between the ages of 8 and 11 years in boys and 8–10 years in girls as a secondary center of ossification. When the ossification center remains unfused in a skeletally mature individual, it is referred to as the os trigonum, but it is still connected to the lateral tubercle of the posterior talar process by a fibrocartilaginous synchondrosis. Fusion results in the formation of a prominent lateral tubercle of the posterior talar process, also termed as a 'Stieda's process'.

In persons with an os trigonum, it is not uncommon for individuals who participate in intense physical activities that result in extreme plantar flexion of the ankle, such as in ballet, soccer, football and downhill running to develop persistent posterior ankle pain [4–7]. Pain may be secondary to disruption of the aforementioned fibrocartilaginous synchondrosis between the os trigonum and the lateral tubercle of the posterior talar process. The presence of an os trigonum may also predispose to posterior ankle impingement in these individuals, with secondary posterior tibiotalar synovitis and flexor hallucis longus tenosynovitis [4,6].

Reports of os trigonum fractures are uncommon in the published literature [8–12]. This type of injury to the os trigonum usually follows an acute forced hyper-plantar flexion injury to the ankle. We report two cases of acute fractures of the os trigonum, and describe the increased sensitivity of computed tomography (CT) over radiographs in establishing the imaging diagnosis of this uncommon bony injury. Correlation between the underlying mechanism of injury and associated findings on CT is also discussed.

2. Case 1

A 43-year-old male presented to our emergency department with acute left posterior ankle pain following a hyper-plantar flexion injury during a game of soccer. His ankle was swollen and he was unable to bear weight on the affected limb. There was marked tenderness on palpation over the posterior aspect of the ankle, posterior to the lateral malleolus. The attending emergency physician made a diagnosis of a posterior talar process fracture from a lateral radiograph of the left ankle (Fig. 1(A)), and the patient's left ankle was subsequently immobilized with a backslab. A CT scan of the left ankle performed 11 days following the initial injury showed an intact posterior talar process, as well as an acute fracture of an os trigonum with mild distraction of the fracture

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Fig. 1. (A–D) Left ankle. (A) Lateral radiograph demonstrates a linear lucency at the posterior talar process (white arrow) which was diagnosed as an acute fracture. (B) Axial and (C) sagittal CT scan bone window images demonstrate an acute fracture of a slightly prominent, corticated os trigonum (white arrows). The posterior talar process (white asterisks) is intact. (D) Sagittal CT scan soft tissue window image also shows thickening of the extensor hallucis longus tendon with surrounding soft tissue stranding (dashed white arrow) about the level of the tibiotalar joint, which suggested the presence of co-existing acute tendon injury.

fragments (Fig. 1(B) and (C)). Thickening of the extensor hallucis longus (EHL) tendon with surrounding soft tissue stranding about the level of the tibiotalar joint was also noted on CT, which suggested the presence of an acute strain rather than a tear, given that pain and tenderness of the extensor hallucis longus tendon without weakness of great toe extension were found clinically (Fig. 1(D)). The patient was treated non-operatively with non-weight bearing of the affected limb for 6 weeks to allow for healing. He was also counselled on the potential need for excision of the os trigonum fragments should symptoms arise from non-union and posterior impingement.

3. Case 2

A 31-year-old male was brought to our emergency department after falling from a height of 7th floors. On physical examination and imaging, he was found to have multiple injuries including open fractures of the left distal tibia and lateral malleolus as well as the right calcaneus. His left ankle radiographs showed comminuted and displaced left distal tibia and fibula fractures, as well as a possible posterior talar process fracture (Fig. 2(A)). Radiographs of his right ankle showed a comminuted intra-articular fracture of the right calcaneus (not shown). The patient underwent urgent lavage and debridement of the soft tissue injuries related to his lower limb open fractures. External fixation for his open left distal tibia pilon open fracture was also performed. A CT scan of the left ankle performed the following day showed an acute fracture of an os trigonum, along with an intact posterior talar process (Fig. 2(B) and (C)). A severely comminuted and displaced pilon fracture of the distal tibia with multiple intra-articular loose bodies were also noted, as well as a displaced distal fibular fracture and disruption of the ankle mortise (Fig. 2(D)). The comminuted pilon fracture of the left distal tibia was eventually treated surgically using a ring fixator device, with the fractured os trigonum left in situ.

4. Discussion

With regards to both of the cases reported in our study, a preliminary diagnosis of a posterior talar process fracture was

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