

Case Report

IMAGING OF TARSAL COALITION AS AN INCIDENTAL FINDING IN A POST-TRAUMATIC CASE

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ABSTRACT

The tarsal coalition has a very low incidence with the predilection for males. It is the union of two or more bones in the mid or hindfoot and the most common types being talocalcaneal and calcaneonavicular. The bridging tissue can be either bony, cartilaginous or fibrous. Radiographic imaging is an important key in the diagnosis of this condition. Herewith we report a case of a 59- year old lady who presented with a history of trauma to her right leg and radiographic imaging revealed an incidental finding of talocalcaneal coalition.

Keywords: Tarsal Coalition, Talocalcaneal Coalition, Talar Beak Sign, CT, MRI

INTRODUCTION

Tarsal coalition refers to the union of two or more bones in the mid or hindfoot with a slight predilection for males. The incidence in the general population is less than 1% (Major Steven *et al.*, 1996). The most frequently encountered types include talocalcaneal and calcaneonavicular. A coalition of calcaneocuboid and cubonavicular is uncommon.

The bridging tissue can be either bone (synostosis), cartilaginous (synchondrosis) or fibrous (syndesmosis). The etiology is due to the absence of segmentation and differentiation of the primitive mesenchyme.

It can also occur secondary to rheumatoid arthritis, trauma etc. Though developmental, the onset is usually during the adolescent period and mostly bilateral. The presenting symptoms are usually chronic pain that increases with activity and peroneal tendon spasm causing pes planus, a commonly associated feature.

Radiographic imaging with X-ray, CT and MRI is the modality of choice for arriving at a precise diagnosis. Radiograph if not accurate can be helpful in showing indirect signs of a coalition like a talar beak sign, C-sign and anteater's nose sign. CT is useful to depict the bony fusion and MRI is helpful to detect cartilaginous or fibrous fusion.

Hereby in this case report, we will discuss an incidental case of a tarsal coalition of a female who presented with trauma and the usefulness of imaging in discriminating bony and fibrous coalition.

CASES

A 59- year-old female presented with a history of injury to right leg due to an accidental fall. On examination, there was swelling and restricted motion. Ankle radiograph lateral view was taken to look for any fracture and it showed an extra-articular oblique fracture in the posterior aspect of the distal tibia, mildly flattened dome of the talus, talar beaking on the anterosuperior aspect and retrocalcaneal spur (Figure 1).

CT and MRI were done to further evaluate for tarsal coalition due to the presence of talar beaking. Reconstructed CT images showed severe reduction in subtalar joint space, subchondral sclerosis, articular surface irregularity and degenerative osteophytes with bony coalition of talocalcaneal joint Figure 2 (a, b) MRI was done to find the presence of any other type of coalition and it revealed bony coalition of anterior process of calcaneus and talus Figure 3 (a, b) comminuted fracture of distal tibia, subtalar joint space narrowing, and talar beak sign. Calcaneonavicular joint space was reduced with altered subchondral marrow changes suggesting fibrous coalition Figure 4 (a, b).

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Figure 1: X-Ray Ankle Lateral View Shows 1(a) Fracture of the Distal Tibia, Mildly Flattened Dome of the Talus, Talar Beak Sign and Retrocalcaneal Spur

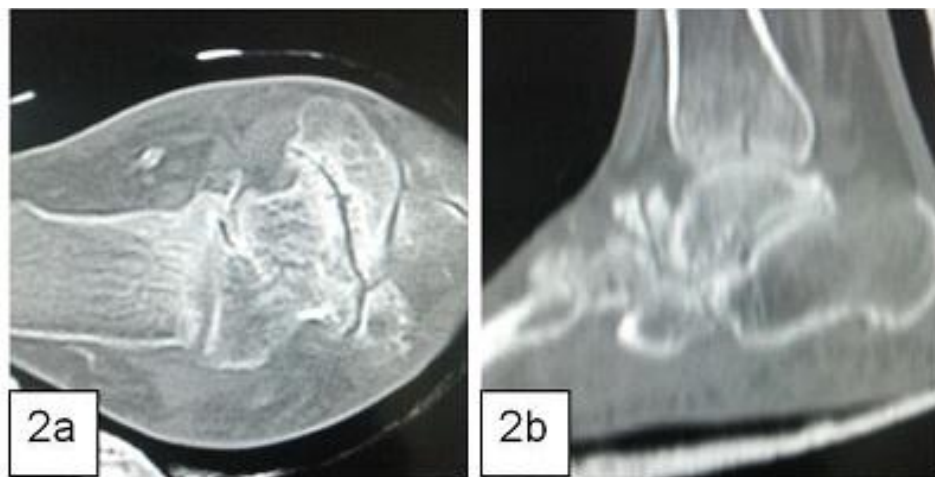


Figure 2: Axial (a) and Sagittal (b) Reconstructed CT Images Show Severe Reduction in Subtalar Joint Space, Subchondral Sclerosis, Articular Surface Irregularity and Degenerative Osteophytes with a Bony Coalition of Talocalcaneal Joint



Figure 3: Sagittal STIR Sequences (a, b) Show Bony Coalition of Anterior Process of Calcaneum and Talus

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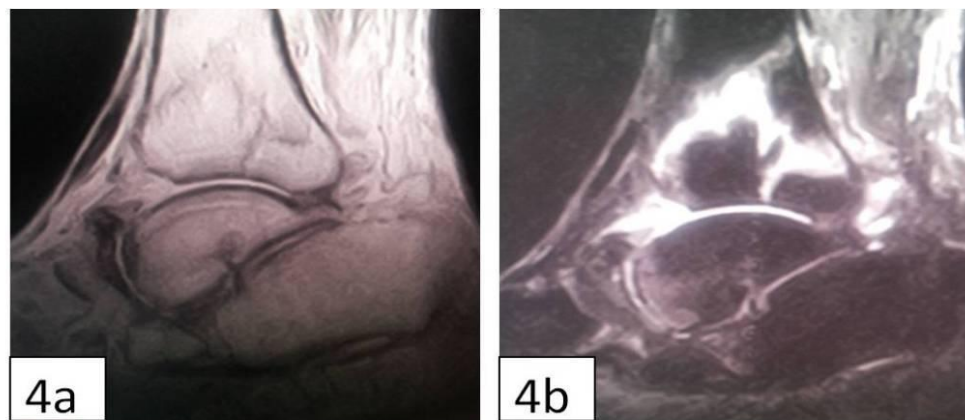


Figure 4: Sagittal T1 Weighted (a) and STIR Sequences (b) Show Clearly the Comminuted Fracture of the Distal Tibia, Subtalar Joint Space Narrowing, and Talar Beak Sign. Calcaneonavicular Joint Space is Reduced with Subchondral Marrow Changes Suggesting Features of Fibrous Coalition

DISCUSSION

The radiographic views taken for tarsal coalition include anteroposterior, 45° internal oblique, and lateral. Talocalcaneal joint also called as the subtalar joint consists of three facets - anterior, middle and posterior facets. Talocalcaneal coalition usually affects middle facet at the level of sustentacular tali (Umul *et al.*, 2015). The standard radiographic views do not aid in the diagnosis of this subtype of coalition due to the complexity of the joint anatomy. Talar beak sign that can be seen on the radiograph is an indicator of talocalcaneal coalition. The sensitivity and specificity in detecting the talar beak sign in the talocalcaneal coalition are 48% and 91%, respectively, thus, making talar beak a useful sign if present, but the absence of the sign cannot be used as a helpful distinguisher (Lawrence *et al.*, 2014). As in our case, this sign that was seen on lateral radiograph lead to further evaluation of the case with cross-sectional imaging.

On radiograph and CT few indirect signs of the talocalcaneal coalition include talar beak sign and C – sign. Talocalcaneal coalitions are well seen on coronal CT scans (Newman *et al.*, 2000). A talar beak arises due to restricted subtalar joint movement, that leads to overriding of the navicular on the talus. At the insertion of the talonavicular ligament, periosteal elevation is seen with osseous repair resulting in the formation of the talar beak. Though, talar beak is not present in all cases of talocalcaneal coalition. The C sign is formed between the cortex of the talus on the medial aspect and the cortex of the sustentacular tali inferiorly and is seen as a continuous arc on lateral radiographs (Crim *et al.*, 2004). This sign can be seen in both osseous and non-osseous coalitions though it is not found in all cases of talocalcaneal coalition.

To diagnose calcaneonavicular coalition a 45° internal oblique radiograph is taken. Ant eater's nose sign is an indirect sign where there is a tubular elongation anteriorly on the superior surface of the calcaneus. Hypoplasia of talar head can be seen and it is a rare possibility.

CT findings differ for each type of coalition. Osseous coalitions are mostly straightforward and will demonstrate an abnormal osseous continuance of the two bones. Non-osseous coalitions are generally very subtle and are evident as abnormal narrowing of the joint space and with minimal marginal reactive osseous changes (Crim *et al.*, 2004). The findings may simulate osteoarthritis changes in the tarsal joint in few instances apart from which the foot appears normal and non-arthritic.

In our case talar beak sign seen on radiograph raised the suspicion of underlying coalition demanding CT, which showed a reduction in subtalar joint space, subchondral sclerosis, articular surface irregularity and bony coalition. Hence, MRI was done to rule out a fibrous or cartilaginous coalition.

MR imaging has a role in differentiating the type of bridging whether osseous, cartilaginous, or fibrous. In osseous coalitions, there is continuity of bone marrow signal across the bone as seen in our case. It is visualized as high signal intensity on T1-weighted sequence and low signal intensity on T2-weighted fat-suppressed images. In non-osseous coalitions of cartilaginous and fibrous types, there is a reduction of

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joint space, and irregularity of the surface of the involved joint. Usually, bone marrow edema can be seen in the zone of a coalition. Also, cartilaginous coalitions mostly show intermediate signal on T1 weighted images and intermediate to hyperintense signal on T2 weighted images. In fibrous coalitions, MRI shows low signal intensity on all pulse sequences. In our case, there was decreased subchondral marrow signal intensity suggesting fibrous coalition. The above- mentioned findings are not true to all cartilaginous and fibrous coalition and in such situations, it can be stated as a non-osseous coalition.

The cuboid-navicular coalition remains an extremely rare form of a tarsal coalition (Awan *et al.*, 2015). It is usually asymptomatic. On radiography usually, the only indication for a cuboid navicular coalition is as an abnormal articulation of the posterior medial cuboid and plantar lateral navicular with overriding of the cuboid over the navicular bone.

Conclusion

In summary, we present an incidental case of a talocalcaneal coalition that presented with a history of trauma. The coalition gave rise to a restricted range of movements which resulted in fracture even though the injury was only trivial. Imaging revealed the diagnosis of the underlying cause for injury as tarsal coalition due to the presence of classic imaging finding of talar beak sign on the radiograph. Therefore, though the initial inciting event was trauma the cause was coalition. The aim of this study is to emphasize on the various radiological signs that help us give a clue to the diagnosis of tarsal coalition and how CT and MRI help in differentiating the types of coalition and therefore, help us give a confident diagnosis.

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