REVIEW ARTICLE

Tarsal coalitions

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Introduction

Tarsal coalitions are rare but not uncommon. It is an abnormal, congenital, connection of two or more tarsals in the foot. Total tarsal coalitions are extremely rare (Figure 1). Tarsal coalition may be present at birth, but may not show signs until early adolescence and late in life. It may result in a severe rigid flat foot. It is inherited as autosomal dominance with variable penetrance. The incidence may vary from 1-2%. However, the exact incidence is not known in Indian population.

Figure 1: Complete tarsal coalition with anomalous metatarsals.

Investigations and imaging findings

Two most common coalitions include calcaneo talar and calcaneo navicular, although other coalitions have been described. In 50% of the patients, these are bilateral. The bridge between the tarsal bones may be fibrous, cartilaginous or osseous. The investigations include conventional radiographs in A.P., oblique and lateral radiographs preferably weight bearing. To demonstrate complete osseous bridge computed tomography (CT) may be necessary. Magnetic resonance imaging (MRI) would certainly demonstrate all types of bridges.

Calcaneonavicular coalitions amount to 45%. It involves the anterior process of calcaneum and is often named as “anteater nose sign”. This is better seen on conventional oblique views (Figures 2a, b). The coalition may be a complete bridge or segmented with a fibrous connection (Figures 2c, d). CT shows the complete osseous connection while MRI may show the cartilaginous portion (Figures 2e, f).

In chronic calcaneo-navicular coalitions secondary changes in the talonavicular joint occur and show narrowing of the space with enthesopathy (Figure 2f). MRI may show edema of the adjacent bones (Figure 2g).

Talocalcaneal coalitions amount to another 45%. Involvement of the middle facet is common

Figures 2a, b: a) Conventional view, b) Anteater nose (internet).

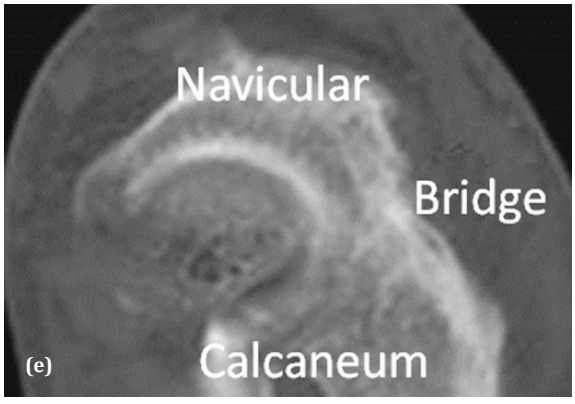
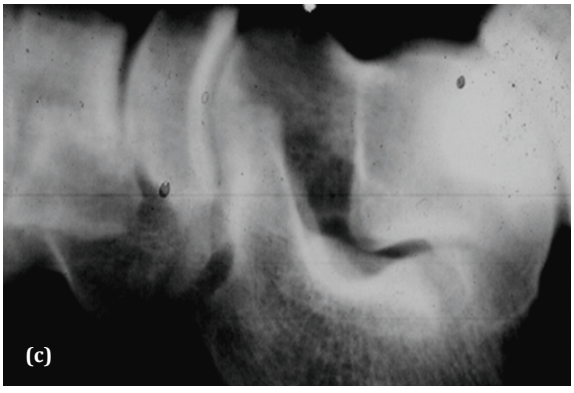


Figure 2e: CT showing the bridge between calcaneum and navicular bones.

Figure 2f: Calcaneonavicular coalition with degenerative changes at the talonavicular joint.



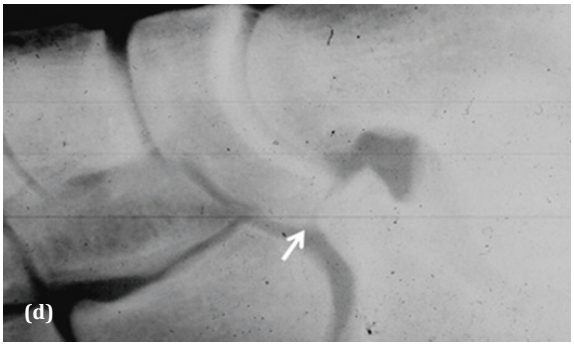
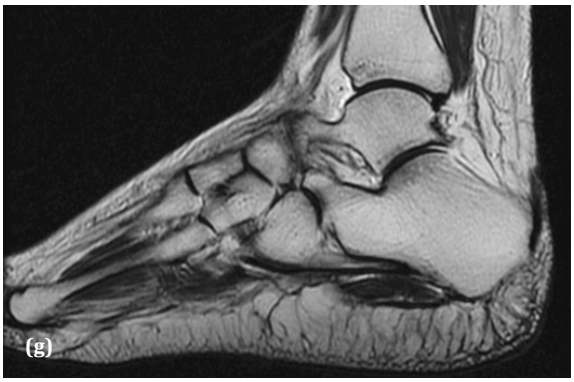
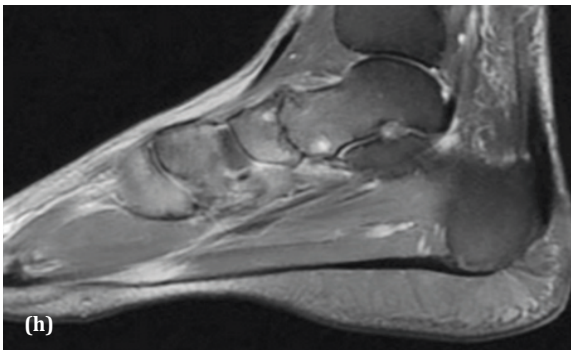


Figure 2c, d: c) Complete osseous connection, d) Partial (fibrous or cartilaginous).





Figures 2g, h: g) Calcaneonavicular coalition, h) Degenerative changes at talonavicular joint.

(Figure3a). This is best seen on lateral views of the foot. Others include posterior and anterior joints (Figures 3b, c). Talar beak sign indicates impaired subtalar movements (Figure 3d). Another important finding is the "C" sign which constitutes complete posterior ring around talus and sustentaculum tali (Figure 3e). CT definitely demonstrates the osseous bar with bridging between talus and sustentaculum tali, particularly in axial view (Figures 3f, g). A sign called "drunken waiter's" has been also described. Drunken waiter sign is based on the cranial height of the sustenaculum as well as how well formed the inner curve appeared. The dysplastic sustentaculum tali occurring with a subtalar coalition has been

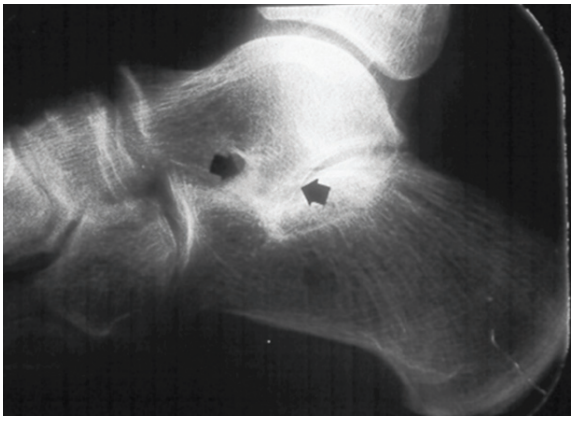


Figure 3a: Talocalcaneal coalition at the mid facet level.

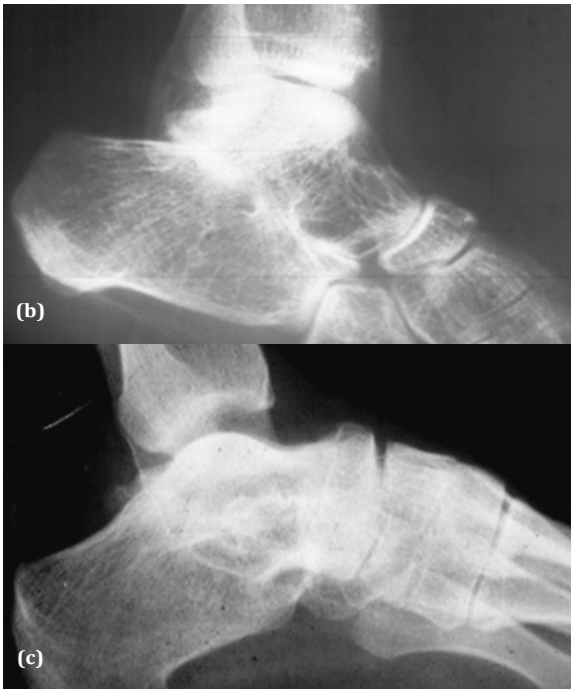


Figure 3b, c: b) Talocalcaneal coalition, c) Talocalcaneonavicular coalition

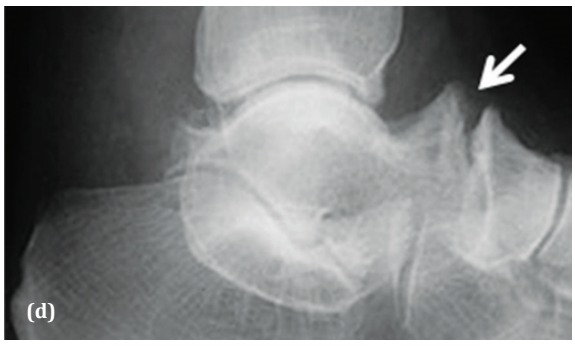


Figure 3d: Talocalcaneal coalition. Note the beak of the talus anterosuperiorly along with "C" sign.

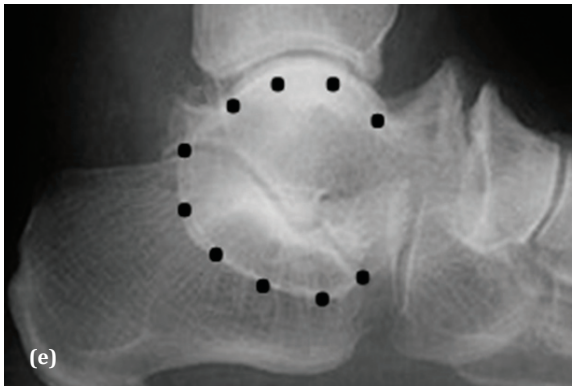


Figure 3e: Talocalcaneal coalition - Black dots indicate "C" sign.

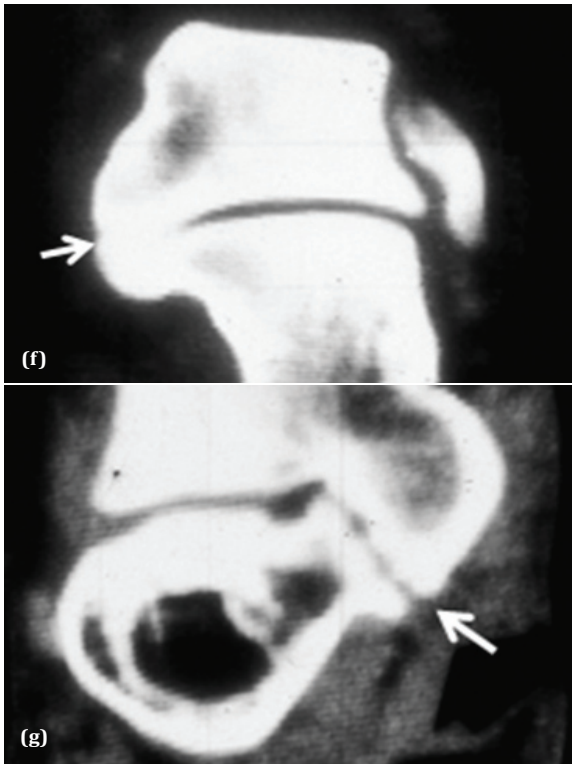


Figure 3f, g: f) CT-complete osseous bridge, g) CT-Fibrous connection.

likened to a waiter having trouble carrying his tray (either an upturned or downturned hand and plate) while intoxicated, where the body of the calcaneus is considered the waiter and the sustentaculum tali is the tray. MRI is specific for non-osseous bars in fibrous bridge, irregularity and narrowing of bony articular margins are noted with associated sclerosis (Figure 3h). The cartilaginous bridge shows intermediate signal on T2. On stir images fluid signal with associated soft tissue and bone marrow edema are noted.

Figure 3h: MRI showing talocalcaneal coalition.

Conclusion

Tarsal coalitions are occasionally encountered with symptoms of pain in the foot. Most common coalitions are talocalcaneal and calcaneonavicular. Three types of bridges are described fibrous, cartilaginous and osseous. Conventional radiology is adequate to diagnose. However, CT and MRI eminently demonstrate the osseous and non-osseous bridges.

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Conflict of interest

The author declares no conflict of interest.

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