

Case Report

Anomaly of the Medial Process of the Cuboid Presenting as Calcaneonavicular Coalition: A Case Report

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Abstract

Calcaneonavicular coalition is currently recognized as a malformative condition which restricts motion in the midfoot and may be responsible for sinus tarsi pain and ankle instability. Local calcaneal morphological anomalies such as too-long anterior process of the calcaneus and calcaneus secundarius may also alter the hindfoot's biomechanics and can clinically act as a calcaneonavicular coalition.

The purpose of this case report is to describe a never described medial process of the cuboid, which can limit the range of motion of the Chopart joint complex, thus mimicking a calcaneonavicular coalition. We aim also to explain the clinical and the radiological approaches to reach the diagnosis.

Introduction

Tarsal coalition is defined as an abnormal union between two or more tarsal bones which may be fibrous (synfibrosis or syndesmosis), cartilaginous (synchondrosis) or osseous (synostosis) in nature [1]. The two most common coalitions are talocalcaneal and calcaneonavicular [2]; they are clinically significant because they prevent normal joint motion, and are frequently associated with non-traumatic pain and recognized as a common cause of rigid flatfeet [3-7]. Coalition with a cuboid starting point is much rarer, comprising less than 2% of all tarsal coalitions [8-11]. Cubonavicular coalition is also characterized by a fibrous or osseous fusion between the cuboid and navicular bone, which can lead to debilitating symptoms such as foot pain and restricted range of motion [12,13].

Other situations with morphological anomalies without fusion can act as real coalitions, by preventing normal joint motion, and causing pain, foot stiffness, flat feet, and repeated ankle sprains. The authors report the case of a 12.5-year-old girl who sustained several lateral sprains of ankles and expressed pain of anterolateral aspect of both hindfeet. Clinical findings were consistent with calcaneonavicular coalition but radiographic examinations revealed an extended medial process of the cuboid which limited the range of motion of the subtalar joint, mimicking a calcaneonavicular coalition.

Case Report

A 12.5-year-old girl presented with chronic pain around her both ankles. She claimed to have had many ankles' sprains during the last 2 years. She related pain on the anterolateral aspect of both hindfeet. Pinpoint tenderness could be elicited on palpation of the anterior aspect of the sinus tarsi, and around the dorsolateral aspect



Figure 1: The oblique views of both feet demonstrated an abnormal medial cuboid process that fits into the calcaneonavicular space.

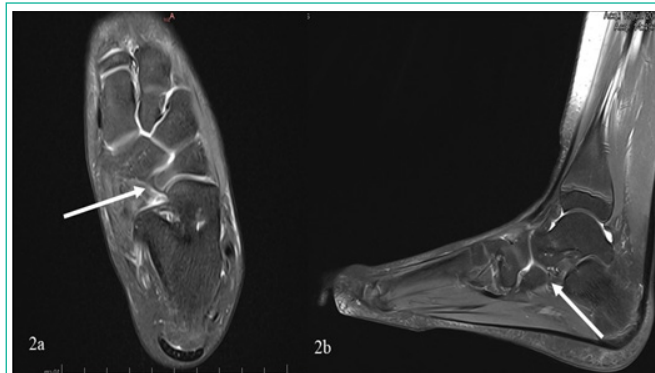


Figure 2: The MRI of the left foot confirmed the presence of an extended medial cuboid process that insinuated itself between the anterior process of the calcaneus and the navicular (arrow on the figure 2a), and which articulated with the talus plantar face (arrow on the figure 2b).

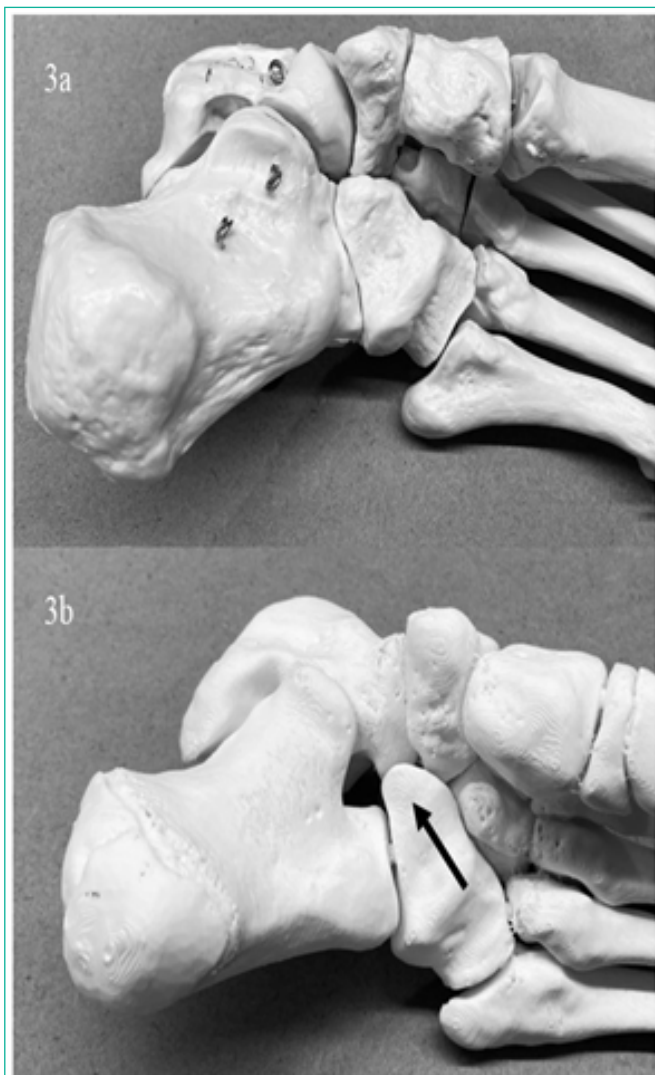


Figure 3: Inferomedial views of the printable 3D model created from a CT scanner of the left foot and of a normal normal skeletal foot. On the image 3a, the normal appearance of the calcaneonavicular space. On the figure 3b, we noted that the anterior calcaneus process was absent, and that the too-large medial process of the cuboid (arrow) occupied the calcaneonavicular space where it behaved like a real coalition. In addition, there was a real joint between the abnormal medial process of the cuboid and the talus.

of the talonavicular joint. Subtalar motion was severely restricted but there was no hindfoot valgus or flatfoot. Conventional X-rays revealed the presence of an abnormal medial process of the cuboid (Figure 1), which insinuated itself between the anterior process of the calcaneus and the navicular. MRI confirmed the cuboid anomaly and demonstrated that the abnormal medial process of the cuboid met the talus with which it had a real joint (Figure 2a,2b). Finally, a printable 3D model was created from a ct scanner and allowed to better define the malformation; it showed that the anterior calcaneus process was absent, and that the too-large medial process of the cuboid occupied the calcaneonavicular space where it behaved like a real coalition (Figure 3a,3b).

Discussion

The cuboid is a tarsal bone which has a cub-like shape, and which is interposed between the calcaneus and the fourth and fifth metatarsals,

constituting the lateral column of the foot. The cuboid has usually four articular surfaces that contribute to the intrinsic movement of the foot. These articulations include the calcaneus posteriorly, the fourth and fifth metatarsals anteriorly, and lateral cuneiform medially. On occasion there may be a fifth facet for articulation with the navicular, occurring only in a quarter of 'normal' feet.

The cuboid is recognized to provide crucial stability to the foot by its role as the supporting element of the static and rigid lateral column of the foot. In fact, this tarsal bone is subjected to stress forces during standing and ambulation, and its contribution is essential to the mobility of the lateral column of the foot [14-17].

The anomalies incriminating the cuboid essentially revolve around cuboid-navicular coalition. In this regard, cuboid-navicular coalition remains an extremely rare form of tarsal coalition. In fact, less than 2% of all coalitions have been reported to occur between the cuboid and the navicular [8-11], with 34 reported cases to date into the literature [18-35]. Many authors consider that this form of tarsal coalition is essentially asymptomatic and rarely becomes symptomatic at specific times of activity and stress.

Our case is totally different in that in that there is no abnormal fusion between the cuboid and another tarsal bone. In this case, the anomaly is based on a totally unknown medial cuboid process that insinuates itself between the talus, the anterior process of the calcaneus and the navicular, thus locking this space and behaving as a real calcaneonavicular coalition. In addition, this structure give rise to a true joint between the cuboid and the talus, which has never been described before. It is difficult to provide a plausible explanation for this morphological anomaly, even if it can be attributed to a failure of differentiation and segmentation of the primitive mesenchyme in the first stages of development [36-39]. The rarity of this condition necessitates meticulous evaluation, combining clinical examination and advanced imaging modalities for accurate diagnosis.

Conclusion

This case report aims to contribute valuable insights into the clinical manifestations, diagnostic strategies, and therapeutic interventions associated with atypical tarsal bone anomalies which may act as real coalitions in the pediatric population. By presenting a comprehensive overview of the case, we seek to enhance the understanding of this unique musculoskeletal abnormality and provide a basis for informed decision-making in the management of similar cases.

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