Symptomatic Bipartite Medial Cuneiform with Naviculocuneiform and 1st Metatarsal Cuneiform Arthritis: A Case Report
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Background
Bipartition of certain bones within the human skeleton is quite common and more increasingly common as we are starting to look for them. In particular the foot has multiple bones that can be bipartite including the navicular, sesamoids, and the medial cuneiform. The bipartition of the medial cuneiform was first described by Morel in 1757. [1] During osseous development, it can separate into either horizontally aligned or obliquely aligned segments. They can be separated by either a cartilaginous synchondrosis, fibrous synostosis, or a combination of the two. [3,7]

Most anomalies are asymptomatic and are left untreated. Symptomatic bipartite medial cuneiforms often present as generic midfoot pain that worsens with ambulation. This is thought to be a result of the instability caused by the bipartition and increased stress on the surrounding joints leading to early arthritic changes. These abnormalities are difficult to capture on simple radiographic imaging because of the superimposition on the lateral images from the other tarsal bones. Also because most commonly it is seen in a horizontal partition it is not seen on the standard dorsal plantar views or oblique views. MRI and Computed Topography are usually needed for adequate assessment. Treatment regarding a symptomatic bipartite medial cuneiform ranges from excision, fusion, fluorescent and ultrasound guided corticosteroid injections. [2-6]

Here we describe a case involving symptomatic arthritis involving the 1st metatarsal cuneiform and medial cuneiform navicular articulations secondary to a bipartite cuneiform successfully treated with a medial column fusion. There are 2 other case reports in the literature that surgically treated bipartite cuneiforms. Both cases had bilateral involvement but only symptomatic on one side. [5, 6] Both reports also mention a pes planovalgus deformity as well. Furthermore, previous anatomical studies and texts describe that most commonly the dorsal segment is slightly smaller than the plantar segment. From our review this is the only case described treating the deformity with a medial column fusion.

Case Report
A 52 yr old male with a past medical history pertinent for psoriasis, depression, and hyperlipidemia presented with diffuse midfoot pain. He was given oral anti-inflammatory agents and a steroid injection which provided some relief. An MRI was obtained which was read as possible fracture of the medial cuneiform and surrounding degenerative joint disease. The MRI was reviewed by the primary clinician and compared with radiographs revealing a bipartite cuneiform. He returned 2 months later with worsening symptoms and was then scheduled for a medial column fusion.

A Medial longitudinal incision was created over the desired joints. Dissection was carried down to full exposure of the medial column, while preserving the tibialis anterior tendon. We used .062 k-wires with hinternar distractors for access to each joint space. Resection of the joint spaces was achieved using a combination of a sagittal saw, curettes, osteotomes and a bone rasp. After cartilage was completed demedulated, each joint was fenestrated using a .045 k-wire to help prep the fusion site with healthy, bleeding bone.

Large tenorrhaphy forces were used to keep the bipartite medial cuneiform dorsal and plantar segments compressed during k-wire insertion for the 4.0mm cannulated screws. Two crossing 4.0mm cannulated screws were inserted 1- medial plantar in the navicular tuberosity, through the dorsal segment of the medial cuneiform, and into the dorsal-lateral aspect of the 1st metatarsal base. 2 – Dorsal from the 1st metatarsal, through the plantar segment of the medial cuneiform, and into the lateral aspect of the navicular. Care was taken to not penetrate the talonavicular joint. Bone graft was then used to fill in any voids.

An anatomically pre-contoured medial column fusion plate was placed on the medial column, slid underneath the preserved tibialis anterior tendon, and tacked down using olive pins.

Fixation was then achieved by using a combination of 3.5mm locking and non-locking screws. Distally, three 3.5mm non locking bicortical screws we used in the metatarsal, two 3.5mm locking screws were used to secure the plate proximally in the navicular, and one 3.5mm locking screw was using in the medial cuneiform.

The patient was placed in a Jones compression dressing and removable cast boot. The staples were removed at 3 weeks and patient was kept non weight bearing for 8 weeks. Physical therapy was initiated at 12 weeks post op for 2 months. At 3 months post op the patient was at 90% improvement and his VAS score was 2/10. A bone stimulator was started at 5 months post operatively due to slow radiographic findings of arthrodensis.

Imaging

Pre-Operative WB Films

T1 Weighted Imaging

T2 Weighted Imaging

Post Op Week 1

Post Op 5 Months

Discussion

The Bipartite medial cuneiform is an infrequent congenital variant. Normally ossification occurs from one center within the tarsal bones but in the case of bipartite cuneiforms there are 2 ossification centers. Most often they occur horizontally and they are separated by a synchondrosis but not a true joint.

The phenomenon was first encountered and documented in the 18th century by Morel in a cadaver. It was first described in 1942 as part of an anthropologic study finding that an occurrence of approximately 0.3%. [1] Chang et al noted a 0.1% incidence after reviewing over 1000 MRI images at their institution. [2]

With advanced imaging it has shown that portions of the tibiotalar and posterior longus tendons insert at the plantar segment and the anterior tibiotalar tendon will insert into the dorsal segment. [9] In our case we have observed the same as well as erosive changes between the dorsal and plantar segments. Due to the excessive stress from the pull of the tibialis anterior, posterior tibial, and peroneal longus tendons in different directions may cause increased wear and instability within the medial column in some patients. In this particular case the patient was found to have a much smaller dorsal segment which added to the increased difficulty of providing a stable medial column.

Most often the finding is incidental and not treated but there have been a few documented incidences of symptomatic bipartite cuneiforms. Chiodo et al reported a case involving an elite Olympic marathoner that was symptomatic upon exertion and was treated with excision of the smaller fragment. [5] They reported that all though the two segments articulated with each other there were no cartilaginous surfaces found between them. [5] Azurza et al described a case in which the patient became symptomatic after having an injury playing soccer. They pursued surgical treatment after conservative measures had failed and treated him with an intercuneiform arthrodesis. [6] They noted as well that it was a synchondrosis and no cartilaginous surfaces were present. O’Neill et al reported a fracture between the synchondrosis of the dorsal and plantar segments in a pediatric patient was found during histologic examination after the patient sustained a traumatic amputation of the involved limb. [8]

References