Rare Bipartite Medical Cuneiform Managed with Medical Column Arthrodesis

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Statement of Purpose

The purpose of this case example was to review the limited literature related to management of a bipartite medial cuneiform (BMC) with concomitant tarsal arthritis. We propose a case example where successful pain relief was found with ultimate midfoot arthrodesis.

Introduction

Bipartite medial cuneiform is a rare anatomic variant with an incidence ranging from 0.1%-7%.[1,2] Cuneiforms typically arise from a single ossification center, however, a BMC develops due to a failure of two primary ossification centers to coalesce, resulting in a pseudoarthrosis.[3] As with most midfoot pathology, initial diagnostic testing begins with weight bearing plain film radiographs. Advanced imaging is usually necessary to confirm a clinical suspicion of a BMC which can be diagnosed with either magnetic resonance imaging (MRI) or computer tomography (CT). Elias et al. described the 'E-sign' found on a sagittal view MRI which is formed by the cleft between each of the segments in the horizontal plane.[4]

Currently there is a paucity of literature regarding BMC's and these are primarily limited to case reports. Due to the rarity of this pathology, treatment options can vary and consist of orthotic management, image guided corticosteroid injections, and forms of physical therapy. Surgical intervention has been described to consist of fusion of the bipartite fragment or fusion of surrounding joints. The medial cuneiform serves as a proximal attachment of Lisfranc's ligament to form a primary stabilizer of the transverse arch. When a bipartite medial cuneiform results in instability of the transverse arch, we advocate for fusion of surrounding joints.

Case Study

We present a case of a 54-year-old Caucasian male who began a home exercise program approximately 6 weeks prior to the onset of symptoms. He initially presented to another provider where he was diagnosed with plantar fasciitis and given a corticosteroid injection. This did not alleviate his symptomology and he sought another opinion at our facility. Radiographs revealed an unusual appearance of the medial cuneiform and subsequently an MRI was ordered confirming the diagnosis of a BMC with adjacent joint arthrosis. After failing conservative measures such as orthotic management and a dedicated physical therapy program, surgical intervention was performed. The patient ultimately had a fusion of his bipartite medial cuneiform, first metatarsal-cuneiform joint, and first cuneiform-navicular joint. After a 6-week period of immobilization, followed by a progressive rehabilitation and walking program the patient was able to successfully return to his preoperative levels without complaint.

Figure 1. Preoperative AP Radiograph.

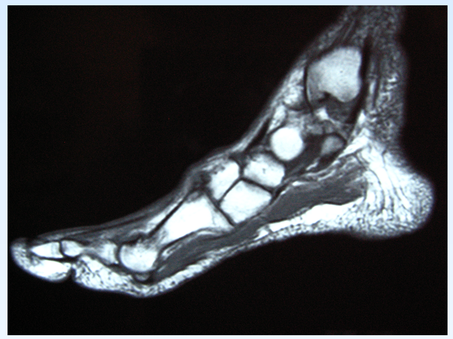

Figure 3. Sagittal T1 MRI showing BMC and the 'E-sign'.

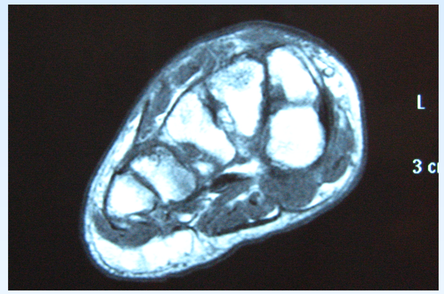

Figure 4. Coronal T1 MRI showing BMC.

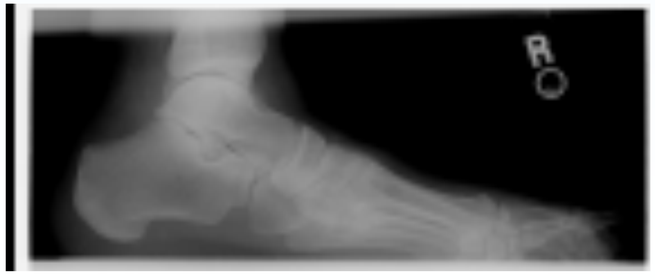

Figure 2. Preoperative Lateral Radiograph.

Figure 5. Postoperative AP Radiograph.

Discussion

A Symptomatic BMC is a rare anatomic variant infrequently described in the literature. It has been reported to present bilaterally 60% of the time with a familial tendency and predilection for the male gender.[5] Anatomically speaking, a BMC will result in a horizontally divided cuneiform with a larger plantar than dorsal segment.[6] The interosseous and dorsal component of Lisfranc's ligament are believed to insert on the dorsal segment of a BMC while the plantar ligament extends onto the plantar segment.[6] Acute or repetitive damage to either of the segments of a BMC can result in pain and instability of the transverse arch eventually leading to midfoot arthrosis.[7]

Various treatments of a BMC have been described and can consist of surgical resection when the dorsal segment comprises 30% or less of the combined segment volume, [8] isolated fusion across the fibrocartilaginous articulation,[7] image guided corticosteroid injection[9] and fusion of the first tarsometatarsal joint with or without a 'homerun' Lisfranc screw.[10]

Our case demonstrates repetitive damage across the BMC with arthrosis of proximal and distal joints found on radiograph and MRI. Due to extent of arthrosis of nearby joints the decision to perform fusion of the BMC followed by a medial column midfoot fusion was undertaken. Due to the independent motion of the medial column and Lisfranc instability, we propose fusion of the medial column to prevent malalignment of the midfoot as a potential sequalae of this untreated pathology.

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