

## Case Report

# Bipartite medial cuneiform: a potential cause of midfoot pain - case report

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## Abstract

Bipartite medial cuneiform is a rare variant of the tarsal bones. The condition can be a potential source for non-traumatic midfoot pain and a possible misdiagnosis cause of several foot disorders, such as the anterior and posterior tibialis tendon disorder. We present the case of a patient with midfoot pain with signs and symptoms suggestive of tibialis anterior tendinopathy. Imaging tests, however, elucidated a bipartite medial cuneiform. The conservative treatment using a removable boot for six weeks effectively relieved symptoms, temporarily promoting pain and limp-free gait, but symptoms relapsed were observed at the last visit.

**Level of Evidence V; Case Report; Expert Opinion.**

**Keywords:** Tarsal bones; Magnetic resonance imaging; Conservative treatment.

## Introduction

Pain at the dorsomedial aspect of the foot is a common cause of medical appointments, and several diagnosis possibilities exist. Painful dorsiflexion of the ankle, swelling, and tenderness at the tendon's insertion site are characteristics of many common foot disorders, such as tibialis anterior tendinopathy<sup>(1)</sup>. On the other hand, bipartite medial cuneiform is a rare tarsal developmental variant first described in 1932 by Barclay<sup>(2)</sup>. The condition can be a potential source for non-traumatic midfoot pain and a possible misdiagnosis cause<sup>(3,4)</sup>.

We present a case of a 30-year-old man with bilateral bipartite medial cuneiform, symptomatic only on the right foot. The patient complained of non-traumatic midfoot pain simulating insertional tibialis anterior tendinopathy, a much more common condition. This case report illustrates a bipartite medial cuneiform condition, a rare anatomic variant that could mimic midfoot tendinopathy, and alerts for this possibility when investigating midfoot pain.

## Case description

This study was approved by the Institutional Review Board under the number 66349622.9.0000.5330, and the patient signed the informed consent form.

A 30-year-old man presented at our hospital reporting pain in the right midfoot without a history of trauma. Physical examination showed mild cavus varus feet and pain on palpation on the dorso-medial region of the midfoot along the insertion of the anterior tibial tendon and pain with resisted ankle dorsiflexion, typical findings of insertional tendinopathy. The neurovascular status of both feet was normal. (Figure 1). Due to the painful and limping gait, immobilization with a removable boot was prescribed, and radiographs and magnetic resonance imaging (MRI) were requested.

Although difficult to visualize on radiographs, the image (Figure 2) led to suspicion of medial bipartite cuneiform, later confirmed by MRI (Figure 3). The MRI revealed an important signal change in the synchondrosis area. A computed

Study performed at the Hospital Moinhos de Vento, Porto Alegre, RS, Brazil.

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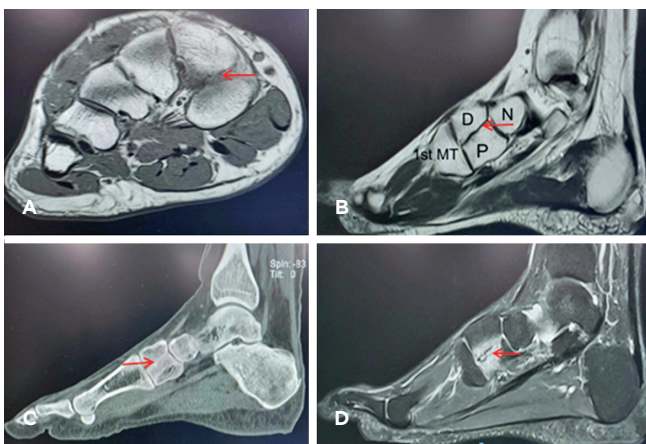




**Figure 1.** Clinical aspect at the first evaluation. Anterior (A) and posterior (B) foot view. After two weeks, the patient returned to the hospital with the exams.



**Figure 2.** Foot anteroposterior (A), oblique (B), and lateral (C) radiographs. Note that the overlapping images on the medial cuneiform make radiographic analysis difficult.



**Figure 3.** Axial (A) and sagittal (B) T1 MRI images and CT (C) and T2 (D) MRI images of bipartite medial cuneiform (red arrow). Sagittal T1 (B) depicting the dorsal (D) and plantar (P) components articulating with the first metatarsal (1st MT) and navicular (N).

tomography (CT) scan was requested to understand the bone structure better, showing incomplete bipartition of the medial cuneiform (Figure 3).

There was no damage to other musculotendinous and bone structures or ligaments, and the tibialis anterior tendon was normal. The navicular-cuneiform and cuneo metatarsal joint of the first ray showed a preserved cartilage thickness with no joint effusion.

The conservative treatment using a removable boot for six weeks effectively relieved symptoms, temporarily promoting pain and limp-free gait, but symptoms relapsed were observed at the last visit.

## Discussion

Bipartition of the medial cuneiform is a rare segmentation anomaly. Although uncommon, the prevalence ranges from 0.1% to 7% and is considered the most recognized anatomic variant of cuneiform bones<sup>(5)</sup>.

The bipartite medial cuneiform is usually asymptomatic, but the disorder can become painful due to the micro-mobility and instability in the fibrocartilaginous joint between the dorsal and plantar segments. The false joint between the segments is usually bridged by a cartilaginous synchondrosis, fibrous syndesmosis, or a combination of both<sup>(5)</sup>. Due to the fibrocartilaginous union, instability may precipitate a stress reaction and/or degeneration, sometimes resulting in pain.

The pain is located in the medial cuneiform and worsens with mobilization of the first ray<sup>(5,6)</sup>. Patients with tibialis anterior tendinopathy often demonstrate pain in the same region, but the pain is usually worse with active mobilization, especially resisted ankle dorsiflexion. Once the bipartite medial cuneiform is sick, it can also present pain during resisted ankle dorsiflexion, as seen in our patient, and this similarity in the physical examination can lead to a misdiagnosis.


Several diagnostics methods can be used to diagnose bipartite medial cuneiform. However, in our study, it was not easy to observe in the radiographs. The overlapping images make radiographic analysis difficult. The best view to detect this anatomic variant is the 30° external oblique view of the foot<sup>(5)</sup>. Computed tomography and MRI show bipartite medial cuneiform.

It is important to differentiate bipartite medial cuneiform from an isolated fracture of the medial cuneiform, which represents 1.7% of all tarsal fractures<sup>(5)</sup>. There is a history of trauma and irregular bone contours in acute fractures with sharp margins. On the other hand, the bipartite medial cuneiform is well-corticated with smooth bone contours.

Given the lack of literature available, there is no consensus on the optimal treatment plan. Our patient improved with conservative treatment initially, but symptoms relapsed, and surgical treatment might be necessary. Steen et al.<sup>(7)</sup> showed a series of five cases treated successfully with conservative and surgical treatment. Four cases have been treated with arthrodesis and one with immobilization and injection therapy. Eves et al.<sup>(8)</sup> report the case of an 11-year-old soccer player boy with a bipartite medial cuneiform. The injury was

treated nonoperatively with a non-weight-bearing cast and pneumatic walker immobilization, with successful resolution of his symptoms and a return to sports activity four months after the injury.

Bipartite medial cuneiform is a rare cause of midfoot pain and presents a similarity of findings with a much more common anterior tibialis tendinopathy. This case report alerts us to this diagnosis and how challenging its treatment is.

**Author' contributions:** Each author contributed individually and significantly to the development of this article: TASHI \*(<https://orcid.org/0000-0001-6107-6808>) and JAVS \*(<https://orcid.org/0000-0002-6321-9566>) Conceived and planned the activities that led to the study, wrote the paper, participated in the reviewing process, approved the final version; interpreted the results of the study, participated in the reviewing process; MPVS \*(<https://orcid.org/0000-0002-0177-8338>) and MEPW \*(<https://orcid.org/0000-0003-3518-3719>) Participated in the reviewing process, approved the final version. The author read and approved the final manuscript.\*ORCID (Open Researcher and Contributor ID) .

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