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الجمعية السعودية لجراحة العظام
Saudi Orthopedic Association

Journal of Musculoskeletal Surgery and Research

Technical Notes

Anteater nose sign and reverse anteater nose sign: Are they specific for calcaneonavicular coalition?

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Received: 27 April 2023
Accepted: 14 July 2023
Epub Ahead of Print: 26 July 2023
Published: 31 July 2023

DOI
10.25259/JMSR_85_2023

Video available on:
https://doi.org/10.25259/JMSR_85_2023

Quick Response Code:

ABSTRACT

The anteater nose sign has been described on imaging in the case of the calcaneonavicular coalition and is produced by a tubular elongation of the anterior calcaneal process that approaches or overlaps the navicular bone, resembling an anteater's nose. Similarly, the reverse anteater sign refers to the posterior and lateral extension of the navicular bone, also seen in the case of the calcaneonavicular coalition. Originally described on lateral or oblique foot/ankle radiographs, this appearance is also observed in the case of magnetic resonance images (MRI) on sagittal sections. We describe a case of a talocalcaneal coalition, in which the MRI had a similar appearance, thereby confusing the imaging findings of the case, and discuss the key imaging features for the correct diagnosis. We also propose a new sign, "Opposing beak sign," for this similar appearance in the case of a talo-calcaneal coalition, awareness of which as a distinct entity on sagittal MRI would help correct preoperative diagnosis and subsequent management.

Keywords: Anteater nose sign, Calcaneonavicular, Coalition, Magnetic resonance images, Opposing beak sign, Reverse anteater nose sign, Talocalcaneal

INTRODUCTION

The anteater sign has been described on imaging in a case of the calcaneonavicular coalition.[1] It is produced by a tubular elongation of the anterior calcaneal process that approaches or overlaps the navicular bone, resembling an anteater's nose. Similarly, the reverse anteater sign[2] refers to the posterior and lateral extension of the navicular bone, also seen in the case of the calcaneonavicular coalition and originally described on lateral or oblique foot and ankle radiographs.[1-4] This appearance is also observed in the case of magnetic resonance images (MRIs) on sagittal sections.[5,6]

We encountered a similar appearance on sagittal MRI in a case of a talocalcaneal coalition, thereby confusing the imaging findings of the case and discussing the key imaging features for the correct diagnosis.

CASE STUDY

A 16-year-old male patient complained of medial left ankle pain with limited joint movements for 5–6 months. There was no history of significant trauma, fever, or previous surgery. There

How to cite this article: Bhoil R, Ahluwalia A, Sharma R, Das A, Jhobta A. Anteater nose sign and reverse anteater nose sign: Are they specific for calcaneonavicular coalition? J Musculoskelet Surg Res, 2023;7:214-7.

was no history of pain in any other joints. On examination, there was peroneal spastic flatfoot (pronation and abduction of the foot due to spasm of the peroneal tendon, resulting in an appearance of a flat foot).

MRI of the ankle with the foot was done for further characterization, which revealed [Figure 1; Clip S1] the presence of the continuity of the marrow signal between the talus and calcaneum involving the middle facet of the talocalcaneal joint suggestive of an osseous talocalcaneal coalition.

Also seen were irregularities and bone marrow edema [Figure 1c] of opposing surfaces of the talus and calcaneum at the posterior facet of the subtalar joint with reduced joint space suggestive of associated subtalar arthritis.

Although the diagnosis was clinched on axial images [Figure 1a] on sagittal images [Figure 1b], an "anteater/reverse anteater appearance" was visualized, which is typically seen in cases of calcaneonavicular coalition [Figure 2], thereby confusing the imaging findings.

The clue to the correct diagnosis was that, in the true calcaneonavicular coalition, the anterior calcaneal process (seen on the *lateral* aspect of the calcaneus) is elongated and approaches the navicular bone. Whereas in the case of a talocalcaneal coalition involving the middle facet of the subtalar joint, like in our case, the coalition is seen across the middle facet of the talocalcaneal/subtalar joint (Seen on the *medial* calcaneal aspect).

DISCUSSION

A tarsal coalition occurs when bones of mid-foot and hind-foot grow toward one another, joined by a bridge or bar of osseous tissue (synostosis), cartilage (synchondrosis), or fibrous tissue (syndesmosis).[5-7] These occur due to a defect in the differentiation and segmentation of mesenchymal tissue, due to which normal tarsal joints are not formed.[7] The incidence of tarsal coalition is approximately 1% though it has been reported in cadaveric studies that the incidence may be up to 13%.[7] This may be attributed to the fact that not all coalition cases are symptomatic. The condition may be seen on both sides in up to 50% of the cases.

Although congenital, tarsal coalitions usually manifest in late childhood or early adolescence period when the ossification process starts. Tarsal coalition clinically presents as foot pain and stiffness, limitation of movements at the subtalar joint, and repeated ankle sprains that may result in flat foot deformity.[4-7]

Radiological imaging of tarsal coalition is generally the first imaging test performed, as it is widely available and comparatively inexpensive. The computed tomography (CT) and MRI features of the tarsal coalition are similar; however, among these, MRI has the advantage of being the best imaging tool for evaluating the anatomical details in all three types of the coalition (fibrous/cartilaginous/osseous). On imaging, many signs have been described that point toward the presence of tarsal coalitions, including the anteater nose sign; reverse anteater nose sign; talar beak sign; C sign; drunken waiter sign; and absent middle facet sign, among others.[3,4,6,7]

Treatment options range from conservative methods such as arch support, short-leg walking cast, and anti-inflammatory drugs to surgical methods (resection with soft-tissue interposition or primary arthrodesis) in refractory cases.[7]

The two most common coalitions are talocalcaneal (48.1%) and calcaneonavicular (43.6%) type.[1,6,7] On sagittal section

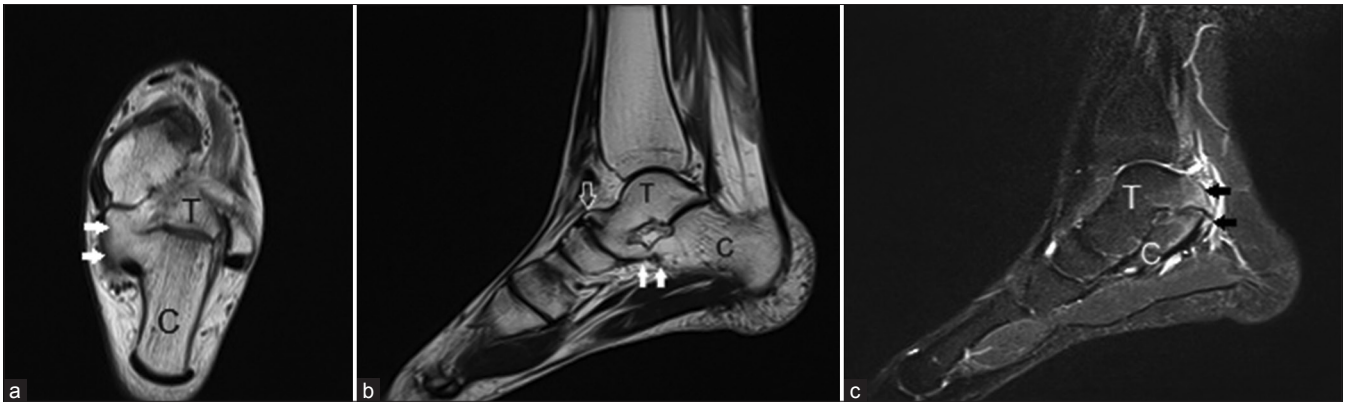
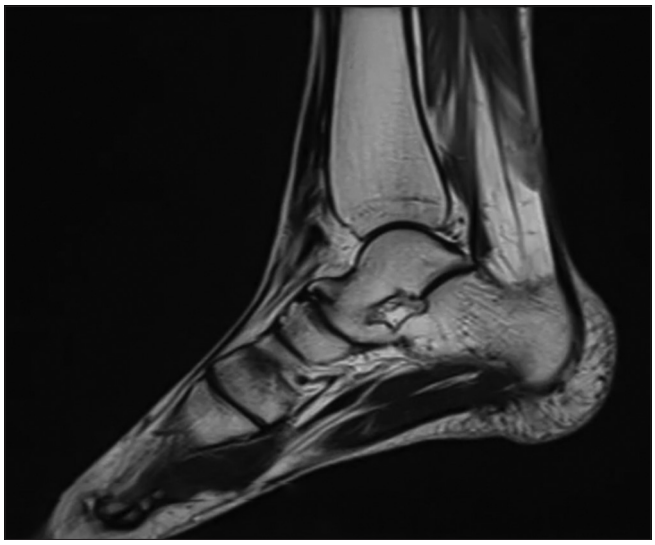


Figure 1: Magnetic resonance images of a patient (a) axial and (b) sagittal T1-weighted images depicting marrow continuity (arrows) between the talus and calcaneum suggesting a solid osseous fusion involving medial facet of the subtalar joint. Also seen on the sagittal image is traction spur/enthesophye (open arrow) arising from the dorsal head of the talus, also referred to as the "talar beak." (c) Sagittal short-tau inversion recovery image showing irregularities and bone marrow edema (arrows) of opposing surfaces of talus and calcaneum at the posteriorly located facet of the subtalar joint with reduced joint space suggestive of subtalar arthritis.



Clip S1: Video clip showing the sagittal T1-weighted magnetic resonance image of the left ankle.

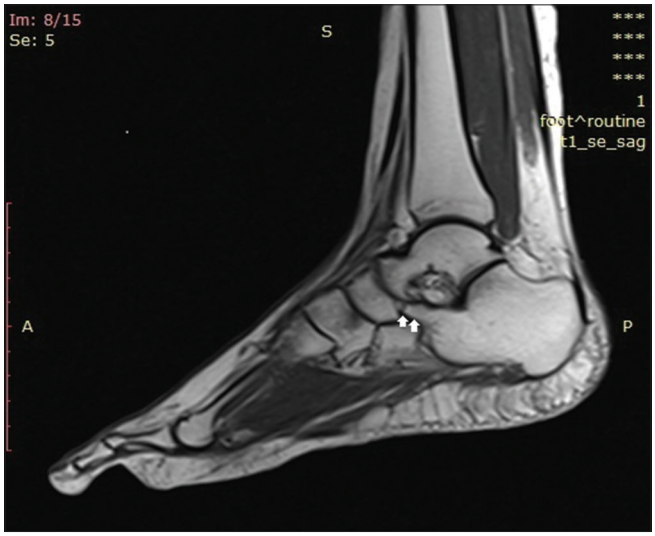


Figure 2: A sagittal T1-weighted magnetic resonance image of a 22-year-old female complaining of the right heel pain demonstrates the osteocartilaginous type of calcaneonavicular coalition where an elongated anterior process of the calcaneus (arrowheads) approaches the navicular, sometimes referred to as the "anteater's nose sign."

images (radiographs/CT scan/MRI), the tubular elongation of the anterior calcaneal process that approaches or overlaps the navicular bone in case of the calcaneonavicular coalition is referred to as the anteater nose sign, resembling an anteater's nose.[1] Similarly, the reverse anteater sign[2] refers to the posterior and lateral extension of the navicular bone, also seen in the case of the calcaneonavicular coalition. However, a similar appearance may be seen on sagittal section images in the case of a talocalcaneal coalition, as seen on MRI in our case.

Figure 3: T1-weighted sagittal magnetic resonance image depicting the talocalcaneal coalition involving the middle facet of the subtalar joint giving the "opposing beaks" sign as the two projections, one each from the middle facet of the subtalar joint (on the calcaneus, denoted by *) and from the inferiomedial aspect of the dome of the talus (denoted by #) appear like the beak of two birds opposing and approaching (and merging with) each other. (Inset: The image of two birds with their beaks opposing each other).

The reason for this similar anteater/reverse anteater appearance on sagittal images in cases of both calcaneonavicular and talocalcaneal is the fact that, in the case of a true calcaneonavicular coalition, the anterior calcaneal process (seen on the *lateral* aspect of the calcaneus) is elongated and approaches the navicular bone. Whereas in the case of a talocalcaneal coalition involving the middle facet of the subtalar joint, the coalition is seen across the middle facet of the talocalcaneal/subtalar joint (Seen on the *medial* calcaneal aspect).

Although this confusion may be cleared by carefully evaluating the axial images (on CT scan and MRI), as discussed above, both calcaneonavicular and talocalcaneal coalitions may appear similar on sagittal images depending on the medial/lateral images being analyzed (*lateral* aspect of the calcaneus in case of the calcaneonavicular coalition and *medial* aspect of the calcaneus in case of the talocalcaneal coalition).

We propose that this appearance of the talocalcaneal coalition (on CT scan/MRI) involving the *middle* facet of the subtalar joint should be called the "opposing beak" sign as the two projections, one each from the middle facet of the subtalar joint (on calcaneus) and from the inferiomedial aspect of the dome of the talus resemble the beak of two birds opposing and approaching (and merging with) each other [Figure 3].

CONCLUSION

Awareness of this "opposing beaks" appearance as a distinct entity on sagittal MRI would help in the correct pre-operative diagnosis and subsequent management.

ETHICAL APPROVAL

All procedures performed in this study were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

AUTHOR CONTRIBUTIONS

RB conceived and designed the study, conducted research, provided research materials, collected and organized data, and wrote the initial and final draft of the article. RS and AD contributed to preparing the draft and final manuscript. AA and AJ analyzed and interpreted data. All authors have critically reviewed and approved the final draft and are responsible for the manuscript's content and similarity index.

USE OF ARTIFICIAL INTELLIGENCE (AI)- ASSISTED TECHNOLOGY FOR MANUSCRIPT PREPARATION

The authors confirm that there was no use of Artificial Intelligence (AI)-Assisted Technology for assisting in the writing or editing of the manuscript and no images were manipulated using the AI.

DECLARATION OF PATIENT CONSENT

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

FINANCIAL SUPPORT AND SPONSORSHIP

This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CONFLICTS OF INTEREST

There are no conflicting relationships or activities.

REFERENCES

1. Chapman VM. The anteater nose sign. Radiology 2007;245:604-5.
2. Ridley LJ, Han J, Ridley WE, Xiang H. Anteater nose and reverse anteater signs: Calcaneo-navicular coalition. J Med Imaging Radiat Oncol 2018;62:118-9.
3. Oestreich AE, Mize WA, Crawford AH, Morgan RC Jr. The "anteater nose": A direct sign of calcaneonavicular coalition on the lateral radiograph. J Pediatr Orthop 1987;7:709-11.
4. Crim JR, Kjeldsberg KM. Radiographic diagnosis of tarsal coalition. AJR Am J Roentgenol 2004;182:323-8.
5. Newman JS, Newberg AH. Congenital tarsal coalition: Multimodality evaluation with emphasis on CT and MR imaging. Radiographics 2000;20:321-32.
6. Docquier PL, Maldaque P, Bouchard M. Tarsal coalition in paediatric patients. Orthop Traumatol Surg Res 2019;105(1S):S123-31.
7. Lawrence DA, Rolen MF, Haims AH, Zayour Z, Moukaddam HA. Tarsal coalitions: Radiographic, CT, and MR imaging findings. HSS J 2014;10:153-66.