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Fracture of Stieda Process with Posterior Ankle Impingement Syndrome: A Case Report

R. Essofi[1*], I. Azzahiri[1], M. Benzalim[1], S. ALJ[1]

[1]Radiology Department of Ibn Tofail Hospital, Mohamed VI University Hospital, Marrakech, Morocco
[1]Faculty of Medicine and Pharmacy, Cadi Ayyad University, Marrakech, Morocco

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***Corresponding author:** R. Essofi
Radiology Department of Ibn Tofail Hospital, Mohamed VI University Hospital, Marrakech, Morocco

Abstract **Case Report**

Ankle impingement syndromes, prevalent among athletes, result in significant pain and limited joint mobility. Using imaging techniques (such as radiographs, CT, MRI, and ultrasound) not only assists in diagnosis but also helps in understanding the anatomical cause of the impingement, directing therapeutic injections, and pre-surgery planning. This article presents a case of a 36-year-old female with a two-year history of chronic ankle pain, associated with recurrent swelling and decreased mobility who underwent a radiographic imaging and MRI revealing a fracture of the Stieda process as a cause of posterior ankle impingement (PAI) syndrome. The diagnosis of ankle impingement syndromes mainly depends on comprehensive clinical examination and patient's medical history, but MRI was proved crucial for diagnosing syndromes affecting the posterior areas and excluding other causes of ankle pain.

Keywords: Stieda process, posterior ankle impingement syndrome, MRI.

INTRODUCTION

Ankle impingement syndromes are frequent and significant sources of morbidity especially among athletes. Clinically it is characterized by pain and a restricted range of motion around the joint. Imaging (Radiographs, CT, MRI, and ultrasound) provide supporting data for the diagnosis, help clarify the anatomic mechanism of impingement, guide therapeutic injections, and help with pre-surgical planning.

The most common causes of impingement include post-traumatic synovitis, fracture malunion, scarring, recurrent sprains, and other osseous conditions.

These syndromes are categorized as anterolateral, anterior, anteromedial, posteromedial, and posterior from anatomical and clinical perspectives.

In this article we will present a rare cause of posterior ankle impingement syndrome: The fracture of Stieda process.

CASE REPORT

We present the case of a 36-year-old female patient, a homemaker, with no particular pathological history, who was transferred to our unit for chronic ankle pain evolving over 2 years. The clinical examination found a recurring sub-malleolar swelling along with a reduction in both active and passive ankle mobility.

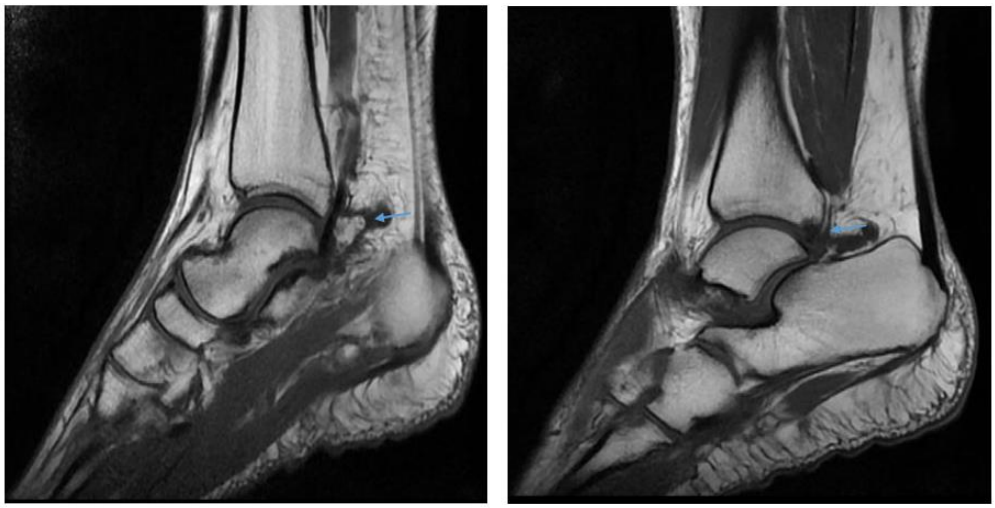
A conventional radiography was performed and it revealed a fractured Stieda process, which is an extended posterior process of the talus.

A lateral view of a conventional radiography: Fractured Stieda process

Further testing of the patient involved magnetic resonance imaging, which revealed thickening of the synovial membrane of the talocrural and posterior subtalar joints with low signal intensity on T1-weighted images, and high signal intensity on PD and STIR sequences, this further enhanced heterogeneously post-gadolinium injection, indicating synovitis.

MRI lateral view on PD sequence showing a thickening of the synovial membrane of the posterior subtalar joint with high signal intensity

It also revealed a corticalized fracture with irregular margins on the Stieda Process, which presents a high signal intensity on PD sequences; Notably, there was also a prominent posterior tibial tubercle.



MRI lateral view on T1 sequence showing corticalized fracture with irregular margins on the Stieda Process, with a prominent posterior tibial tubercle

A subchondral signal abnormality of the calcaneum was also seen at the posterior part of its subtalar joint surface, with low signal intensity on T1-weighted images, and high signal intensity on PD sequences, which is related to a bone contusion.

On the soft tissues we witnessed a poorly defined signal abnormalities of the posterior intersection with a high signal intensity on PD sequences. There was also a tenosynovitis involving the tendon sheaths of both peroneus longus and brevis, as well as the flexor hallucis longus.

DISCUSSION

The posterior ankle impingement syndrome has also been referred to as "os trigonum syndrome," "talar compression syndrome," and "posterior block of the ankle". This syndrome is often found in ballet dancers because of the chronic stress on the posterior ankle and the repetitive movements required by the choreography [1].

Acute plantar flexion of the foot may also cause posterior ankle impingement syndrome, which has been linked to both sports and non-sports-related activities. An important contributing element to the occurrence of this

syndrome is the anatomy of the posterior portion of the ankle. The talar posterior process protrudes posteriorly to the ankle joint surface and extends posteriorly and medially from the body of the talus [2].

The posterior talofibular ligament is attached to the lateral tubercle, which is more noticeable than the medial tubercle. The lateral tubercle can articulate with a different ossification centre known as the os trigonum. The Stieda process is the term used when the lateral tubercle is lengthy. The superior surface of the calcaneal tuberosity, which may have a prominence, and the posterior tibial articular surface, which may have a more or less prominent down slope, are two additional bone structures involved in the impingement mechanism.

The symptoms of PAI syndrome can include an osseous injury, an inflammation of the posterior ankle soft tissues, or a combination of both. Clinically it manifests as posterior ankle pain that is worsened by plantar flexion of the foot [3].

When conducting initial evaluations with traditional radiography, appearances may seem normal, because the typical pathophysiology, as opposed to anterior impingement, involves ligaments or soft tissue. However, it is crucial to examine the lateral radiograph carefully for any signs of Stieda's process or an os trigonum; it is not always easy to distinguish between an os trigonum and a broken lateral talar tubercle; os trigonum is often round or oval with clearly defined corticated margins, and a fracture of the lateral tubercle has irregular margins.

A more in-depth investigation using CT scans can help identify bone variations, extra bony bodies, and osteochondral irregularities. These scans can also be useful in making pre-operative management decisions [1]. Ultrasound can serve a dual purpose by guiding local anaesthetic or corticosteroid injections that might help in diagnosing and relieving symptoms of posterior impingement syndrome.

MRI, renowned for its superior soft-tissue contrast, is invaluable in assessing posterior ankle pain. A critical feature to look for is bone marrow edema (characterized by low T1 and high T2 signal) within the talus, calcaneus, or an os trigonum. Additional aspects to look out for include elevated signal at the synchondrosis, associated synovitis, and thickened posterior ligaments [4].

Various conditions can mimic the symptoms of PAIS, making imaging a crucial tool for differentiation. Conditions such as Achilles tendinopathy, retrocalcaneal bursitis, and Haglund's deformity can present with similar posterior ankle pain. Moreover, os trigonum syndrome and FHL (flexor hallucis longus) tendinopathy are other notable conditions that warrant differentiation from PAIS. Using a combination of radiographic, ultrasound, and magnetic resonance imaging (MRI) techniques can significantly aid in distinguishing PAIS from these other conditions.

PAI syndrome is initially treated conservatively. A below-the-knee cast is used for 4-6 weeks, or longer if necessary, in the event of isolated soft-tissue involvement, such as in the case of an os trigonum or lateral talar tubercle fracture. After the cast is taken off, a rehabilitation program is put in place. The flexor hallucis longus tendon may need to be released during surgical removal of the osseous pieces if conservative treatment fails [1].

CONCLUSION

Typically, the diagnosis of ankle impingement syndromes is primarily clinical, heavily relying on a detailed medical history and thorough physical examination. The use of radiographs alone can be sufficient to verify the presence of ankle impingement syndrome. However, MRI serves an essential role in confirming the diagnosis of ankle impingement syndromes, especially those affecting the anterolateral and posterior aspects. It also helps in ruling out other potential causes of ankle pain that may be present concurrently or mimic the symptoms of ankle impingement syndrome.

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