



Posterior ankle impingement in athletes: Pathogenesis, imaging features and differential diagnoses



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ARTICLE INFO

Article history:

Received 25 May 2015

Received in revised form 29 June 2015

Accepted 9 July 2015

Keywords:

Ankle impingement

Posterior

Os trigonum

Stieda's process

Posterior tibiotalar ligament

Intermalleolar ligament

ABSTRACT

Posterior ankle impingement is a clinical diagnosis which can be seen following a traumatic hyper-plantar flexion event and may lead to painful symptoms in athletes such as female dancers ('en pointe'), football players, javelin throwers and gymnasts. Symptoms of posterior ankle impingement are due to failure to accommodate the reduced interval between the posterosuperior aspect of the talus and tibial plafond during plantar flexion, and can be due to osseous or soft tissue lesions. There are multiple causes of posterior ankle impingement. Most commonly, the structural correlates of impingement relate to post-traumatic synovitis and intra-articular fibrous bands-scar tissue, capsular scarring, or bony prominences. The aims of this pictorial review article is to describe different types of posterior ankle impingement due to traumatic and non-traumatic osseous and soft tissue pathology in athletes, to describe diagnostic imaging strategies of these pathologies, and illustrate their imaging features, including relevant differential diagnoses.

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1. Introduction

The term "impingement" represents painful limitation of motion. Posterior ankle impingement is a clinical diagnosis which may complicate an acute traumatic hyper-plantar flexion event or may relate to repetitive low-grade trauma associated with hyper-plantar flexion, e.g., in female dancers ('en pointe' or the 'demi-pointe'), downhill running, football players, javelin throwers and gymnasts [1–3]. The forceful plantar flexion that occurs during these activities produces compression at the posterior aspect of the ankle joint and can put extreme pressure on the anatomic structures normally present between the calcaneus and the posterior part of the distal tibia. Through exercise, the joint mobility and range of motion may gradually increase, progressively reducing the distance between the calcaneus and the posterior portion of the distal tibia [4]. Symptoms of posterior ankle impingement are due

to failure to accommodate the reduced interval between the posterosuperior aspect of the talus and tibial plafond during plantar flexion [5]. There are multiple causes of posterior ankle impingement. These include bony lesions, posteromedial and posterolateral soft tissue lesions, and anomalous and accessory muscles.

Multimodality imaging including radiography, CT, ultrasound and MRI is useful for assessing the structural correlates of ankle impingement. MRI is particularly valuable for identifying or rule out other causes of persistent ankle pain that may mimic or coexist with ankle impingement, e.g., occult fractures, cartilage damage, intra-articular bodies, osteochondral talar lesions, tendon abnormalities, and ankle instability. MRI features supportive of impingement may be present in asymptomatic individuals and therefore accurate diagnosis requires careful clinical correlation.

The aims of this pictorial review article are to describe different types of posterior ankle impingement due to traumatic and non-traumatic osseous and soft tissue pathology, and to describe diagnostic imaging strategies of these pathologies and illustrate their imaging features, including relevant differential diagnoses.

2. Anatomy relevant to posterior ankle impingement

In athletes presenting with posterior ankle impingement symptoms, radiologists should pay specific attention to the presence of

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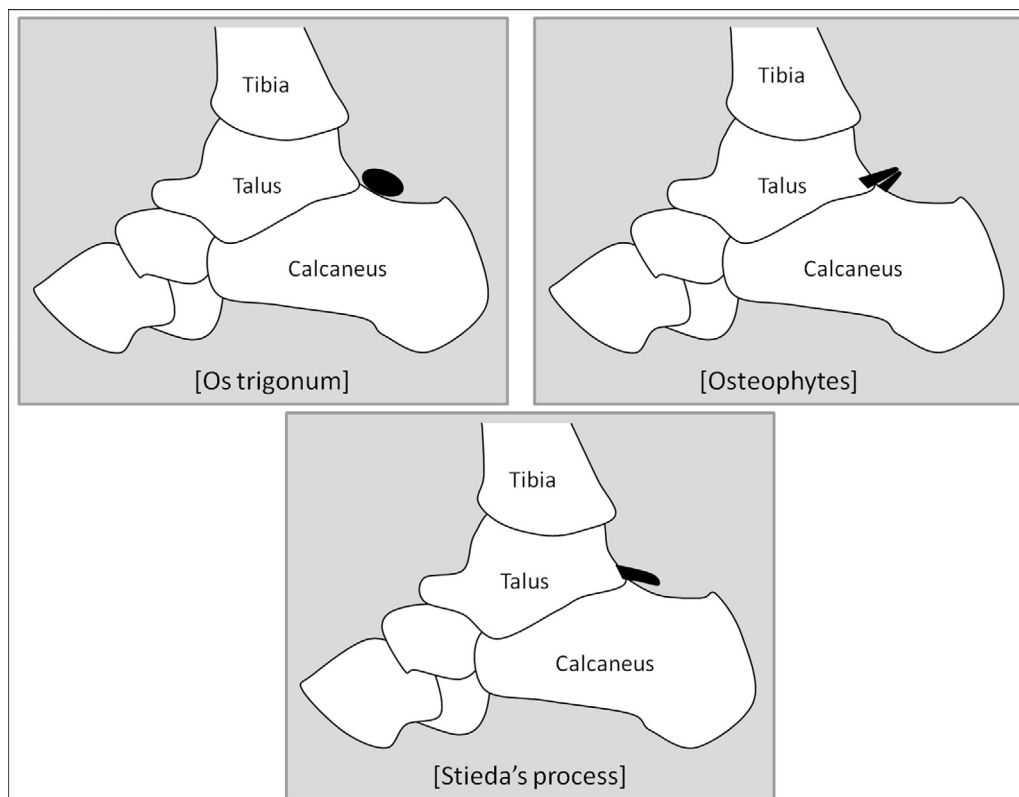


Fig. 1. Schematic illustration of os trigonum, osteophytes and Stieda's process.

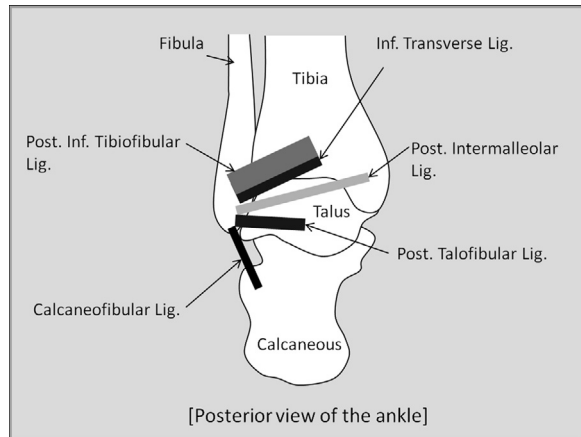


Fig. 2. Schematic illustration of the posterior view of the ankle.

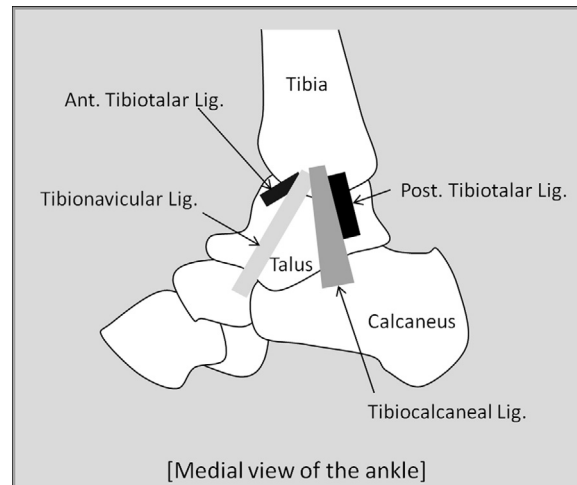


Fig. 3. Schematic illustration of the medial view of the ankle.

os trigonum, Stieda process (posterolateral talar process) (Fig. 1), posterior capsule and the posterior talofibular, intermalleolar, and tibiofibular ligaments (Fig. 2), and the flexor hallucis longus tendon [6]. Additionally, posteromedial tibiotalar capsule and posterior deltoid fibers (specifically those of the posterior tibiotalar ligament between the talus and medial malleolus) should be assessed for abnormality related to posteromedial impingement [7] (Fig. 3). In the diagnostic report, in addition to standard dictation based on a generic template used in each institution, the above structures should be specifically mentioned to describe whether they are normal or abnormal. For interested readers, the Radiological Society of North America Radiology Reporting Initiative published a clear and concise structured report template for MRI of the ankle

[Table 1] (available online at <http://www.radreport.org/template/0000041>). Note; however, this template is not specifically tailored for posterior ankle impingement. One should add description of specific details related to aforementioned anatomical structures when reporting a posterior ankle impingement case.

3. Imaging strategies for posterior ankle impingement

The first step in the imaging assessment of posterior ankle impingement is to identify anatomical variants using conventional radiography. Routine anteroposterior (AP) ankle view typically do not reveal abnormalities related to posterior impingement. On the

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