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List of abbreviations

Abbreviations	Description
AITFL	Anterior inferior tibiofibular ligament
AO	Association Orthopedic
AP	Anteroposterior
CT	Computerized tomography
DTTL	Distal tibio talar ligament
EDL	Extensor digitorum longus
EMG	Electromyography
GA	Gastrocnemius muscle
HS	Heel strike
ITL	Inferior transverse tibiofibular ligament
K wire	Kirschner wire
MRI	Magnetic resonance imaging
O.R.I.F	Open reduction & internal fixation
PITFL	Posterior inferior tibiofibular ligament
PL	Peroneus longus muscle
PL	Posterolateral
PM	Posteromedial
ROM	Range of motion
SO	Soleus muscle
STJ	Subtalar Joint
TA	Tibialis anterior

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Aim of the work

Aim of the work is to highlight on the posterior malleolus fractures, to clear out its mechanism of injury, different methods of treatment of its fractures, possible complications and its impact on ankle function.

Introduction

The posterior malleolus is the back edge of the bottom of the tibia, or shinbone. The tibia ends in a slightly flared, concave joint with two slight knobs. The knob situated over the heel bone, at the back of the ankle, is the posterior malleolus. (1)

This part of the bone provides connection points for tendons to stretch from the bottom of the tibia to the bones in the ankle. It's difficult for a person to feel this bone through the skin because it's covered by fibrous connective tissue. The best way for it to be observed is through an X ray. (1)

Although it is small, the posterior malleolus is a strong, load-bearing bone. When standing, humans often rest most of their weight on their heels, compressing the tendons around it. This dense little knob takes the weight and distributes it throughout the ankle with the help of the medial and lateral malleoli, as well as the connective tissue surrounding all three bones. (1)

Fractured ankles can occur in any of the malleolus bones, but fractures in the posterior one are particularly devastating. The bone in the back of the ankle takes and distributes most body weight, so breaks in this area can be very painful. A person who has a broken posterior malleolus often cannot walk until the fracture is fully healed.(1)

Fractures in the posterior malleolus might also threaten the tendons around it. Sharp, fractured bone could slice into the tendons, further injuring the ankle. If this little bone is broken and separated, not just fractured, the bone could push against the inside of the tendon connections and tear them. Someone who has a possible injury to the

posterior malleolus should not try to stand or walk, because this could cause more damage. Instead, someone with an injured ankle should be lifted or carried to a place where he or she can be examined and treated. [1]

Fractures of the malleoli are common. Court-Brown et al calculated an incidence of 125/100000/year. They occur equally in both sexes, but are commoner in young men and old women. They are increasingly becoming an elderly person's osteoporotic fracture. [2]

Most ankle fractures are low-energy twisting injuries sustained in falls, and only 1-2% is open injuries. [2]

Fractures of the posterior malleolus almost always occur in association with a fracture of the lateral malleolus and a medial injury. "Isolated" posterior malleolar fracture should lead to suspicion of a proximal fibular (Maisoneuve) fracture and/or a major soft tissue disruption. [3]

Haraguchi et al (2006), using CT, found that 2/3 of posterior malleolar fractures were wedge-shaped and related to the posterior tibiofibular ligament, but 20% were transverse, extending to the medial malleolus, and 15% were small posterior shell fragments [3]

A number of biomechanical studies suggest that tibiotalar instability occurs with a posterior fracture that separates 30-40% of the joint surface, in the posterolateral position, from the rest of the plafond. It is difficult to measure the proportion of separated joint surface from plain X rays, as the fracture line is usually oblique. Ebraheim et al (1999) recommended the use of external rotation lateral views. [3]

Clinical studies, however, have not shown a clear proportion of posterior separation that predicts a poor result. Both Harper (1988) and Jaskulka (1989) found that outcome was determined by the overall severity of the fracture and the adequacy of reduction. There have been no prospective clinical studies or trials. [4]

Recent studies have explored the importance of the posterior malleolus in syndesmotic injuries. Gardner (2006) demonstrated in a cadaver model that posterior malleolar fixation restored 70% of syndesmosis stability compared with 40% after syndesmotic screw insertion. Miller (2010) then demonstrated, in a small series that open reduction and stabilization of the syndesmosis produced equivalent clinical results to syndesmosis screw fixation. They recommended (Miller 2009) direct visual confirmation of syndesmotic reduction and described the use of the posterolateral approach to achieve this. By using this method, they reduced the rate of syndesmotic malreduction from 52% to 16%.[5]

The presence of a posterior malleolar fragment usually indicates that the ankle has received a greater amount of trauma [6]and so these injuries may either be susceptible to worsen outcome with pain and dysfunction even at two years following injury. There are biomechanical advantages to fixing the posterior malleolus to reduce the peak pressure distribution, which has a role in post-traumatic osteoarthritis although the literature reveals no consensus to the size of the fragment requiring fixation. [7]When surgeons themselves were asked when 50% of the articular surface was involved, 97% would fix the fracture however, when the size fell to 10% only 9% would perform internal fixation. [8]

The stabilization of the posterior malleolus and the posteroinferior tibiofibular ligament may also stabilize the syndesmosis, giving good functional outcome.[9] It is worthwhile noting that with this entire fixation "isolated" posterior malleolar fractures do well being managed conservatively. [10]

I-Ankle joint osteology

The ankle is a three-bone joint composed of the tibia, fibula, and talus. The talus articulates with the tibial plafond superiorly, the posterior malleolus of the tibia posteriorly, and the medial malleolus medially. The lateral articulation of the talus is with the lateral malleolus portion of the fibula.[11]

1) lower end of the tibia:

The anteromedial aspect of the distal tibia is composed of the medial malleolus to which the fibers of the deltoid ligament are attached.[12],[13]

The medial malleolus composed of the anterior and posterior colliculi separated by the intercollicular groove. The anterior colliculus is the narrower and most distal portion of the medial malleolus and serves as the origin of the superficial deltoid ligaments. The intercollicular groove and the posterior colliculus, which is broader than the anterior colliculus, provide the origin of the deep deltoid ligaments.[14]

The distal lateral border of the tibia is concave with anterior and posterior tubercles. The anterior tubercle (Chaput tubercle) is the origin of the anterior inferior tibiofibular ligament (AITFL) and the posterior tubercle is the origin of the deep component of the posterior inferior tibiofibular ligament (PITFL). The anterior tubercle overlaps the fibula, and this relationship is the basis of the radiologic interpretation of the status of the syndesmosis. The more superficial fibers of the posterior tibiofibular ligaments are also attached to the posterior tubercle.[14]