MR IMAGING IN THE DIAGNOSIS OF THE ANKLE JOINT LESIONS

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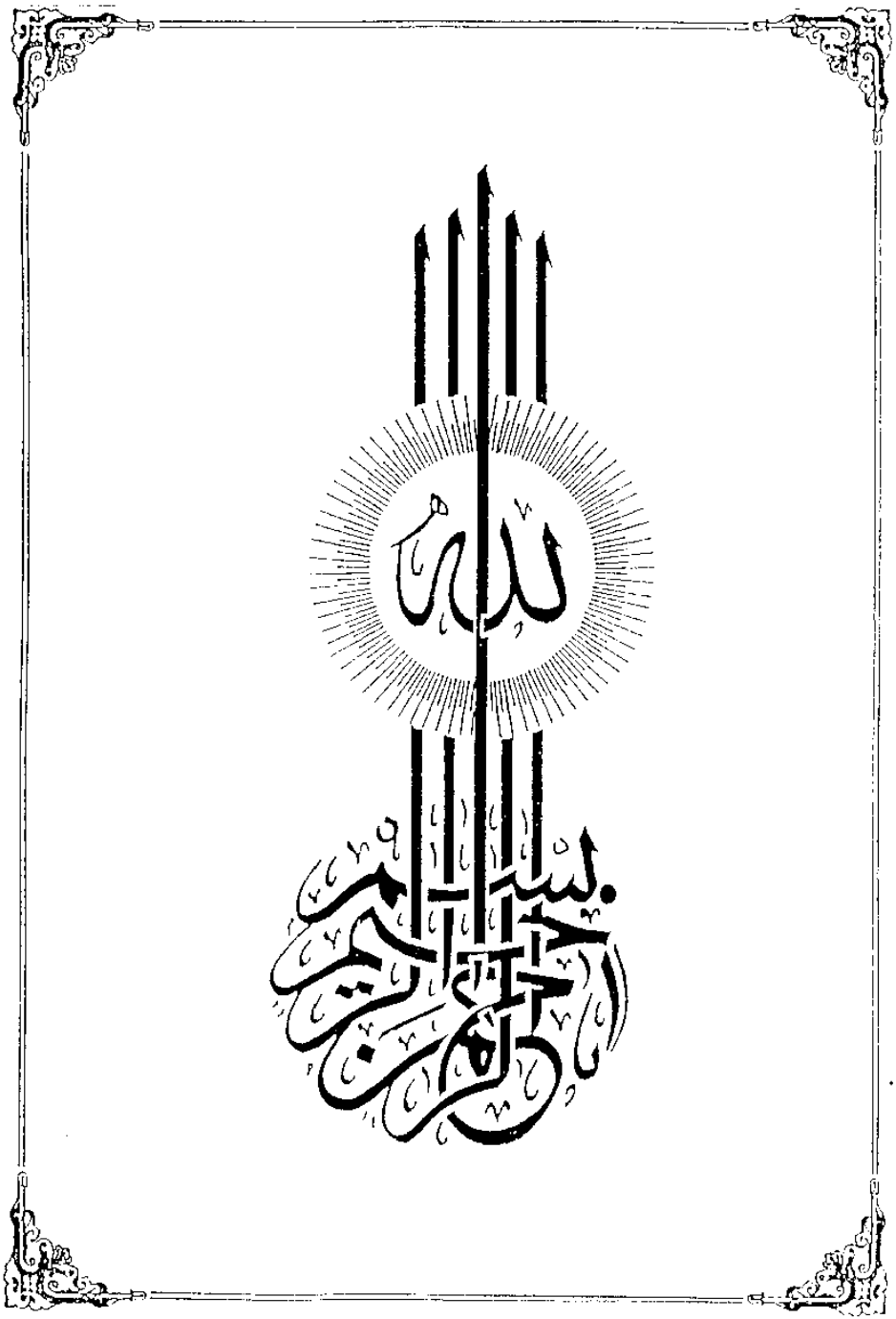

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INTRODUCTION

During the past decade there has been an explosion of interest in the clinical application of magnetic resonance (MR) to medical imaging. The high soft tissue and spatial resolution of MR, coupled with its multiplanar capability, have proven ideal for the noninvasive depiction of all the principal components (e.g., bone, muscle, ligaments) of the musculoskeletal system. MR Imaging (MRI) has provided a window through which we can observe a wide spectrum of abnormalities involving bone and soft tissue. Many of the disorders depicted by MRI have previously eluded diagnosis by other available diagnostic methods, and the technique has afforded us a unique opportunity for increasing our awareness and understanding of many of these disorders. MRI has rapidly become a well established diagnostic technique that in many situations has already displaced previously established methods (e.g., arthrography of the ankle) and is posing significant challenges to many others.

ANATOMY

Anatomy of The Ankle Joint

Gross Anatomy

This synovial joint, properly called the tibiotalal joint although the fibula also takes part in it (Fig. 1), is usually described as being of the hinge variety; but its movements are not quite those of a simple hinge, for the axis of rotation is not fixed but changes between the extremes of plantarflexion and dorsiflexion *(Last RJ, 1990)*.

Articular Surfaces:

The Proximal articular surface formed by the cartilage-covered areas on the lower ends of the leg bones provides the socket (Fig. 2). Its roof is formed by the distal surface of the tibia; this is wider in front than behind, is slightly convex from side to side, and is concave from before backwards. Posteriorly the articular surface projects downwards slightly and the socket is deepened further by the posterior tibiofibular ligament . The medial wall is the lateral surface of the medial malleolus and its articular cartilage is continuous with that of the roof at a rounded angle. The lateral wall is the triangular facet on the

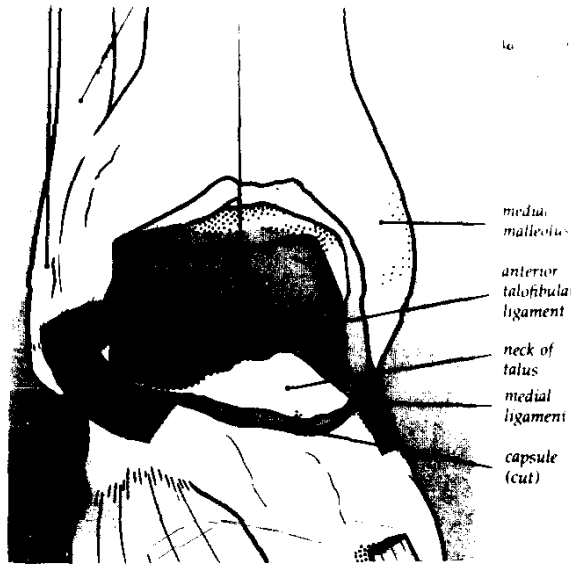

Fig. 3 : An anterior view of the Ankle joint and its articular surfaces is revealed by removal of the capsule . *(Quoted from Stoller DW. 1993)*

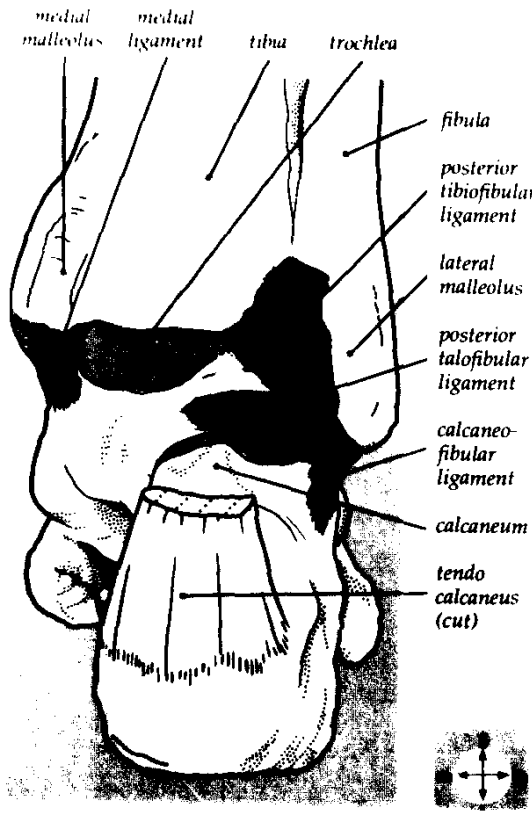

Fig. 4 : The posterior view of the Ankle joint shows the articular surface of the Talus after removal of the capsule . *(Quoted from Stoller DW. 1993)*

anterior part of the medial side of the lateral malleolus. In the angle between this wall and the roof is the narrow cleft between the tibia and fibula distal to the interosseous ligament .

The distal articular surface is formed entirely by the upper part of the body of the talus-the trochlea tali- which has the approximate shape of the upper part of a short cylinder placed transversely (Fig. 3). However, the radius of curvature decreases and the trochlea tali is slightly broader in front, the lateral surface often sloping medially at the back. The upper surface articulates with the roof of the socket (tibia), which also is broader in front. The upper trochlear surface is slightly concave transversely to fit the convexity of the tibial surface.

The cartilage on the top of the trochlea is continued on to its sides. The medial articular surface is vertically set, and is shaped like a comma laid on its side, tail backwards; it is opposed to the medial malleolar wall of the proximal articular surface.

The lateral articular area of the trochlea is triangular and very much larger than the medial articular area. Inferiorly, it curves laterally to a projecting apex, while posteriorly it slopes medially (Fig. 4). It articulates with the facet on the lateral malleolus and posterosuperiorly, with the inferior part of the posterior tibiofibular ligament (transverse tibiofibular ligament) where the

angle between the upper and lateral surfaces of the trochlea is bevelled *(Romanes GJ, et al. 1981).*

Fibrous Capsule:

Surrounds the joint; it is thin in front and behind and attached above to the borders of the articular surfaces of the tibia and malleoli, and below, to the talus close to the margins of the trochlear surface except in front where it is attached to the dorsum of the neck of the talus at some distance in front of its superior articular surface. It is supported on each side by strong collateral ligaments. The posterior part of the capsule consists principally of transverse fibers. It blends with the inferior transverse ligament and is some what thickened laterally where it reaches as far as the malleolar fossa of the fibula *(Gray H. 1976).*

Synovial membrane:

The synovial membrane of the joint lines the fibrous capsule and covers fat pads lying anteriorly and posteriorly . A synovial fold occupies the cleft between the tibia and fibula below the base of the interosseous tibiofibular ligament; the sides of this cleft may be lined by an extension of the articular cartilage of the tibia and fibula *(Romanes GJ, et al. 1981).*