Evaluation of Calcaneal Fractures by Multi Detector CT and Its Significant Effect on the Surgical Management Planning

Thesis

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Doaa Sobhy Aneis

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List of Abbreviations

Abb.	Full term
AJ	*Ankle Joint*
APC	*Anterior Process of the Calcaneus*
CCJ	*Calcaneocuboid Joint*
CT	*Computed Tomography*
HS	*Highly Significant*
Lp	*Lateral Process*
LPT	*Lateral Process of the Talus*
MDCT	*Multi Detector Computed Tomography*
MPR	*Multi Planar Reconstruction*
M-STJ	*Middle Facet of the Subtalar Joint*
NS	*Non Significant*
ORIF	*Open Reduction and Internal Fixation*
P	*Posterior*
Pl	*Peroneus Longus*
P-STJ	*Posterior Facet of the Subtalar Joint*
S	*Significant*
SC	*Sulcus Calcanei*
SD	*Standard Deviation*
ST	*Sustentaculum Tali*
T	*Tuberosity*
TNJ	*Talonavicular Joint*

Abstract

This study aimed to look at the role played by the multi detector computed tomography (MDCT) in assessing calcaneus fractures and delineate the fracture fragment which help in decision making in the management of extra and intra articular fractures of the calcaneum and pre-operative planning.

A total of 41 cases with calcaneal fracture were included. MDCT films were performed. Sanders classification for intraarticular fractures was used. The study showed that MDCT is the best method of assessing calcaneus fractures, delineate the fracture fragment and help in making the pre-operative planning.

Keywords: Computed Tomography, Calcaneal Fracture, Sanders classification, Musculoskeletal

INTRODUCTION

The calcaneus is the largest and most commonly fractured of the tarsal bones. Calcaneal fractures represent only about **2%** of all fractures but **60%** of fractures involving the tarsal bones ***(Clare et al., 2011).***

Familiarity with the normal calcaneal anatomy is important for understanding fracture mechanisms and classification schemes. Clinical presentation at the time of evaluation generally includes *(a)* a history of a fall from a height, and *(b)* certain signs that aid the physician in identifying possible calcaneal fractures ***(Badillo et al., 2011).***

Modern calcaneal fracture classification systems rely heavily on computed tomography (CT) because of its three-dimensional approach, rather than on two-dimensional conventional radiography as was used in the past. Use of multidetector CT has allowed the development of classification systems that correlate with management ***(Clare et al., 2011).***

The Sanders classification system is the most commonly used system for describing intra articular fractures of the calcaneus, which account for the majority of calcaneal fractures. Extra articular fractures are classified according to a tripartite anatomic division of the calcaneal surface. Treatment can be either surgical or conservative depending on the radiologic classification of the fracture ***(Heger et al., 2015).***

Familiarity with calcaneal anatomy and fracture patterns is essential for radiologists to guide the treating physicians ***(Badillo et al., 2011).***

AIM OF THE WORK

This study aimed to look at the role played by the multi detector computed tomography (MDCT) in assessing calcaneus fractures and delineate the fracture fragment which help in decision making in the management of extra and intra articular fractures of the calcaneum and pre-operative planning.

Chapter 1
ANATOMY OF THE CALCANEUS

The calcaneus is designed to withstand the daily stresses of weight bearing. Understanding of the anatomy of the calcaneus is essential in determining the patterns of injury and treatment goals and options ***(Moore et al., 2007).***

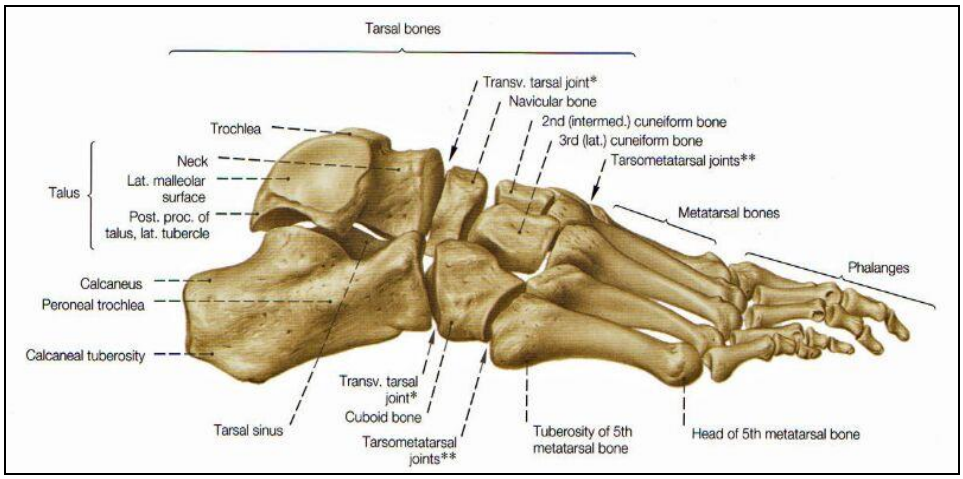

Figure (1): In this image, we can see different parts of foot bone anatomy like calcaneus bone, cuboid bone, fibula, tibia, navicular bone, cuneiform bone, talus bone, metatarsal bone, phalanges bone anatomy in detail.

The calcaneus has four articulatoin surfaces, three superior and one anterior **(Figure 2).** The superior surfaces, the posterior, middle, and anterior facets articulate with the talus. The posterior facet is separated from the middle and anterior facets by a groove that runs posteromedially, known as the *calcaneal sulcus*.

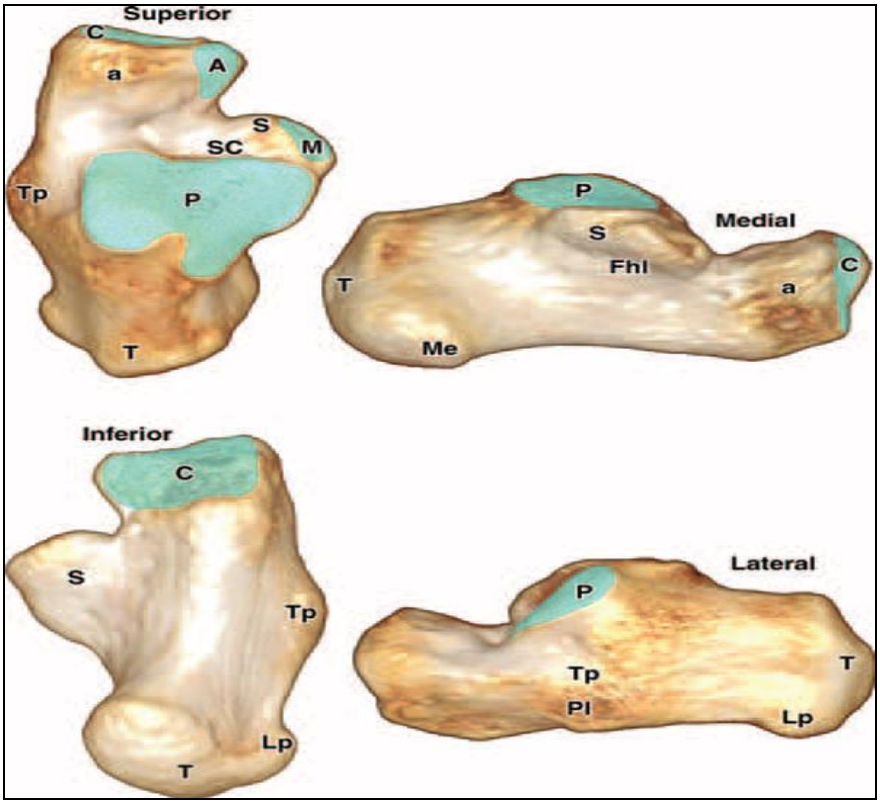

Figure (2): Drawings illustrate the anatomy of the calcaneus, including the anterior process of the calcaneus *(a)*, anterior facet of the talus *(A)*, anterior facet of the cuboid bone *(C)*, groove for the flexor hallucis longus tendon *(Fhl)*, lateral process *(Lp)*, middle facet of the talus *(M)*, medial process *(Me)*, posterior facet *(P)*, peroneus longus groove *(Pl)*, sustentaculum tali *(S)*, sulcus calcanei *(SC)*, posterior tuberosity *(T)*, and trochlear process *(Tp)* ***(Badillo et al., 2011).***

The canal formed between the calcaneal sulcus and the talus is called the *sinus tarsi*. The middle calcaneal facet is supported by the sustentaculum tali and articulates with the middle facet of the talus. The anterior calcaneal facet articulates with the anterior talar facet and is supported by the calcaneal beak. The triangular anterior surface of the calcaneus articulates with the cuboid ***(Gray, 2009).***