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A study of usefulness of X-Ray in diagnosis of ligamental tear in talocrural joint

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Abstract
At times the deltoid ligament pulls the medial malleolus thereby causing avulsion fracture of the malleolus. Potts fracture occurs when the foot is caught in the rabbit hole in the ground and the foot is forcibly everted. In this condition at first there is an oblique fracture of shaft and lateral malleolus of fibula. The strong eversion pull on the deltoid ligament causes transverse fracture of medial malleolus. If the tibia is carried anteriorly, the posterior margin of the distal end of the tibia is also broken by the talus producing a trimalleolar fracture. So in order to understand the usefulness of X-Ray in diagnosis of ligamental tear in talocrural joint this study has been conducted.

Keywords: talocrural, x-ray, ligamental, deltoid, malleolus.

Introduction
The ankle joint is one of the most frequently injured joint [1]. The ankle injuries occur in the plantar flexed position of the foot. The lateral ligament is injured more often when compared to medial [2-12]. A sprained ankle results due to tear of anterior talofibular and calcaneofibular ligaments when the foot is twisted in lateral direction. In forcible eversion of the foot the deltoid ligament may be torn [13]. At times the deltoid ligament pulls the medial malleolus thereby causing avulsion fracture of the malleolus. Potts fracture occurs when the foot is caught in the rabbit hole in the ground and the foot is forcibly everted [14-15]. In this condition at first there is an oblique fracture of shaft and lateral malleolus of fibula. The strong eversion pull on the deltoid ligament causes transverse fracture of medial malleolus. If the tibia is carried anteriorly, the posterior margin of the distal end of the tibia is also broken by the talus producing a trimalleolar fracture [16-22].
Conventionally X-ray techniques have been used to diagnose ligament injuries.
Magnetic resonance (MR) imaging has opened new horizons in the diagnosis and treatment of many musculoskeletal diseases of the ankle and foot. It demonstrates abnormalities in the bones and soft tissues before they become evident at other imaging modalities.
So in order to understand the usefulness of X-Ray in diagnosis of ligamental tear in talocrural joint this study has been conducted.

Aims and Objectives
To study and understand the usefulness of X-Ray in diagnosis of ligamental tear in talocrural joint.

Materials and Methods
This study was done in the Department of Radiology, Kanachur Institute of Medical Sciences, Mangalore. The study was done from Feb 2019 to July 2019.
Thirty healthy individuals were made to undergo ankle x-ray and the following were measured for

- Talocrural Angle.
- Tibial overlap.
- Tibiofibular distance.
- Joint Space A.
- Joint Space B.

Fig 1: X-ray AP, view Talocrural Joint.

Results

Table 1: Side difference

	Side	Mean	Std. Deviation	Sig. (2-tailed)
Talocrural angle°	R	13.1	1.51	0.56
	L	13.02	1.53	
Tibial overlap	R	10.62	0.81	0.17
	L	10.4	0.63	
Joint space a	R	2.91	0.33	0.51
a	L	3.12	0.42	
Joint Space b	R	3.08	0.37	0.977
b	L	3.01	0.31	
Tibio Fibular Distance	R	3.49	0.32	0.71
space	L	3.52	0.21	

Table 2: Sex Difference

	Sex	Mean	Std. Deviation	Sig. (2-tailed)
Talocrural angle°	M	12.96	1.48	0.89
	F	13.1	1.62	
Tibial overlap	M	10.42	0.49	0.162
	F	10.82	0.71	
Joint space a	M	3.01	0.47	0.952
a	F	3.08	0.34	
Joint Space b	M	3.06	0.41	0.42
b	F	3.02	0.37	
Tibio Fibular Distance	M	3.61	0.32	0.28
space	F	3.61	0.37	

Discussion

The talocrural joint is a major weight bearing joint of the body. The weight of the body is transmitted from the tibia and fibula to the talus which distributes the weight anteriorly and posteriorly within the foot. One sixth of the static load of the leg is carried by the fibula at the tibiofibular joint [1]. These require a high degree of stability which is determined by the passive and dynamic factors [2]. The passive stability depends on the contour of the articular surfaces, the integrity of the collateral ligaments, the integrity of the distal tibiofibular ligaments, the reticular system around the ankle and the crossing and attached tendon tunnels. The dynamic stability is conferred by gravity, muscle action, and the reaction between the foot and the ground. Patil MS *et al.* [1] in 2012 in their study on anthropometric measurements of ankle mortise for evaluating mortise fracture reductions with an aim to develop contoured implants measured the talocrural angle, tibiofibular clear space, tibiofibular overlap and compared joint clear space at two places. Anteroposterior radiographs, of both ankles in 20 adult individuals formed the material. They agreed that the talocrural angle of two ankles of a given individual does not vary by more than 2 degrees. Tibiofibular clear space on Anteroposterior radiographs measured a mean value of 2.4 mm with a standard deviation of 1.3 mm. Tibiofibular overlap on Anteroposterior radiographs was measured as 11.2 mm with a standard deviation of 4.4 mm. Joint spaces at two levels were almost equal. Chen Yan-Xi *et al.* [2] in 2011 on a study of three-dimensional morphological characteristics measurement of ankle joint based on computed tomography image post-processing, commented that the mean talocrural angle (10.01±0.38)° was measured to be 10.1 degrees with a standard deviation of 0.38 degrees Tibiofibular clear space mean measurements were 2.78 mm, with a standard deviation of 0.19 mm. There was no significant correlation to gender, height and weight (P >0.05) in 100 cases, (50 males and 50 females). Our study is in agreement with the above discussed studies.

Conclusion

This study is successful in giving us the base values of the measurements in the talo crural joint. Any deviation from the above means there is a problem with the talo-crural ligamental complex. Many such studies has to be conducted in order to get a linear regression model for our population.

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