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Morphometry of Articular Facets of The Body of Talus

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Abstract:
Background: *In the formation of Ankle joint, tibio-fibular mortice receives superior, medial and lateral articular surfaces of body of Talus. Because of very limited availability of the data on the Morphometry of the articular facets on the Body of the dry human Tali, this study was undertaken.*
Aims: *To prepare morphometric data of the articular facets on the superior, medial and lateral surfaces of body of Talus, to find if there is any difference between both the sides of measurements and to compare the results with the previous studies.*
Methods and Material*: 42 Dry Human Tali (20 Right and 22 Left) were measured with Digital vernier caliper for the following Measurements: 1.On the Trochlear surface: Medial length, Central length, Lateral length, Anterior width, Central width, Posterior width. 2.On the lateral triangular articular facet: Central height, Central width. 3. On the coma shaped medial articular facet: Central height, Central width.*
Results: *Superior Articular Surface:On the superior Articular surface, the mean values of Medial, Central and Lateral length were 28.4,29.4 and 28.4mm on Right side and 31.0, 28.0 and 30.0mm on Left side. Mean Anterior, Central and Posterior widths were 28.5, 26.4 and 21.3mm on right side and 26.1, 24.4 and 22.7mm on left side.Medial Articular Surface: Mean central height on the medial articular surface was 12.4mm on the right side and 10.2mm on the left side, Mean central width on the medial articular surface was 24.0mm on the right side and 18.2mm on the left side. Lateral Articular Surface:Mean central height on the lateral articular surface was 22.14mm on the right side and 26.0mm on the left side. Mean central width on the lateral articular surface was 20.8mm on the right side and 16.3mm on the left side.*
Conclusion:*The trochlear articular surface is wider in front, measurements of opposite talus bone can be used as a control during talus bone replacement surgery, it may help surgeons to plan pre-operatively to design accurate talus bone prosthesis and talus implants.*
Keywords: *Articular facets, Talus, Trochlear surface, Comma shapedfacet, Triangular facet.*

I. Introduction

Talus receives the whole weight of the Body and transmits it to the tarsal bones. Talus forms the connecting link between the bones of the foot and the leg. The superior surface and adjacent medial and lateral surfaces of the Body of Talus are received by the Tibio-fibular mortice and form the ankle joint [1]. The talar trochlear surfaces is convex parasagittally and gently concave transeversely, being wider in front. The talar articular surface for medial malleolus is fairly flat, coma shaped and deeper anteriorly. The larger lateral talar articular surface is triangular and vertically concave [2]. A clear understanding of these articular surfaces has applications in designing of ankle braces to ankle implants and in total ankle replacements. Till today, studies have been done on talar morphological features like length, breadth, height, volume, Angles of declination and inclination, Anatomical variations of trochlear surface etc.[3,4,5]. That is the reason we have taken this topic.

II. Material and methods:

The study was conducted on dry Human Tali. The Human Tali were obtained from the bone collection of the Department of Anatomy of Osmania and Kakathiya Medical College in Telangana Region. 42 Dry Human Tali (20 Right and 22 Left) undamaged Human Tali were selected for the study. These Human Tali were of undetermined gender and age separated into right side and left side Tali. Each right and left Human Tali were assigned a serial number. Anatomical measurements were taken on human Tali using a vern iercaliper.

1. On the Trochlear surface: Medial length, Central length, Lateral length, anterior width, Central width, Posterior width (Fig1)
2. On the lateral triangular articular facet: Central height, Central width (Fig 2).
3. On the coma shaped medial articular facet: Central height, Central width (Fig 3).

The Data was tabulated and Analysed. Range and Mean values of each measurement were calculated. Compare the difference between Right and Left sides of measurements.

III. Results

Superior Articular Surface:On the superior Articular surface, the mean values of Medial, Central and Lateral length were 28.4,29.4 and 28.4mm on Right side and 31.0, 28.0 and 30.0mm on Left side. Mean Anterior, Central and Posterior widths were 28.5, 26.4 and 21.3mm on right side and 26.1, 24.4 and 22.7mm on left side.

Medial Articular Surface: Mean central height on the medial articular surface was 12.4mm on the right side and 10.2mm on the left side, Mean central width on the medial articular surface was 24.0mm on the right side and 18.2mm on the left side.

Lateral Articular Surface: Mean central height on the lateral articular surface was 22.14mm on the right side and 26.0mm on the left side. Mean central width on the lateral articular surface was 20.8mm on the right side and 16.3mm on the left side.

IV. Discussion

This measurements shows that trochlear articular surface is wider in front . The comparision of the measurements taken on the superior articular surface of the body of Talus between right and left tali were almost similar with little significant difference. Mean values of Medial, central and lateral lengths were higher in the study done by Dr. ShishirKumar(6) when compare to present study. Gautham K[7] found in his study the mean maximum transeverse width on the body of Talus was 37.94mm on the right side and 36.80mm on the left side which was higher compared to present study. Mean Trochlear length was 30.62mm on right side and 30.44mm on the left side. Ilhan Otag[8] found in his study that the mean values of talar width, Trochlear length and Trochlear breadth were 40.79, 33.45 and 31.69mm on right side and 43.39, 34.12 and 31.72mm on the left side respectively which were higher compared to present study.

V. Conclusion

The trochlear articular surface is wider infront, there is no significant difference between right and left sides of measurements. The difference in the mean values compared to other studies may be due to inherent population variations which may be because of genetic and environmental factors like climate, nutrition etc. As there is no significant difference between right and left sides of measurements, measurements of opposite talus bone can be used as a control during talus bone replacement surgery, it may help surgeons to plan pre-operatively the complex talar fracture surgeries, to design accurate talus bone prosthesis and talus implants[9].

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Table1: Range and Mean of measurements of the articular facet on Superior articular surface of body of Talus, comparison between right and left sides.

Trochlear surface of Talus				
Parameter	Right side (range of parameter)	Right side (mean value)	left side (range of parameter)	Left side (mean value)
Medial Length	20-40mm	28.4	20-40mm	31.0
Central Length	21-35mm	29.4	20-40mm	28.0
Lateral Length	20-40mm	28.4	22-45mm	30.0
Anterior Width	22-35mm	28.5	20-30mm	26.1
Central Width	20-30mm	26.4	20-30mm	24.4

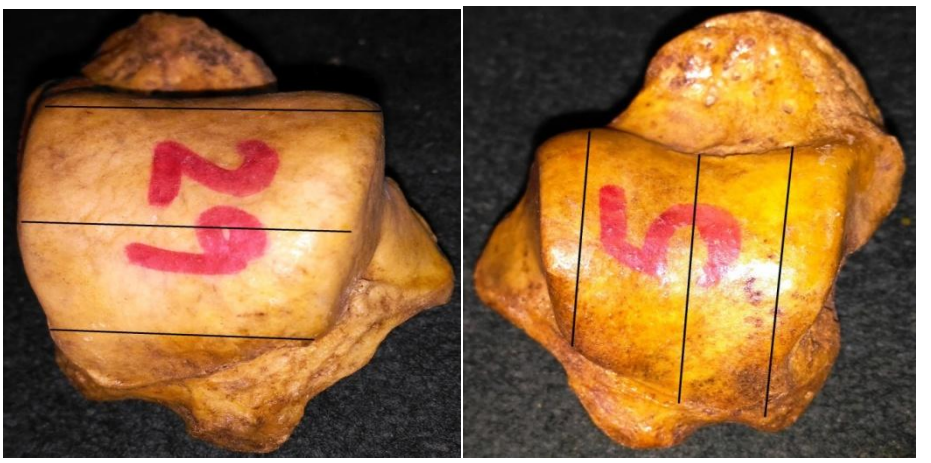
Posterior Width	16-30mm	21.3	15-25mm	22.7

Table2: Range and Mean of measurements of the articular facet on Lateral surfaces of body of Talus, comparison between right and left sides.

Lateral triangular Articular Facet				
parametrer	Right side (range of parameter)	Right side (mean value)	Left side (range of parameter)	Left side (mean value)
Central Height	20-35mm	26.0	18-30mm	22.7
Central Width	15-25mm	20.8	14-25mm	16.3

Table3: Range and Mean of measurements of the articular facet on Medial surface of body of Talus, comparison between right and left sides.

Coma shaped medial Articular Facet				
parameter	Right side (range of parameter)	Right side (mean value)	Left side (range of parameter)	Left side (mean value)
Central Height	10-28mm	12.4	08-15mm	10.2
Central Width	15-30mm	24.0	10-25mm	18.2



(a) **(b)**

(c) **(d)**

Fig: 1 Showing measurements of Articular facets of talus (a) & (b) Superior articular surface,(c)Coma shaped facet on medial surface, (d)Triangular facet on lateral surface.