Assessment of acetabulum in human dry hip bone

Dr. Swapna A Shedge[1], Dr. Manoj Ambali[2], Dr. Sandeep S Mohite[3],

[1]Associate Professor, [2]Professor, Department of Anatomy, Krishna Vishwa Vidyapeeth deemed to be University, Krishna Institute of Medical Sciences Karad, Maharashtra, India

ABSTRACT

Background: The acetabulum is a deep cup-shaped cavity on the lateral aspect of the hip-bone about its center and is directed laterally, downwards and somewhat forwards. The present study was conducted to assess acetabulum in human dry hip bone.

Materials & Methods: 82 dry human hip bone of either gender was selected. Parameters such as depth and diameters of acetabulum of the hip bone was recorded. Results of present study was also compared with previous study

Results: Out of 82 dry hip bones, 40 were of males and 42 were of females. The mean depth of acetabulum was 27.2±3.5 mm and diameters was 46.3± 2.3 mm. There was no correlation between two (r- 0.47).

Conclusion: The depth of acetabulum correlates with acetabular diameter so this information may be helpful during hip arthroplasty, treatment of joint fracture and in diagnosing congenital hip dysplasia.

Key words: acetabulum, hip arthroplasty, hip dysplasia

Introduction

The acetabulum is a deep cup-shaped cavity on the lateral aspect of the hip-bone about its center, and is directed laterally, downwards and somewhat forwards.[1] It is surrounded by an irregular projecting margin which is deficient inferiorly; this gap is termed the acetabular notch. The floor of the cavity is roughened and non-articular and is termed the acetabular fossa. The sides of the cup present a horseshoe-shaped articular surface which is widest superiorly; in this situation the weight of the trunk is transmitted to the femur in the erect attitude.[2] In the recent state this strip is covered with articular cartilage and provides the surface on which the head of the femur moves within the hip-joint. All three elements of the hip-bone contribute to the formation of the acetabulum in human, but not in equal proportions.[3]

The three main hip ligaments (iliofemoral, ischiofemoral, and pubofemoral) offer support. As the hip extends, all three ligaments get harder.[4] The ligaments and capsule of the hip are the stiffest when there is wide, little internal rotation, or abduction. The region of maximum bony congruency at most other joints is not the same as the location of highest ligamentous consistency at this joint. The hip's joint congruency is at its peak when the joint is flexed to 90 degrees. Other than the capsular hip ligaments, lesser ligaments may alter the hip joint's strength.[5] The present study was conducted to assess acetabulum in human dry hip bone.

Materials & Methods

The present study consisted of 82 dry human hip bone of either gender. The study was conducted in the department of Anatomy. The study was approved form institutional ethical committee.

Parameters such as depth and diameters of acetabulum of the hip bone was recorded. Results of present study was also compared with previous study. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I Distribution of patients

Total- 82		
Gender	**Male**	**Female**
Number	40	42

Table I shows that out of 82 dry hip bones, 40 were of males and 42 were of females.

Table II Assessment of parameters

Parameters	Mean	SD	Correlation
Depth	27.2	3.5	0.47
Diameter	46.3	2.3	

Table II, graph I shows that mean depth of acetabulum was 27.2±3.5 mm and diameters was 46.3± 2.3 mm. There was no correlation between two (r- 0.47).

Graph I Assessment of parameters

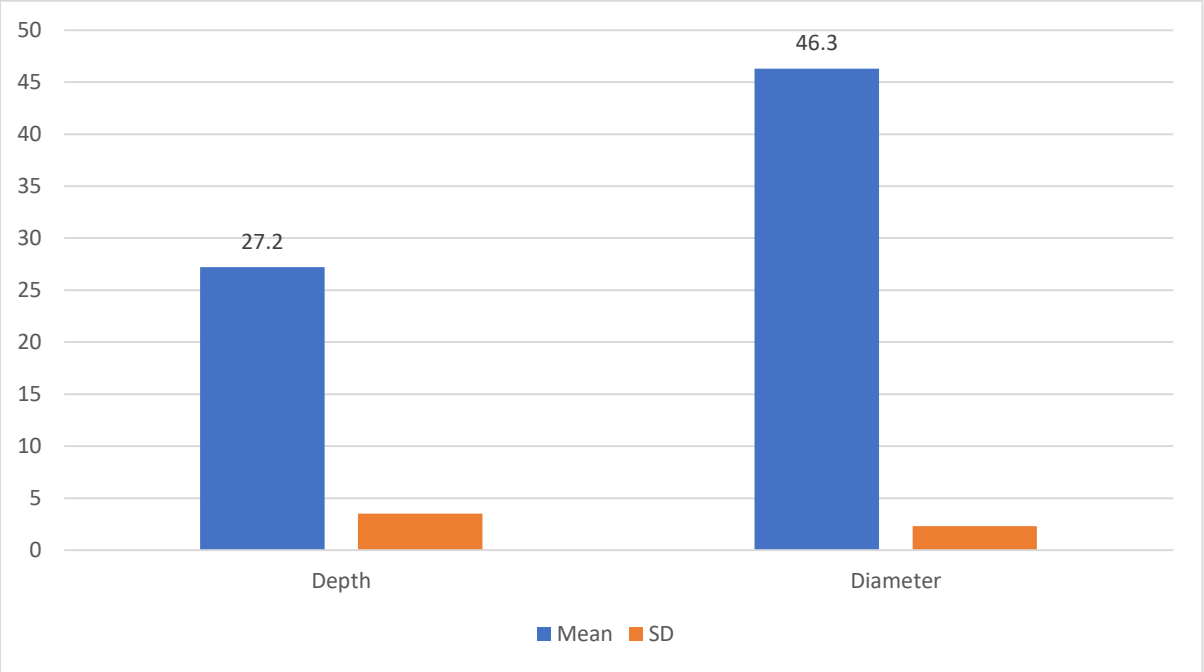

Table III Comparison with previous study

Parameters	Present study	Funda Tastekin Aksu	Jeremic Dejan
Depth	27.2	29.49	11.9
Diameter	46.3	54.29	2.8

Table III shows that mean depth was 29.49 mm and diameters was 54.29 mm in Funda Tastekin Aksu et al study and it was 11.9 mm and 2.8 mm in Jeremic Dejan et al study.

Discussion

The acetabulum (Latin Acetabulum-Shallow Vinegar Cup) is an approximately hemispherical cavity central on the lateral aspect of the innominate bone, facing antero-inferiorly and surrounded by an irregular margin deficient inferiorly at the acetabular notch.[6,7] The acetabular fossa forms the central floor and is rough and non-articular. The articular lunate surface is widest above (the 'dome'), where weight is transmitted to the femur. All three innominate elements contribute to the acetabulum, but unequally.[8] The pubis forms the anterosuperior fifth of the articular surface, the ischium forms the floor of the fossa and rather more than the posteroinferior two-fifths of the articular surface, and the ilium forms the remainder.[9] The present study was conducted to assess acetabulum in human dry hip bone.

We found that out of 82 dry hip bones, 40 were of males and 42 were of females. Kumar et al[10] selected 154 dry human hip bone of unknown sex. The mean ±S.D value of depth and diameter of acetabulum were 27.14 ± 3.50 mm, 47.57 ± 3.99 mm. The maximum and minimum measurements of acetabulum depth were 38.0 mm; 13.0 mm and maximum and minimum measurements of acetabulum diameter were 56.0 mm, 39.0 mm respectively.

We found that mean depth of acetabulum was 27.2±3.5 mm and diameters was 46.3± 2.3 mm. There was no correlation between two (r- 0.47). Ranjan et al[11] evaluated the relationship between depth and diameter of Acetabulum in 154 dry hip bone of Human. The mean ±S.D value of depth and diameter of acetabulum were 27.14 ± 3.50mm, 47.57 ± 3.99mm. The maximum and minimum measurements of acetabulum depth were 38.0 mm; 13.0 mm and maximum and minimum measurements of acetabulum diameter were 56.0 mm, 39.0 mm respectively.

We observed that mean depth was 29.49 mm and diameters was 54.29 mm in Funda Tastekin Aksu et al[12] study and it was 11.9 mm and 2.8 mm in Jeremic Dejan et al[13] study. Padmakaran et al[14] enrolled 300 dry hip bones of known gender in their study. The vertical diameter of acetabulum found to be significantly. This was observed that the average was found in male 49.49 ± 3.26 and in female 46.23 ± 3.55. The vertical diameter of acetabulum was found significantly higher in male comparison to that in the female. Steyn et al[15] noted that the males' vertical acetabular diameter (50.85123967 mm) was greater than the females' (47.22352941) and that the males' transverse acetabular diameter (48.1322314 mm) was greater than the females' (45.24705882 mm) and concluded that the diameter of the acetabulum was the single most dimorphic trait, offering, on average, 83.9% accuracy when employed alone. Sandhya K et al[16] conducted a morphometric study of acetabulum in

adult dry human pelvic bone and they observed that mean depth of the acetabulum was found significantly more in male as compared to females.
The limitation the study is small sample size.

Conclusion

Authors found that the depth of acetabulum correlates with acetabular diameter so this information may be helpful during hip arthroplasty, treatment of joint fracture and in diagnosing congenital hip dysplasia.

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