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Glenoid Fossa Morphology, a Study in Dry Adult Human Scapula

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Abstract: *Integrity of the glenoid cavity of scapula is needed for free movement of the upper limb. It is commonly affected by osteoarthritis and trauma. Arthroplasty which is the mode of treatment requires a proper and perfect prosthesis for better function of the joint. The measurements of glenoid cavity vary in different races and locality. The present study is to observe the dimensions of glenoid cavity of scapula in the state of Uttar Pradesh.*

Keywords: *Glenoid cavity, Dimensions, Arthroplasty, Prosthesis*

I. Introduction

The shoulder joint is a ball and socket variety of synovial joint. It has more mobility then stability. The lateral angle of the scapula is called the head of the scapula. It is also called glenoid fossa or glenoid cavity of scapula. The head of the scapula, is connected to the body by the neck of scapula [1]. The small glenoid fossa articulates with the larger head of the humerus making it a inherent instable joint. The stability of the humeral head on the glenoid fossa is provided by the musculotendinous cuff. Fracture of the glenoid rim is usually associated with dislocation of the glenohumeral joint [11]. The inherent instability of the joint makes the glenoid surgery, the most difficult procedure for the treatment of glenohumeral arthritis [2,3]. The shape of the glenoid cavity is variable. Anatomical parameters like shape, height, width, articular surface area and inclination of the glenoid cavity are relevant to design the prosthesis [9].

II. Materials And Methods

The study was carried out in the Department of Anatomy, Hind Institute of Medical Sciences, Mau, Ataria, Sitapur. One hundred and six adult dry unpaired scapulae were included, out of which 61 were of right side and 45 were of left side. Age and sex of the bones was not considered. The superior-inferior and the anterior-posterior diameters of glenoid fossa were measured using the Vernier sliding caliper. The superior-inferior glenoid diameter was taken from the most prominent point of the supraglenoid tubercle to the inferior point on the glenoid margin. The anterior-posterior glenoid diameter was taken from the maximum breadth of the articular margin of the glenoid cavity perpendicular to the superior-inferior diameter of glenoid cavity. The shape of the glenoid fossa was also noted.

III. Results

The mean superior - inferior (SI) diameter of the glenoid fossa on the right side scapulae was 3.70 ± 0.30 and left scapulae was 3.61 ± 0.43 centimeters. The mean anterior - posterior (AP) diameter of the glenoid fossa on the right scapulae was 2.45 ± 0.27 and left scapulae was 2.46 ± 0.23 centimeters [table 1].

In left side, out of 45 scapulae, the pear shaped glenoid fossa was found in 8 (17.78%), the oval shape was 23 (51.11%), and the coma shape was 14 (31.11%). In right side, out of 61 scapulae, the pear shaped glenoid fossa was found in 4 (6.56%), the oval shape was 36 (59.02%), the coma shape was 21 (34.43%). Out of total 106 scapulae, the pear shaped glenoid fossa was found in 12,the oval shape was 59 , the coma shape was 35 [table 2].

IV. Discussion

The knowledge of shape and size of the glenoid fossa are required for successful shoulder arthroplasty and minimize failure rates in the surgery [11]. The shape of the glenoid cavity can be of three types. When a distinct notch is present in the anterior margin of the glenoid cavity, the shape of the glenoid cavity can be described as inverted comma-shaped. If an indistinct notch is present it is described as pear-shaped. In absence of the notch, the cavity is oval shaped [4, 6]. The shoulder joint is the most frequently dislocated joint in the body. Dislocations with fractures of the glenoid are also quite common in trauma [7]. The anatomical basis and variations of shape and size of glenoid cavity of scapula is of fundamental importance in understanding of rotator cuff disease, shoulder dislocation and to decide the proper size of the glenoid component in the shoulder

arthroplasty [8]. In this study The mean superior - inferior (SI) diameter of the glenoid fossa on the right side scapulae was 3.70 ± 0.30 and left scapulae was 3.61 ± 0.43 centimeters. The mean anterior - posterior (AP) diameter of the glenoid fossa on the right scapulae was 2.45 ± 0.27 and left scapulae was 2.46 ± 0.23 centimeters. The diameters are similar to the study by Von Schroeder et al. & they are higher than the study by Moosa Shajiya Sarwar(2015), Mamtha et al(2011), Hina B Rajput(2012), and lower than what was observed by Iannotti et al (1992)[table 3]. The most common shape found was the oval shape, which was (59%) & the pear shaped were found least(12%). In the studies by Hina B Rajput(2012), Moosa Shajiya Sarwar(2015), Gamal Hamed El-Sayed Hassanein(2015) most common shape found was pear shape.

V. Conclusion

The mean superior - inferior (SI) diameter of the glenoid fossa on the right side scapulae was 3.70 ± 0.30 and left scapulae was 3.61 ± 0.43 centimeters. The standard available smallest glenoid component in the market is 4 centimeters[8]. The diameter in this study is close to the size of prosthesis available. The most frequent shape of scapula in this study is oval.

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OVAL SHAPE

PEAR SHAPE

COMMA SHAPE

Table 1 Mean S-I, A-P diameter

Variable		SUPERIOR - INFERIOR		ANTERIOR - POSTERIOR	
	N	Mean	Std. Deviation	Mean	Std. Deviation
LEFT	45	3.61	0.43	2.46	0.23
RIGHT	61	3.70	0.30	2.45	0.27

Table 2 Percentage of different shapes

	OVAL	COMA	PEAR	N
Left	51.11	31.11	17.78	45
Right	59.02	34.43	6.56	61
Total	59	35	12	106

Table 3 Comparison of Superior-Inferior and Anterior-Posterior-1 diameters in different studies

Study	Side of scapula	S-I diameter	A-P diameter
Moosa Shajiya Sarwar(2015)	Left	34.53 ± 3.21mm	23.64 ± 2.37mm
Mamtha *et al*(2011)		33.92 ± 2.87mm	23.02 ± 2.30mm
Hina B Rajput(2012)		34.43+3.21	22.92+2.80
Present study		3.61 ± 0.43cm	2.46 ± 0.23cm
Moosa Shajiya Sarwar(2015	Right	35.22 ± 3.26mm	23.95 ± 2.78mm
Mamtha *et al*(2011)		33.67 ± 2.82mm	23.35 ± 2.04mm
Hina B Rajput(2012)		34.76+3	23.31+3.0
Present study		3.70 ± 0.30cm	2.45 ± 0.27cm
Von Schroeder *et al* (2001)		36 ± 4mm	28.6 ± 3.3mm
Mallon *et al* (1992)		35 ± 4.1mm	24 ± 3.3mm
Iannotti *et al* (1992)		39 ± 3.5mm	29 ± 3.2mm