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ORIGINAL ARTICLE

Assessment of morphological variation in shape and size of scapulae

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ABSTRACT:

Background: The scapulae are a pair of triangular, large, flat bones that are situated dorsally in the ribcage in relation with the second to seventh ribs. The present study was conducted to evaluate scapulae measurement. **Materials & Methods:** 40 scapular bones of both gender were classified into three types; pear shaped or inverted comma shape in presence of a glenoid notch & oval in absence of notch. Parameter studied was superior-Inferior Glenoid Diameter, Anterior-Posterior Glenoid Diameter-1 (AP-1), Anterior-Posterior Glenoid Diameter-2 and Glenoid cavity index (GCI). **Results:** Pear type was present in 15, oval in 12 scapulae and inverted comma in 13 cases. The difference was non- significant (P> 0.05). The mean length on left side was 132.6 mm and on right side was 134.2 mm, width was 95.5 mm and 96.4 mm, superior-inferior glenoid diameter was 33.7 mm and 34.3 mm, anterior-posterior glenoid diameter-1 was 22.6 mm and 21.2 mm, anterior-posterior glenoid diameter-2 was 14.7 mm and 15.2 mm and glenoid cavity index was 63.4 mm and 64.2 mm in left and right respectively. The difference was non- significant (P> 0.05). **Conclusion:** Common type of scapula was pear type followed by inverted comma and oval shaped.

Key words: scapula, Forensics, Pear

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INTRODUCTION

The scapulae are a pair of triangular, large, flat bones that are situated dorsally in the ribcage in relation with the second to seventh ribs.[1] Determination of sex using scapular measurements is very useful in medicolegal cases, natural disasters and in circumstances where other bones are fragmented or not available.[2] Scapular measurements can be used for comparative anatomy, for surgical procedures and for manufacturing prosthesis. The dimensions of scapula are important in case of rotator cuff diseases, shoulder arthroplasty and in recurrent shoulder dislocation. Scapular indice is also useful to compare racial differences.[3] The shoulder joint is the most frequently dislocated joint in the body. Dynamic factors of the rotator cuff muscles and the static factors of the glenohumeral ligaments, the labrum and the joint capsule play a role in gleno-humeral joint stability.[4] Alignment of the humerus and the glenoid articular surfaces is one of the predisposing factors for glenohumeral joint instability, which is one of the predisposing factors for rotator cuff pathology. Dislocations may also be associated with fracture of the glenoid cavity; for the management of this, prostheses and arthroplasty are required.[5] The knowledge of the normal anatomical features and variations in shape and size of the glenoid fossa are required for better understanding of shoulder joint arthroplasty are prerequisites for complete understanding of the mechanics of shoulder joint. This information has clinical application in shoulder arthroplasty, glenohumeral instability and rotator cuff tear management.[6] The present study was conducted to evaluate scapulae measurement.

MATERIALS & METHODS

The present study comprised of 40 scapular bones of both gender. Ethical clearance was obtained before starting the study.

Scapular bones were classified into three types; pear shaped or inverted comma shape in presence of a glenoid notch & oval in absence of notch. Parameter studied were superior-Inferior Glenoid Diameter (SI): Maximum distance from inferior point on the glenoid margin to the most prominent point of supraglenoid tubercle, which is also the maximum height of glenoid cavity. Anterior-Posterior Glenoid Diameter-1 (AP-1): represents the maximum breadth of articular margin of the glenoid cavity perpendicular to glenoid cavity height Anterior-Posterior Glenoid Diameter-2 (AP-2): It is the anterior-posterior diameter (breadth) of the top half of the glenoid cavity at the mid-point between the superior rim and the mid equator. Glenoid cavity index (GCI): was calculated with the help of following formula. GCI = Anterior-Posterior Glenoid Diameter- 1 x 100/ Superior-Inferior Glenoid Diameter. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Assessment of type of scapula

Type	Number	P value
Pear	15	0.36
Oval	12	
Inverted comma	13	

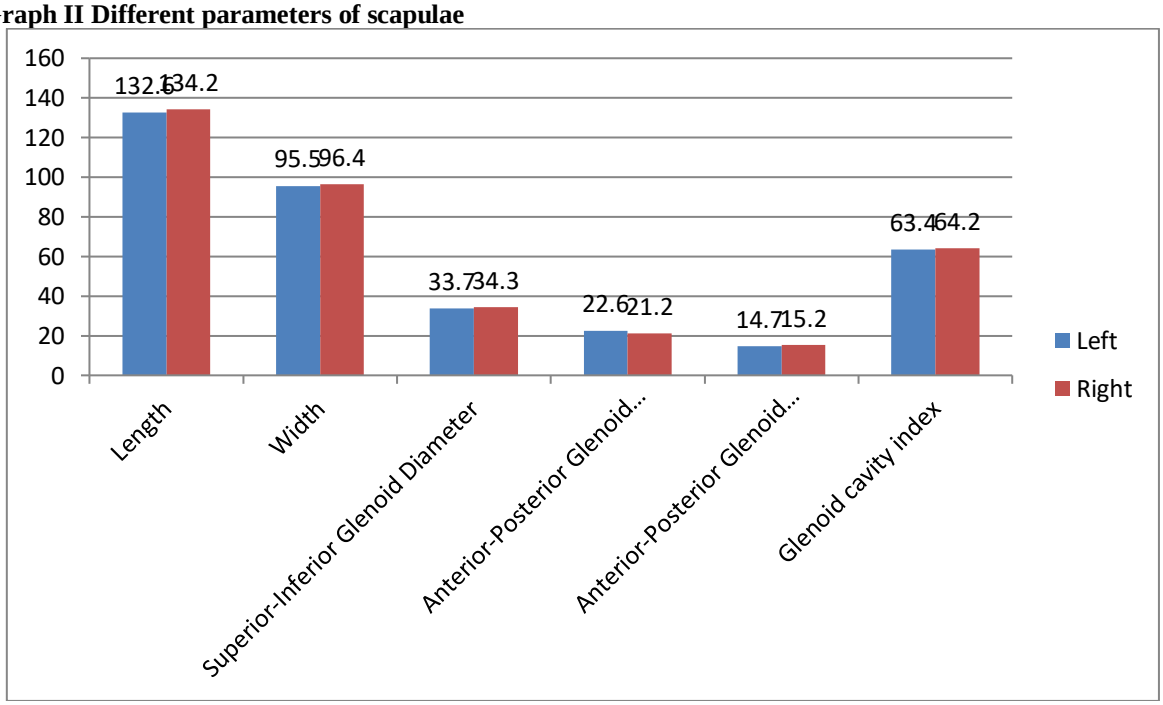
Table I shows that pear type was present in 15, oval in 12 scapulae and inverted comma in 13 cases. The difference was non- significant (P> 0.05).

Table II Measurement parameters of scapulae

Parameters	Left	Right	P value
Length	132.6	134.2	0.92
Width	95.5	96.4	0.94
Superior-Inferior Glenoid Diameter	33.7	34.3	0.78
Anterior-Posterior Glenoid Diameter-1	22.6	21.2	0.17
Anterior-Posterior Glenoid Diameter-2	14.7	15.2	0.82
Glenoid cavity index	63.4	64.2	0.71

Table II, graph II shows that mean length on left side was 132.6 mm and on right side was 134.2 mm, width was 95.5 mm and 96.4 mm, superior-inferior glenoid diameter was 33.7 mm and 34.3 mm, anterior-posterior glenoid diameter-1 was 22.6 mm and 21.2 mm, anterior-posterior glenoid diameter-2 was 14.7 mm and 15.2 mm and glenoid cavity index was 63.4 mm and 64.2 mm in left and right respectively. The difference was non- significant (P> 0.05).

Graph II Different parameters of scapulae



DISCUSSION

The exact dimensions of the scapula and its geometry are of fundamental importance in the pathomechanics of rotator cuff disease, total shoulder arthroplasty and recurrent shoulder dislocation.[7] The scapula has three borders, three processes, and three angles. The Glenoid (Gk. Gléne "socket") fossa is oriented at the lateral angle of the bone. Scapula a bone of shoulder girdle is among the interesting bones of our body because of variations present in it.[8,9] Its lateral angle becomes truncated and broadened that bears the glenoid cavity which articulates with the head of the humerus in the shoulder joint. The glenoid cavity which is also known as the head of the scapula is connected with the head of the humerus to form shoulder joint.[10,11] The present study was conducted to evaluate scapulae measurement.

We found that pear type was present in 15, oval in 12 scapulae and inverted comma in 13 cases. Polguj et al[12] found that most common shape of glenoid fossa was Pear shape that is 44% (42.9% on right, 45.5% on left), followed by oval shape in 34% (35.7% on right, 31.8% on left side) and inverted comma shape in 22% scapulae (21.4% on right side, 22.7% on left side). The mean measured values in total scapulae were; SI diameter was 34.24±3.27 mm, AP-1 diameter was

23.93±2.67 mm, AP-2 diameter was 12.96±1.84 mm and glenoid cavity index was 70.12±7.13 mm.

We observed that mean length on left side was 132.6 mm and on right side was 134.2 mm, width was 95.5 mm and 96.4 mm, superior-inferior glenoid diameter was 33.7 mm and 34.3 mm, anterior-posterior glenoid diameter-1 was 22.6 mm and 21.2 mm, anterior-posterior glenoid diameter-2 was 14.7 mm and 15.2 mm and glenoid cavity index was 63.4 mm and 64.2 mm in left and right respectively. Wael et al[13] found that the pear shaped glenoid cavity was most common type followed by inverted comma shaped and the oval glenoid cavity was least common type. Mean length and breadth of scapula was 136.07±14.1mm & 97.13 ± 10.63mm respectively. Mean SI diameter was 36.71±4.14 mm, mean diameter AP-1 was 24.85±3.50 mm, mean diameter AP-2 was 16.27±3.24 mm and GCI was 65.40±8.14%. Results of study shows that there are variations in the shape of glenoid cavity and in Indian population pear shaped glenoid cavity is most common. There are minor differences in the dimensions of the glenoid cavity of right and left side but the differences are statistically insignificant.

Krisnaiah M et al[14] found that the breadth of scapula was ranging from 90.3 mm to 113.3 mm. The mean and SD were 105.6 and 5.08 respectively. The breadth range of 105 mm to 110 mm had the maximum number of scapulae while the minimum number was noted in the 90 to 100 range. The mean length of the scapula and SD observed were 143.28mm and 11.44 respectively. Maximum number of scapulae was in the range of 135mm to 145mm while least number was in the 165 mm to 175 mm range.

CONCLUSION

Authors found that common type of scapula was pear type followed by inverted comma and oval shaped.

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