Research Article

Morpmometric patterns of glenoid cavity in coastal region of Andhra Pradesh

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Abstract

Background: In the movement of shoulder girdle scapula plays an important role. The peculiar triangular shape of this bone often attracts the anatomists. **AIM:** The present study aims to collect the morphological measurements of the glenoid cavity of the scapula and to study the various shapes of the glenoid cavity for the better understanding and management of shoulder pathology. **Methodology:** In the present study 03 diameters of the glenoid cavity of 70 males and 30 females, dried human scapulae were taken for the study and the various diameters were measured using a digital vernier calipers. Results: The mean scapular height was 162.1mm in males and 137.7 mm in females. The mean scapular breadth was 109.5mm in males and 100.2mm in females. The average height of the glenoid cavity in males was 40.25on right side and 40.37 on the left side and females was on the right side 33.90 and on the left side 33.97.The average breadth of the glenoid cavity was 26.47 in males on the right side and 26.50 towards the left side and right side21.23 in females and 21.28 towards left side. Different shapes of the glenoid cavity like Inverted comma in 33% of cases, pear shaped in 46%of the cases and oval shaped in 21%of the cases based on the glenoid notch have also been observed. **Conclusion:** The purpose of the current study was to obtain the morphometrical data of the glenoid cavity of the scapula specifically, the diameters of the glenoid cavity, to study the various shapes of the glenoid cavity relevant to the coastal population and to compare the data obtained from the present study with earlier report.
Keywords: Glenoid Cavity, Glenoid Labrum, Shoulder Arthoplasty, Glenoid Notch, Scapula, Scapular Length, Scapular Breadth.

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Received Date: 29/09/2014 Accepted Date: 07/10/2014

Access this article online	
Quick Response Code:	Website: www.statperson.com
	DOI: 22 February 2015

INTRODUCTION

Scapula plays an important role in the movement of shoulder girdle. Its peculiar shape has been a point of attraction to anatomists. The glenoid cavity is considered to be the head of scapula. It is a shallow pyriform particular surface on the lateral angle of the scapula bone else called as the glenoid fossa. The glenoid rim presents a notch anterior aspect (breathnach as *et al*., 1965). Due to the presence of glenoid notch various shapes of glenoid cavity are found like pear shaped, oval or inverted comma shaped. The notch if not distinct the glenoid labrum will not be fixed to the bony margin of the notch instead bridges the notch. The vertical diameter of the glenoid cavity is the longest and it is broader above. Dislocations with fractures of glenoid are quiet common in trauma. Along with repair of the labrum and reinforcing the capsule by an overlapping repair and rearrangement of anterior muscles, total shoulder replacement is also being used as treatment (sinnatamby cs, 2007). Studies have reported that the glenoid inclination is associated with full thickness rotator cuff tears (hughes re *et al*., 2003). Glenoid morphology has a prognostic implication on the primary gleno humeral arthritis (walch g *et al*., 1999).the morphometry of glenoid cavity has clinical application in orthopedic joint replacement, gleno - humeral instability and rotator cuff tear managements. Knowledge of the shape and dimensions of glenoid are important in the design and fitting of glenoid components for total shoulder arthro-plasty. An understanding of variations in normal anatomy of the glenoid is essential while

How to site this article: Lattupalli Hema, Madala Venkateswara Rao. Morpmometric patterns of glenoid cavity in coastal region of Andhra Pradesh. *International Journal of Recent Trends in Science and Technology* February 2015; 14(1): 225-227 http://www.statperson.com (accessed 23 February 2015).

evaluating pathological conditions like osseous bankart lesions and osteochondral defects.

MATERIAL AND METHODS

This study utilized 100 adult skeletons (70 males and 30 females) with intact and well preserved scapulae. These best preserved skeletons of scapulae were taken from narayana medical college. Only adult skeletons with closed epiphysis were included in the analysis. The following measurements of the scapula were taken utilizing sliding caliper. All the measurement were taken in millimeters:

1. Maximum scapular height (msh): maximum distance between the highest point of the superior angle and the lowest point of the inferior angle.
2. Maximum scapular breadth (msb): maximum distance between the point on the longitudinal axis of the glenoid cavity and the point on the prolongation of the inferior boundary of the dorsal margin of the spine.
3. Glenoid cavity height (gch): maximum distance from the inferior point of the glenoid margin to the most prominent point of the supra glenoid tubercle.
4. Glenoid cavity breadth (gcb): maximum breadth of the articular margin, perpendicular to the glenoid cavity height.

OBSERVATION

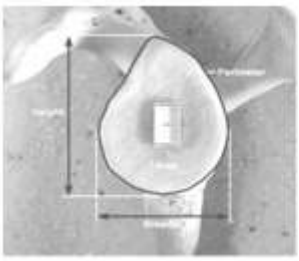

Figure 1: image of glenoid cavity illustrating The glenoidal length and glenoidal breadth

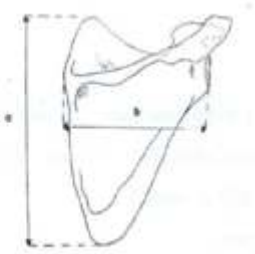

Figure 2: image shows the method of measurement of scapular height and breadth

In the present study, the mean scapular height was 162.1mm in males and 137.7 mm in females. The mean scapular breadth was 109.5mm in males and 100.2mm in females. The average height of the glenoid cavity in males was 40.25on right side and40.37on the left side and females was on the right side 33.90 and on the left side 33.97.the average breadth of the glenoid cavity was 26.47 in males on the right side and 26.50 towards the left side and right side21.23 in females and 21.28 towards left side. Different shapes of the glenoid cavity like inverted comma in 33% of cases, pear shaped in 46%of the cases and oval shaped in 21%of the cases based on the glenoid notch have also been observed.

DISCUSSION

In current study observed the mean value of scapular height as 162.171mm in total sample where as coskun *et al* (2006) has reported this mean as 98.9mm, bigliani lh *et al*., (1986) in another study sitha *et al* (2004) found this as 131.1mm which is less than the value we found in our study that may be due to population variation. The mean value of scapular breadth has found 109.54 mm in total samples and according to the sitha *et al* (2004) it was reported to be 95.70 cms morrison ds *et al* (1987). Keeping in view the correlation values mentioned above its concluded that the coracoid-glenoid distance which is important for formation of musculo-rotator cuff affected with scapular height, scapular width and transverse diameters of glenoid cavity. In the present study the mean vertical diameter of the right glenoid was 45.0 mm and the left glenoid was 41.0 mm. The maximum and minimum transverse diameters of the glenoid in our study were found as 29.00 mm and 21.0 mm in right side whereas its 30.0 mm and 17.00 mm in left side scapulae. Mamatha *et al*(2011) have reported the mean values of vertical diameter in the right glenoid cavity as 33.67 mm and left glenoid as 33.92 mm . The mean values of the maximum and minimum diameter for glenoid cavity were in right side 26.47 mm, 16.27 mm and that of the left side were 23.02 mm and 15.77 mm. The upper and lateral angle of the scapula has a glenoid cavity for articulation with the head of the humerus. The glenoid rim presents a notch in its upper and front breathnach *et al*., (1965). Due to presence of this glenoid notch, various shapes of glenoid cavity are found like pear-shaped, oval or inverted comma shaped. The shoulder joint is the most frequently dislocated joint in the body. Dislocations with fractures of the glenoid are also quite common in trauma.

mamatha *et al* (2011). For the management of this, prostheses and arthroplasty are required a number of times. 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. In the present study, the shape of the glenoid cavity was oval shape in 21 (21 %) bones, pear shape in 46(46%) bones, and inverted comma shape in 33(33%) bones. In pear shape 20(43%) belongs to the right side and 26 (56%) bones belong to left side. In oval shape(33%) bones belong to right side, 14 (66%) bones belong to left side and in inverted comma shape 20 (60%) bones belong to right side and 13 (39%) bones belong to left side. Coskun *et al* studied that 64 (72%) of the scapula the shape of the glenoid cavity was oval. In 26 (28%) of the scapulae the glenoid cavity was pear-shaped [9]. Mamatha *et al* reported that the right side total 98 glenoid cavities 33 (34%) were inverted comma shape, pear shape 45(46%) and oval shape 20 (20%). On the left side, glenoid with the inverted comma shape were 34 (33%), pear shape 44 (43%) and oval glenoid cavities were 25 (24). Knowledge of the shape and dimensions of the glenoid are important in the design and fitting of glenoid components for total shoulder arthroplasty. An understanding of variations in normal anatomy of the glenoid is essential while evaluating pathological conditions like osseous bankart lesions and osteochondral defects.

CONCLUSION

We conclude that these measurements like scapular height, breadth and indices can be used in comparative anatomy. Our study did not attempt to use them in characteristics of race and age in man, prosthetic products and surgical procedures such as hardware fixation and prosthetic position. This study is particularly useful in a forensic anthropological case for sex determination in which the skeletal remains of an individual are incomplete or damaged and thus more accurate bones such as the pelvis or cranium are absent. Variations in the size and shape of glenoid cavity which were observed in the current study will be helpful for orthopedic surgeons to decide proper size of the glenoid component for the shoulder arthroplasty and to understand the shoulder pathology better. The dimensions of the glenoid observed in the present study were lesser than those recorded in the studies done on other population. This fact may be taken into consideration while designing glenoid prostheses for the south indian population. The current study recorded a higher percentage of glenoid cavities having the glenoid notch as compared to earlier studies while evaluating defects/lesions of the glenoid, this fact could be useful. No sex difference was found in the prevalence of the notch. If a distinct notch exists, the glenoid labrum is not attached to bone at the notch and is therefore liable to be sheared. Knowledge of the shape and dimensions of the glenoid are important in design and fitting of glenoid components for total shoulder arthroplasty. An understanding of variations in normal anatomy of glenoid is essential while evaluating pathological conditions like osseous bankart lesions and osteochondral defects.

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Source of Support: None Declared
Conflict of Interest: None Declared