MORPHOLOGY AND MORPHOMETRY OF SCAPULAE IN TERTIARY CARE HOSPITAL IN K.M. MEDICAL COLLEGE AND HOSPITAL, MATHURA (UP).

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Abstract

Introduction: The shoulder joint is the most important joint in the body and limitation of this joint movements affects the quality of life. Severe shoulder injury and glenohumeral arthritis causes shoulder dysfunction with devastating results, and to restore normal functions orthopaedic surgeon can perform total shoulder arthroplasty, or reverse shoulder prosthesis, or hemiarthroplasty. Lateral angle of the scapula becomes truncated and broadened and bears the glenoid cavity which articulates with the humerus in the shoulder joint. Shoulder joint is formed when the glenoid cavity is connected with the head of the humerus. This study was carried out to study the morphology and morphometry of the glenoid cavity as dimensions of the glenoid cavity are important in designing and fitting of glenoid components for total shoulder arthroplasty.

Material and Methods: A total of 100 unpaired dry scapula were isolated from the department of Anatomy. Two groups were made according to the side of the scapula and were equally divided into 50 right and 50 left scapula each. Bones were segregated and inspected individually. To classifying shape of the glenoid fossa, presence or absence of a glenoid notch was used and were classified into 3 types, pear shaped or inverted comma shape in presence of a glenoid notch & oval in absence of notch. The pear shaped shows indistinct glenoid notch and the inverted comma shaped shows a distinct notch.

Results: On the basis of presence or absence of the glenoid notch. 56%, 28% & 16% glenoid cavities of right side were pear shaped, inverted comma shaped and oval shaped respectively. On the left side 60%, 30% & 10% were pear shaped, inverted comma shaped and oval shaped respectively. In total 58% glenoid cavities were pear shaped, 29% were inverted comma shaped and 13% were oval shaped. Average length and breadth of scapulae included in this study was 134.07 ± 13.87 mm and 98.43 ± 9.58 mm respectively. Mean glenoid cavity index of right side was 48.12 to 86.87 %, while in left side it was 44.21 – 84.78%.

Conclusion: The most common glenoid cavity was pear shaped followed by inverted comma shaped and the oval glenoid cavity. Mean glenoid cavity index of right side was 48.12 to 86.87 %, while in left side it was 44.21 – 84.78%.

Introduction

The shoulder joint is the most important joint in the body and limitation of this joint movement affects the quality of life. Severe shoulder injury and glenohumeral arthritis causes shoulder dysfunction with devastating results, and to restore normal functions orthopedic surgeon can perform total shoulder arthroplasty, or reverse shoulder prosthesis, or hemiarthroplasty. The long term success of arthroplasty depends on the design of the prosthesis and its fixation to the boneⁱ. Loosening of the joint is the most common problem of joint replacements. Dynamic factors of the rotator cuff muscles and the static factors of the glenohumeral ligaments, the labrum and the joint capsule play a crucial role in stability of the glenohumeral joint. A good understanding of the morphometry of glenoid cavity

is necessary for designing the prosthesis as the problem is accentuated in the glenoid prosthesis fixation because of the relatively small glenoid articular surfaceⁱⁱ.

The scapulae are a pair of large triangular, flat bones situated dorsally in the ribcage in relation to the second to seventh ribs. It has three borders, three processes, and three angles. The Glenoid fossa is oriented at the lateral angle of the boneⁱⁱⁱ. Lateral angle of the scapula becomes truncated and broadened and bears the glenoid cavity which articulates with the humerus in the shoulder joint. Shoulder joint is formed when the glenoid cavity is connected with the head of the humerus^{iv}. Notch which is present on its antero-superior part of the glenoid rim gives scapula its different shape. When this glenoid notch is indistinct its shape is like

piriform or tear drop, when it is distinct it looks like inverted comma shape and when it is absent its oval shape^{v, vi}.

With this background this study was carried out to study the morphology and morphometry of the glenoid cavity as dimensions of the glenoid cavity are important in designing and fitting of glenoid components for total shoulder arthroplasty.

MATERIAL AND METHODS

A total of 100 unpaired dry scapula were isolated from the department of Anatomy at K.M. Medical College and Hospital, Mathura (UP). Two groups were made according to the side of the scapula and were equally divided into 50 right and 50 left scapula each. Bones were segregated and inspected individually.

The border of the fossa was defined by using slightly raised rim of the glenoid fossa in each scapula. To classifying shape of the glenoid fossa, presence or absence of a glenoid notch was used and were classified into 3 types, pear shaped or inverted comma shape in presence of a glenoid notch & oval in absence of notch. The pear shaped shows indistinct glenoid notch and the inverted comma shaped shows a distinct notch. Using the Vernier calliper measurements were taken.

Superior-Inferior Glenoid Diameter (SI), Anterior-Posterior Glenoid Diameter-1 (AP-1), and Anterior-Posterior Glenoid Diameter-2 (AP-2) was calculated. Glenoid cavity index (GCI) was also calculated by multiplying (AP-1) with 100 and then dividing it with Superior-Inferior Glenoid Diameter.

Data was collected and entered in the Microsoft Excel 2013. Statistical analysis was done. The mean and standard deviation of the glenoid cavity in various dimensions were calculated. The morphometric values of the two sides were analysed using an unpaired t-test

RESULTS:

Of the 100 scapulae, 50 were from the right side and 50 from the left side.

Table 1: Glenoid cavity Shapes

Shape	Right side (n=50)	left side (n=50)	Total (n=100)
Pear shaped	28(56%)	30(60%)	58 (58%)
Inverted comma shaped	14(28%)	15(30%)	29(29%)
Oval shaped	8(16%)	5(10%)	13(13%)

On the basis of presence or absence of the glenoid notch. 56%, 28% & 16% glenoid cavities of right side were pear shaped, inverted comma shaped and oval shaped respectively. On the left side 60%, 30% & 10% were pear shaped, inverted comma shaped and oval shaped respectively. In total 58% glenoid cavities were pear shaped, 29% were inverted comma shaped and 13% were oval shaped.

Average length and breadth of scapulae included in this study was 134.07 ± 13.87 mm and 98.43 ± 9.58 mm respectively. The average measurements glenoid cavity were taken. The difference between length, breadth, Supero inferior Glenoid Diameter (SI), AP glenoid Diameter-1, AP Glenoid Diameter-2, Glenoid cavity index on right and left side of the scapulae was statistically non-significant (p value >0.05). Mean glenoid cavity index of right side was 48.12 to 86.87 %, while in left side it was 44.21–84.78%.

DISCUSSION AND CONCLUSION

The anatomical basis and its variations in 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 which emphasizes the importance of the morphometry of glenoid^{vii}.

In our study average length and breadth of scapulae included was 134.07 ± 13.87 mm and 98.43 ± 9.58 mm respectively. Gamel Hamed in their study of 68 dry glenoid fossa of Egyptian population recorded that the length of the glenoid fossa on the right and left scapulae was 3.31 and 2.87cm respectively with the values in right more than left^{viii}. Patil G V et al in their study of 224 scapulae observed that the widths of left side to be slightly more than right side they found a mean length of 136.03 ± 11.49 mm in male scapulae and 119.63 ± 8.81 mm in female scapulae^{ix}. Singal et al in Gujarati population found a mean breadth of 96.4 ± 7 mm^x.

The mean glenoid cavity index (GCI) of right side was 48.12 to 86.87 %, while in left side it was 44.21 to 84.78%. Dhindsa et al^{xi} observed that mean cavity index of $70.37 \pm 4.08\%$ on right side and $68.59 \pm 4.36\%$ on left side. Gamal Hamed et al observed that mean glenoid cavity index on right side was $73.67 \pm 9.08\%$ and $76.71 \pm 8.37\%$ in left side. These values were higher than our study.

In the present study we observed the most common glenoid cavity was pear shaped followed by inverted

comma shaped and the oval glenoid cavity. Mean glenoid cavity index of right side was 48.12 to 86.87 %, while in left side it was 44.21 – 84.78%.

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