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Scapula Morphometry Of Adult Nigerians In The Southeast

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ABSTRACT

Twenty-five adult bony Scapulae of Nigerians were used to report detailed bony dimensions of the scapula. The average length of the scapulae was 146.24 ± 6.78mm. the mean spine length was 126.83 ± 7.29mm and acromial dimensions were 45.46 ± 4.03 x 21.91 ± 2.07 and 7.36 ± 1.30 thick (mm). Glenoid dimensions showed that anteroposterior diameter = 26.54 ± 1.86mm, superoinferior diameter = 37.72 ± 1. 65mm and diameter at glenoid constriction = 19.58 ± 1.35(mm). Coracoid dimensions were 39.20 ± 2.67mm x 9.30 ± 2.12 x 14.48 ± 1.36mm. The average diameter of scapular notch was 14.90 ± 2.94mm. also 52% of Scapula notch were U-shaped and 92% of acromion were curved. The average thickness of the lateral boarder was 11.72 ± 1.23mm. glenoid dimensions correlated with all acromial dimensions except the acromial thickness. This detailed study of scapula dimensions will provide information for surgical procedures and detection of significantly displaced scapular fracture.

Keywords: Scapula, Morphometry, Nigerians.

Physical anthropometrical measurements of bone and other organs have become relatively important in medicine (Didia et al, 2002). These measurements when obtained can be used to ascertain age, sex, and race. They equally serve as a guide in the detection of anomalies.

The scapula is a triangular bone that overlaps the second to seventh ribs on the posterolateral part of the thorax. Structurally, it connects the clavicle to the humerus forming part of the pectoral girdle. Embrologically, it derives from the somatic mesenchyme except its coracoid process, which is derived from the somatopleuric mesenchyme (Gumpel-Pinot, 1984).

The role of the scapula in maintaining upper extremity function cannot be overemphasized and so is the need for knowledge of its morphometric and Geometric anatomy. the morphometric anatomy of the scapula has been implicated in some shoulder joint anomalies, pathomechanics of some rotator cuff diseases (Mallon et al, 1992; Gumina et al, 1999). It equally has a lot of clinical relevance in total shoulder athroplasty and recurrent shoulder dislocation (Mallon et al, 1992). To the knowledge of the authors and search from Google internet search engine, there are no documented values for scapula dimensions of Nigerian adults. Hence, this study is designated to establish normal values of the dimensions scapula of Nigerian adults with a view to establishing a guide for plastic, orthopedic and reconstructive practices in shoulder replacement surgery as well as definition of osseous glenohumeral instability.

MATERIALS AND METHODS

Twenty-five (25) intact scapulae were collected from the Anatomy laboratory of Faculty of Basic Medical Sciences, Ebonyi State University, Abakaliki. The 25 bones were those of Nigerians who lived and were from Southeastern Nigeria.

On collection, the bones were washed and brushed in water using a detergent and then soaked in water at about 70°C for 6 hours. The bones were washed again with water and detergent to remove any left over tissue. Later, the bones were sun dried for four (4) days and then soaked in a mixture of 5 litres of water, 1 litre of bleach and 10% hydrogen peroxide (H_2O_2). Finally, the bones were sun dried for 8 days and measurements were carried out.

Measurements

The measurements were done using a pair of dividers and metric rule calibrated in millimeters. The measurements for each parameter was done by one scientist for three (3) times and the mean value obtained. This was to remove interobserver error and error due to parallax. The measured parameters include:

Scapula length (from superior angle to inferior angle). Distance from the base of the suprascapula notch to superior rim of glenoid cavity; thickness of the medial boarder at 1cm from the edge; length of the spine (from medial edge to lateral margin of the acromion); the anteroposterior width of the spine at 1cm and 4cm from the medial edge; acromial dimensions; coracoid dimensions and glenoid dimensions. Other parameters were diameter of scapula notch, and thickness of the lateral boarder. The mean values of each parameter were calculated and correlations made between glenoid and acromial dimensions. The shapes of the acromion were classified as curved or flat and that of scapula notch classified as either L-shaped or U-shaped.

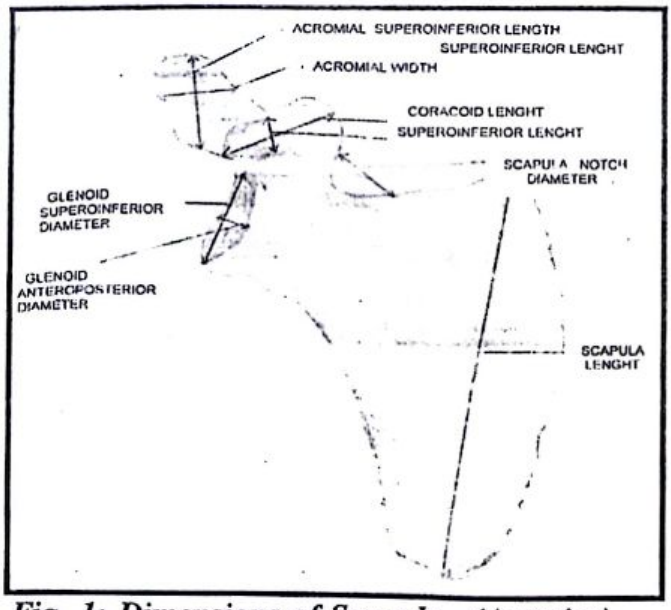

Fig. 1: Dimensions of Scapula (Anterior)

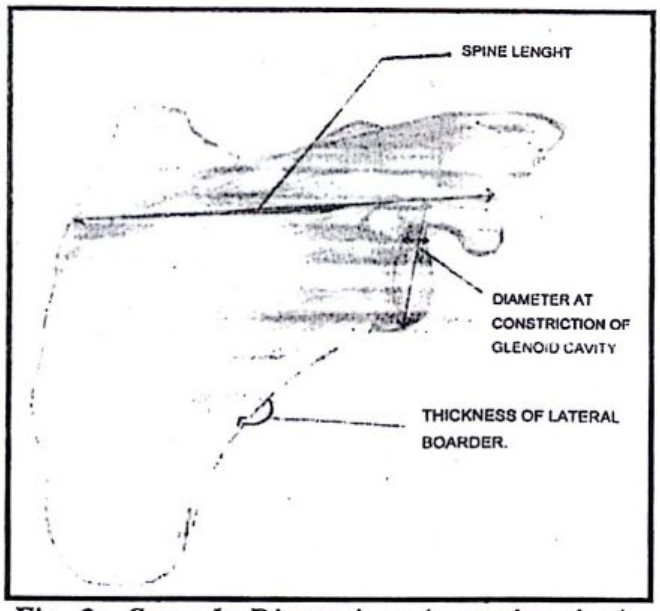

Fig. 2: Scapula Dimensions (posterior view)

RESULTS

The results are shown in the below

S/N	Parameters	Mean measurements (MM)	Range
1	Length of scapula	146.24 ± 6.78mm	131.0 – 157.0mm
2	Thickness of medial boarder	3.61 ± 0.32mm	3.00 – 4.05
3	Base of scapula notch to superior rim of glenoid cavity	29.28 ± 3.56	25.50 – 38.00
4	Spine length	126.83 ± 7.29mm	115.50 – 133.00
5	Width of spine at 1cm from the medial edge	8.38 ± 1.51mm	4.50 – 11.00
6	Width of spine at 4cm from medial edge	18.49 ± 3.07mm	14.20 – 22.50mm
7	Glenoid dimensions:		
	Anteroposterior diameter	26.54 ± 1.86mm	23.50 – 29.50mm
	Supenorinferior diameter	37.72 ± 1.65mm	33.00 – 41.00mm
	Diameter at constriction	19.58 ± 1.37mm	16.50 – 21.50mm
8	Acromial dimensions:		
	Superioinferior length	45.46 ± 4.03mm	37.50 – 54.00mm
	Acromial width	21.91 ± 2.07mm	18.50 – 27.00mm
	Thickness	7.36 ± 1.30mm	5.00 – 9.00mm
9	Coracoid dimensions:		
	Length	39.20 ± 2.67mm	35.00 – 44.50mm
	Superiorinferior thickness	9.30 ± 2.12mm	6.00 – 13.50mm
	Anteroposterior (width)	14.48 ± 1.36mm	13.50 – 16.00mm
10	Diameter of scapula notch	14.90 ± 2.94	10.00 – 21.00mm
11	Thickness of lateral boarder	11.72 ± 1.23	9.50 – 15.00mm

Other results show that the scapula notch was shaped like a "U" in 52% of scapula and "L" shaped in 48%; the acromion was curved in 92% of scapula and flat in 8%. Also Pearson's correlation evinced that Glenoid anteroposterior diameter was related to its superiorinferior diameter ($p=0.041$), Diameter at constriction of glenoid cavity ($p=0.000$), acromial superoinferior length ($p=0.01$) and acromial width ($p=0.02$) at $P<0.05$. The acromial thickness did not correlate with other acromial measurements and all glenoid dimensions.

DISCUSSION

This study was directed mainly towards investigating the normal values of scapula dimensions of Nigerians living in the south-east zone.

Measurements by Von Schroeder et al (2001) showed that for a Caucasian community, the mean values of parameters like length of scapula (155 $\pm$ 16mm); Distance from the base of scapula notch to the superior rim of glenoid (32 $\pm$ 3mm); length of spine (134 $\pm$ 12mm) and acromial dimensions (48 $\pm$ 5 x 22 $\pm$ 4mm 8.9 $\pm$ mm thick) were higher than the values gotten in this study (146.24 $\pm$ 6.78; 29.28 $\pm$ 3.56; 126.83 $\pm$ 7.29; 45.46 v 4.03 x 21.91 and 7.36 $\pm$ 1.30 thick respectively). This could be attributed to one of the racial differences between blacks and Caucasians and should be noted and applied by surgeons performing hardware fixation, drill hole placement and prosthetic positioning of scapula in our immediate environment. These scapula dimensions may serve as a peredictive factor in the pattern of scapula humeral disorders observed in our immediate environment.

Correlations observed between Glenoid dimensions [Superioinferior diameter (AP)] with acromial length and width show that they are factors in the stability of the shoulder joint and may be jointly involved in maintaining subacromial clearance. The non-relationship of acromial thickness shows that it is not a likely factor in shoulder stability and maintenance of subacromial clearance.

Results equally show that 92% of acromion are curved. This value is higher than measurements by Von Schroeder et al (2001) where 63% of scapulae had curved acromial processes. The shape of the acromion could be a factor in the subacromial space clearance during different orientations of the scapula and if there is a decrease of subacromial clearance in upward rotation (Karduna et al, 2005) there could be a possible further decrease in subacromial clearance in individuals bearing highly curved or hooked acromial processes, thus, increasing the likely occurrence of impingement syndromes.

52% of the scapula had U-shaped scapula notch and the shape of the notch could be a factor in the occurrence of a possible suprascapula entrapment neuropathy.

The findings from this study will serve as a tool for surgeons in open reduction and internal fixation of significantly displaced scapula fractures.

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