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Original Research Article

Morphological Study of Dry Human Scapula and its Significance in Treatment of Shoulder Disorders

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Abstract

Introduction: This paper will focus on the determination of the Glenoid fossa of the scapula which refers to the articulation with the forms of the shoulder joint and the head of the humerus. Thus, the knowledge of different sizes and shapes of glenoid fossa will be useful to clinical testing on an efficient understanding of various physical problems among human beings. Thus, orthopaedics will easily choose the right processes for each of the problems regarding the joint.

Aim: To understand the shape of measuring various dimensions of the glenoid fossa within the dry human scapula of a human being.

Material & Methods: A prospective study of 95 dry human scapulae from adults of unknown age and sex which was collected from the Department of Radiology, Icare Institute of Medical Science and Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India over a period of one year. From the 95 samples, 62 will be collected from the right side and the remaining 33 samples will be from the left portions. Various noches will be observed in this study as well. However, digital Vernier callipers will be used here in order to estimate the dimension of the samples.

Results: In this study, the pear shape is the most common shape of the glenoid fossa which has been observed to be 44% of the overall samples with 45.5% on the left side and the remaining 42.9% on the right side whereas oval shape has been observed by 34% which are 31.8% on the left and 35.7% on right. The other samples are 22% in inverted comma shape including 22.7% on the left portion and 21.4% on the right portion.

Conclusion: Clinicians and orthopaedic doctors can benefit from this study of the glenoid fossa of the scapula when treating shoulder disorders and shoulder replacements.

Keywords: Humorous, glenoid fossa structure, scapula of the glenoid fossa, shoulder joint, glenoid cavity.

Introduction

The main bone of the shoulder complex is indeed a strong, often known as the clavicle. It runs from the two ribs to the seven ribs and is located posterior-laterally over the chest wall. It has two surfaces—anterior or coastal areas and posterior or dorsal—three vantage points, lateral, and greater borders—medial, lateral, and superior. The three processes on the scapula are the acromion, coracoid, and

spinous. The glenoid fossa is a hollow that is present in the shortened lateral angle of the scapula. It had a forward, lateral, and somewhat upward direction. Based on the existence or absence of a notch just at the anterior edge of the glenoid fossa, many glenoid fossa forms, including oval, pear, and inverted comma, have been observed (Philip and Dakshayani, 2018). [1] The notch is not present in glenoid cavities with oval, pear, or inverted comma shapes, but is present in those with these shapes. The glenoid fossa is connected to an infra-glenoid hump at the bottom edge at the apical surface of the lateral border of the scapula and a proximal hump at the top boundary of the fossa. The supra-glenoid eminence of the shoulder is located within the joint capsule, while the infra-glenoid eminence is located outside the capsule. When the Glenoid Fundus articulate the secondary data was obtained joint, which is located on the articular surface. The glenoid fossa's elbow joint is sloping and significantly smaller than the medial surface of the humerus's head, which really is concave in both directions. Cartilage covers both the joint cartilage (hyaline cartilage). The articular surface labrum, which is connected to the fibrocartilage wall of the glenoid fossa, deepens its concavity. Despite this, the joint is loosely packed because both articulating surfaces are not perfectly consistent in many joint motion situations. It is most likely tightly packed in entrapment and the joint can rotate to the side. It has been shown that the degree of slope of a glenoid is related to rotator cuff illnesses and tears. To comprehend and identify joint misalignments and supraspinatus disorders, it is critical to grasp the morphometric and morphological variance of the glenoid fossa (Gannon *et al*., 2021). [2] The clinician or orthopaedic surgeon may find it easier to treat different surgical and medical issues with the shoulder, such as arthritis, joint problems, and medullary Bankart's lesions if they are aware of the variance in form and morphologic measurements of the glenoid cavity. In elbow arthroplasty, it could also be helpful to select the proper prosthesis size, which lowers the related morbidity. Research is uncommon in India's northern area. Therefore, the purpose of the current investigation was to evaluate the size and structure of the glenoid fossa in a mature dry adult scapula. [3-6]

Material & Methods

A prospective study of 95 dry human scapulae from adults of unknown age and sex which was collected from the Department of Radiology, Icare Institute of Medical Science and Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India over a period of one year Of those, 62 were on the right-hand side and 33 on the left. Scapulae that were damaged or malformed were not included in the research. According to the presence or lack of a groove on the anterior aspect of the fossa, the morphologies of the glenoid fossa were divided into three categories as previously reported (Grogan and Jobin, 2019). The forms are the inverted comma shape with a noticeable notch, the pear shape with an indistinct tier, and the elliptical shape without a notch. The edge of the glenoid was marked by a slightly elevated margin. With a millimetre precision of 0.01mm, all specs were determined with a digital Vernier calliper (Singh *et al.*, 2019). The glenoid fossa's various measurable characteristics were measured. The greatest distance from the most conspicuous point of the supra-glenoid tubercle to the inferior point on the glenoid edge was used to determine the superior-inferior diameter of the glenoid fossa (SI). The maximal width of the upper half of the glenoid cavity was used to determine the anterior-posterior diameter-2 of the glenoid fossa (AP-2). Anterior-posterior diameter divided by superior-inferior diameter, multiplied by 100, yields the Glenoid Cavity Index (GCI). The greatest width of the glenoid cavity edge,

defined as perpendicular to the height of the glenoid cavity, is known as the anterior-posterior diameter-1 of the glenoid fossa (AP-1).

Results

95 shoulder glenoid canals in total, 62 on the right-hand side and 33 on the left were examined in the current investigation. Three morphologies were seen depending on whether the glenoid notch was present or not. Pear-shaped glenoid cavities made up 44% of the study's total (42.9% on the right-hand side and 45.5% on the left), followed by oval cavities (34%; 35.7% on the right-hand side and 31.8% on the left), and inverted comma cavities (22%; 21.4% on the right and 22.7% on the left) (Singh, 2020). SI length 34.243.27 mm, AP-1 length 23.932.67 mm, AP-2-cylinder 12.961.84 mm, and the articular surface cavity index 70.12%7.13 in total shoulder blades were the mean values of the observed parameters. Shown are morphometric measures for the right, left, and overall, in the following table. With the exception of AP glenoid diameter-2 (p0.05), there was no significant difference statistically between both the measurements of the right and left sides (Chen *et al.*, 2022).

Table 1: Different shapes of glenoid cavity

Shape	Left side N (%)	Right side N (%)	Total N (%)
Oval	14(31.8%)	20(35.7%)	34 (34%)
Pear	20 (45.5%)	24 (42.9%)	44 (44%)
Inverted comma	10 (22.7%)	12 (21.4%)	22 (22%)

(Source: collected)

Table 2: Glenoid cavity determination through Morphometric values

	Minimum	Mean	Maximum
SL	27.75	34.24±3.27	43.25
AP2	9.13	12.96±1.84	17.01
AP1	18.55	23.93±2.67	28.43
GCL	50.95	70.12±7.13	86.36

(Source: collected)

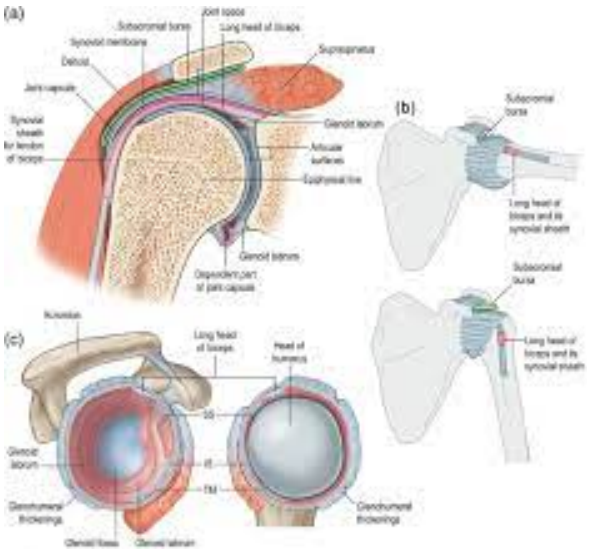
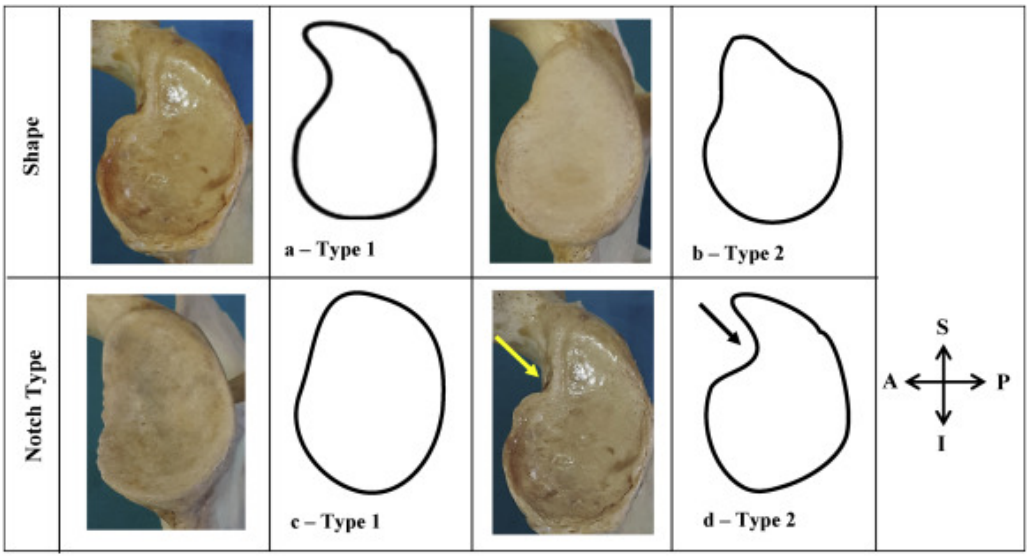


Figure 1: Humeral head in shoulder osteoarthritis

(Source: Alaksham, 2020)



Key: **A-** anterior; **I-** inferior; **P-** posterior; **S-** superior

Figure 2: Significant p-value

(Source: Khan *et al*., 2020)

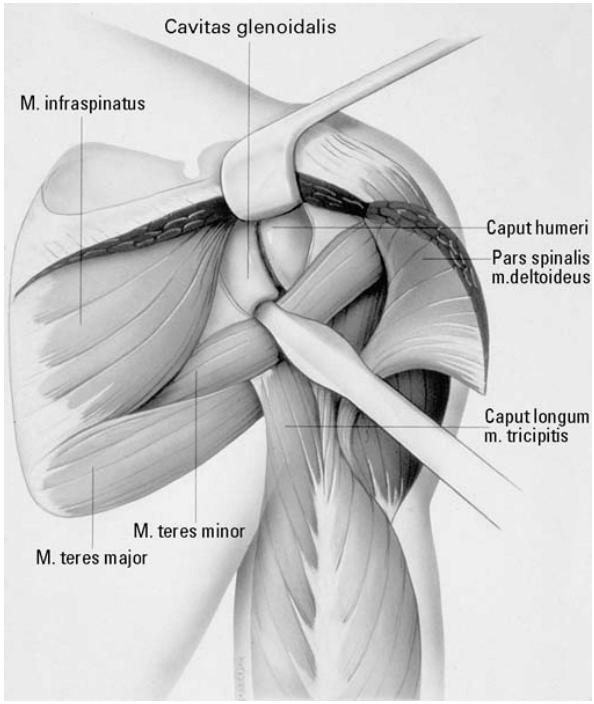


Figure 3: A posterior approach to the glenoid fossa

(Source: Researchgate, 2022)

Discussion

The frequent glenoid cavity form in this study was pear-shaped, trailed by oval and inverse comma-shaped on both sides (Meshram *et al.*, 2020). [7-10] The glenoid cavity is frequently formed like a pear, according to several other writers. In Indian scapulae, it has been noted that the glenoid cavity typically has a pear form, which is determined as an inverted comma and an oval shape. The present investigation into Indian scapulae confirmed that this is the case (Daalder *et*

al., 2018). [11-14] The glenoid cavity is said to have an oval form that is frequently accompanied by a pear shape, whereas an Egyptian scapula has an oval shape that is frequently preceded by a pear, inverted comma, and oval shapes. In the current study, the average SI diameter of the glenoid cavity of the scapula was 34.84 mm overall, 3.46, 34.84 mm on the right side, and 33.48 mm 2.88 on the left (Yadav *et al.*, 2020). [15] The observed SI diameter values were nearly identical to those in the current investigation, although larger values of 36.03 mm, 37.03 mm, and 36.2 mm, respectively, were reported in contrast to the present study's measurement of 34.84 mm (Chaijaroonkhanarak *et al*., 2019). [16] SI glenoid diameter values on the left side were observed to be greater than in the study's right half. Higher SI diameter values than the current study or lower SI diameter values than the current study (Muacevic *et al*., 2021). In the current investigation, the left side's AP-1 glenoid diameter values were somewhat greater than the right side's values, but this variation is not statistically important (Denard *et al*., 2018). Other Indian investigations revealed almost identical findings for the right-side AP-1 diameter, however, larger values have also been observed (Azhagiri *et al.*, 2022). [17] The estimates of AP-1 width in Turkish scapulae were nearly identical to those found in the current investigation (Boileau *et al*., 2019). The morphologic values of the current study's glenoid fossa that vary from those found in other Indian and international studies might be racial in origin. [18,19]

Limitation

Despite the limited sample size of the current investigation, the morphological and molecular parameters of the glenoid fossa may contribute some information (Alkesan *et al*., 2022).

Conclusion

This report concludes that the orthopaedic doctor can utilise the dimensions and information from this research to better comprehend the anatomy of the glenohumeral joint, perform surgical adjustments for disorders of the joint, and select the appropriate size prosthesis when doing shoulder arthroplasty.

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