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ORIGINAL RESEARCH

Study of the acromion process of scapula and its clinical importance

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ABSTRACT

Aim: Study of the acromion process of scapula and its clinical importance.

Materials and methods: The present study used 180 dry adult scapulae (100 right, 80 left) of unknown age and sex at the anatomy department. Broken and wounded scapulae, as well as those with unique and complete features, were excluded from the study. Each scapula was morphologically examined, and the following acromion process parameters were measured and reported in millimetres using a Vernier calliper (mm).

Results: In the current research, the mean values of acromion length were 43.57±4.66 mm in total samples, 43.58±4.58 mm in right side, and 43.56±4.74 mm in left side. (Table 1) The mean values of acromion width were 27.66±3.51 mm in total samples, 27.78±3.58 mm in right side, and 27.54±3.44 mm in left side. (Table 2) The average distance from the tip of the acromion process to the tip of the coracoid process in the overall sample was 34.53± 2.91 mm, 34.17±2.96 mm on the right side, and 34.89±2.87 mm on the left side. (Table 3) The mean acromio-glenoid distance observed in the overall sample was 30.55±3.62, 30.11±3.69 mm on the right side, and 30.98±3.55 mm in the left side.

Conclusion: The acromion process is vital in shoulder joint development and provides stability. The morphometric study of the acromion may be utilised as an adjunct to encourage a better understanding of the illness that manifests itself in the shoulder area.

Key words: Acromion, Morphometry, Shoulder, Scapula

INTRODUCTION

The scapula is a big, flat, triangular bone that runs from the second to the seventh rib on the poster lateral part of the chest wall. The acromion process is the elongated and flattened process of the scapular spine. It is found on the upper lateral end of the scapula and is an essential component of the coraco-acromial arch. The lateral end of the coraco-acromial ligament is connected to the acromion process. The anterior part of the acromion process, the coracoid process, and the coraco-acromial ligament comprise the coraco-acromial apparatus. The rotator cuff tendons, the subacromial bursa, the biceps tendon, and the head of the humerus are all squeezed under the arch. Shoulder impingement syndrome may be caused by any disease that restricts the restricted space available under the coraco-acromial arch, whether developmental or congenital.[1] The acromion process is classed as Type I, which is flat, Type II, which is curved, and Type III, which is hooked. The Bigliani-Morrison-April morphological categorization was recognised as a diagnostic tool for shoulder impingement

syndrome and rotator cuff injury.[2] The most popular explanation for rotator cuff impingement syndrome is categorised into anatomical and functional. The shape and inclination of the acromion process is responsible for most shoulder complaints and is seen most frequently with Type III acromia.[3] Rotator cuff lesions are usually associated with the hooked Type of acromion process.[4] The glenoid cavity may be classified into pear shaped, inverted comma shaped, or oval according to a notch on the anterior glenoid rim.[5] The glenoidal inclination is The Type III acromion is involved in approximately (62-66%) of cases of rotator cuff rupture.[4] It is also important to consider the size of the glenoid component in shoulder arthroplasty as well as gleno-humeral osteoarthritis.[6] The variations of acromial morphology are developmental as well as age related changes due to spur formation. As a result, both of them contribute to impingement syndrome and should be considered before shoulder surgery.[7] The scapula is an essential bone for study due to its phylogenic, ontogenic, and ethnic differences. It aids anthropologists in their research on the development of the acromion process.[8]

MATERIALS AND PROCEDURES

The current investigation was conducted in the anatomy department on 180 dry adult scapulae (100 right, 80 left) of unknown age and sex. Broken and injured scapulae were removed from the research, as were those with distinct and complete characteristics. Each scapula was morphologically evaluated, and the following acromion process characteristics were measured using a Vernier calliper and reported in millimetres (mm).

The data was analysed using SPSS 25.0 software, and the mean results were displayed in tables. The data acquired was analysed using descriptive statistics such as percentage, mean, and standard deviation. To compare quantitative variables, an independent Student's t-test was utilised. The level of statistical significance was fixed at 0.05.

The maximum length of acromion process in mm: the anteroposterior length of the acromion in the longitudinal axis.

The maximum breadth of acromion in mm: the distance between the lateral and medial borders at the midpoint of the acromion process.

The acromio-coracoid distance in mm: the dis- tance between tip of acromion process and tip of coracoid process.

The acromio-glenoidal distance in mm: the distance between the tip of acromion process and surpaglenoid tubercle.

Types of acromion according to Bigliani et al:

type 1 – flat, type 2 – curved, type 3 - hooked.

Results

In the current research, the mean values of acromion length were 43.57±4.66 mm in total samples, 43.58±4.58 mm in right side, and 43.56±4.74 mm in left side. (Table 1) The mean values of acromion width were 27.66±3.51 mm in total samples, 27.78±3.58 mm in right side, and 27.54±3.44 mm in left side. (Table 2) The average distance from the tip of the acromion process to the tip of the coracoid process in the overall sample was 34.53± 2.91 mm, 34.17±2.96 mm on the right side, and 34.89±2.87 mm on the left side. (Table 3) The mean acromio-glenoid distance observed in the overall sample was 30.55±3.62, 30.11±3.69 mm on the right side, and 30.98±3.55 mm in the left side. Type - I flat was seen in 70 (38.89%) of all samples, type - II curved in 87 (48.33%), and type - III hooked in 23 (12.78%).

Table 1: Length of acromion process

Details of Measurements	Number	Range	Mean +Sd	P value
Right	100	34.01 – 54.11	43.58±4.58	0.88

Left	80	32.11 – 56.24	43.56±4.74	

Table 2: Breadth of acromion process

Details of Measurements	Number	Range	Mean +Sd	P value
Right	100	22.0 – 35.98	27.78±3.58	0.59
Left	80	19.69 – 34.98	27.54±3.44	

Table 3: Acromio-cora- coid distance

Details of Measurements	Number	Range	Mean +Sd	P value
Right	100	26.58 – 47.99	34.17±2.96	0.44
Left	80	26.55 – 51.39	34.89±2.87	

Table 4: Acromio-glenoid distance

Details of Measurements	Number	Range	Mean +Sd	P value
Right	100	23.11 – 41.36	30.11±3.69	0.39
Left	80	24.02 – 41.87	30.98±3.55	

DISCUSSION

Several studies on the morphology of the acromion process of the scapulae have been conducted. The relationship between acromial morphology, shoulder impingement, and rotator cuff tears has been well documented.[9-11] We discovered that the mean acromion length and width were 43.57±4.66 mm and 27.66±3.51 mm, respectively. Anetzberger and Putz determined the mean acromial length to be 47.00 mm.[12]

In another study, Singh et al8 found that the mean acromion length and width were 46.1 mm and 23.2 mm, respectively, which is similar to the values found in this study. Similar studies done by Coskun et al had reported the acromion length as 44.7 mm and acromion width as 32.0 mm.[13] Sitha et al observed the same parameters as acromion length 40.1 mm and acromion width 23.9 mm respectively.[14] Paraskevas et al discovered the mean length and width of acromion process as 46.1 mm and 22.3 mm respectively. According to Mansur et al, the average value of acromion width of right scapulae was 26.63 mm and left scapulae was 27.23 mm, which is very close to the current study.[15]

The average distance from the tip of the acromion process to the tip of the coracoid process in the total sample was 34.53± 2.91 mm, 34.17±2.96 mm on the right side, and 34.89±2.87 mm on the left side. Mansur et al.[15] measured the right and left acromio-coracoid distances to be 39.03 mm and 39.39 mm, respectively. Singh et al8 found that the average acromio-coracoid distance was 37.5 mm in the total sample, 37.1 mm on the right side, and 37.9 mm on the left side. In comparison to these previous studies, the current study data shows slightly lower values. The mean acromio-glenoid distance observed in the total sample was 30.55±3.62, 30.11±3.69 mm in the right side, and 30.98±3.55 mm in the left side. Mansur et al found that the mean acromio-glenoid distance was 31.83 mm in the right side and 31.97 mm in the left side, while Singh et al.[8] found that the mean acromio-glenoid distance was 26.6 mm in the right side and 27.6 mm in the left side. Edelson JG et al measured 200 scapulae and concluded that the slope and length of the acromion, as well as the height of the arch, are most closely associated with degenerative changes.[9]

According to Bigliani et al.[2], there are three main types of acromial morphology: type I (flat), type 2 (curved), and type III (curved) (hooked). The three types of acromion were investigated in this study. Type - I flat was seen in 70 (38.89%) of all samples, type - II curved in 87 (48.33%), and type - III hooked in 23 (12.78%). Singh et al[8] found type - I flat in 22.5% of their samples, type - II curved in 38.8%, and type - III hooked in 38.8%. According to Coskun et al.13, type - I flat was observed 10% of the time, type - II curved

73% of the time, and type - III hooked 17% of the time. It is well acknowledged that rotator cuff lesions are more common in type III hooked acromion patients.

CONCLUSION

The acromion process is critical in the creation of the shoulder joint and provides stability. The current research sought to document the fundamental morphometric parameters of the acromion process in an Indian population sample. The morphometric data of the acromion process and the different forms of acromion may be useful to orthopedicians during surgical repair of the shoulder joint. The morphometric study of the acromion may be utilised as an adjunct to encourage a better understanding of the illness that manifests itself in the shoulder area.

REFERENCES

1. Paraskevas G, Tzaveas A, Papaziogas B, Kitsoulis P, Natsis K, Spanidou S. Morphological parameters of the acromion. Folia Morphol (Warsz). 2008;67(4):255-60.
2. Bigliani LU, TicherJB, Flatlow EL, Soslowsky U, Mow VC. The relationship of acromial architecture to rotator cuff disease. Clin Sports Med. 1991;10(4):823-38.
3. Prescher A, Klumpen T. The glenoid notch and its relation to the shape of the glenoid cavity of the scapula. J Anat. 1997;190:457-60.
4. Worland RL, Lee D, Orozco CG, Sozarex F, Keenan J. Correlation of age, acromial morphology, and rotator cuff tear pathology diagnosed by ultrasound in asymptomatic patients. J South Orthop Ass. 2003;12(1):23-26.
5. Hughes RE, Bryant CR, Hall JM, Wening J, Huston LJ, Kuhn JE, et al., Glenoid inclination is associated with full thickness rotator cuff tears. Clin Orthop Relat Res. 2003;(407):86-91.
6. Nicholson GP, Goodman DA, Flatow EL, Bigliani LU. The acromion: Morphologic condition and age-related changes. A study of 420 scapulas. J Shoulder Elbow Surg. 1996;5(1):1-11.
7. Polguj M, Jedrzejewski KS, Podgórski M, Topol M. Correlation between morphometry of the suprascapular notch and anthropometric measurements of the scapula. Folia Morphol (Warsz). 2011;70(2):109-15.
8. Singh J, Pahuja K and Agarwal R . Morphometric parameters of the acromion process in adult human scapulae. Indian Journal of Basic & Applied Medical Research. 2013;8(2):1165-70
9. Edelson JG, Taitz C. Anatomy of the coraco-acromial arch. Relation to degeneration of the acromion. J Bone Joint Surg Br. 1992;74:589–594.
10. Bigliani LU, Morrison DS, April EW. The morphology of the acromion and rotator cuû impingement (abstr). Orthop Trans. 1986;10:228.
11. Gupta C, Priya A, Kalthur SG, D Souza AS. A morpho- metric study of acromion process of scapula and its clinical significance. CHRISMED J Health Res 2014;1:164-9.
12. Anetzberger H, Putz R. The scapula: principles of construction and stress. Acta Anat Basel. 1996;156: 70-80
13. Coskun N, Karaali K, Cevikol C, Bahadir M. Demirel BM, Sindel M. Anatomical basics and variations of the scapula in Turkish adults. Saudi Med J. 2006;27(9):1320-1325.
14. Sitha P, Nopparatn S, Aporn CD. The Scapula: Os- seous Dimensions and Gender Dimorphism in Thais. Siriraj Hsop Gaz. July 2004;56(7):356-365
15. Mansur DI, Khanal K, Haque MK, Sharma K. Mor- phometry of Acromion Process of Human Scapulae and its Clinical Importance Amongst Nepalese Popu- lation. Kathmandu Univ Med J. 2012;38(2):33-36