ORIGINAL ARTICLE

An Evaluation of the Acromion Process of Left Scapula

MOMENA Z[1], PARVEN I[2], MAHMUD S[3], TAHMINA M[4] , JABIN S[5], MAQSOOD F[6]

Abstract

Introduction: *Acromion process projects forward almost at right angles from the lateral end of the spine and over-hangs the glenoid cavity. The medial acromial border is short, bearing anteriorly a small, oval facet for articulation with the clavicle's lateral end. Morphological types of acromion process are helpful for orthopaedic surgeons in surgical repair of shoulder joint. The anatomical and morphological variations of the acromion and related structures of shoulder joint have clinical importance. This study was carried out to observe the morphological variation of acromion process.*

Methods: *This cross-sectional study was conducted in the department of Anatomy, Dhaka Medical College, Dhaka, during the period of July 2017 to June 2018. Shoulder radiograph of lateral view and oblique view were taken from 100 adult male & female attending the Radiology & Imaging Department of Dhaka Medical College & Hospital, Dhaka, aged between 25 to 50 years. From these images morphological measurements, length of acromion process, breadth of acromion process, acromio-coracoid distance, acromio-glenoidal distance were measured.*

Results: *The length & breadth of the acromion process, the acromio-coracoid distance & the acromio-glenoidal distance were significantly higher in male than female.*

Conclusion: *The present study reveals significant difference in morphological measurements of acromion process. The various dimensions of adult acromion process will serve as a reference and will assist the surgeon to be used in the operative technique.*

Key words: *Acromio-coracoid distance, acromio-glenoidal distance, shoulder impingement syndrome.*

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Introduction:

In human anatomy, the acromion (from Greek: akros, "highest", ômos, "shoulder", plural: acromia) is a bony process on the scapula (shoulder blade). Together with the coracoid process it extends laterally over the shoulder joint. The acromion is a continuation of the scapular spine, and hooks over anteriorly.

It articulates with the clavicle (collar bone) to form the acromioclavicular joint. Dimensions of acromion process are important to show linkage to the shoulder girdle pathologies.[1]

1. Zeenatul Momena, Assistant Professor, Department of Anatomy, Green Life Medical College, Dhaka.
2. Irin Parven, Assistant Professor, Department of Anatomy, Monowara Sikder Medical College, Shariatpur.
3. Shaila Mahmud, Assistant Professor, Department of Anatomy, Green Life Medical College, Dhaka.
4. Mousomi Tahmina, Assistant Professor, Department of Anatomy, Green Life Medical College, Dhaka.
5. Suriya Jabin, Assistant Professor, Department of Anatomy, Asgar Ali Medical College, Dhaka.
6. Farzana Maqsood, Assistant Professor, Department of Anatomy, Bangladesh Medical College, Dhaka.

Address of Correspondence: Zeenatul Momena, Assistant Professor, Department of Anatomy, Green Life Medical College, Dhaka, Bangladesh, email: zeenatulmomena@gmail.com

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Morphometric analysis of acromion process would be helpful for surgeons while performing surgical procedures on the shoulder joint.[1] Also anatomic changes in the acromion have been considered a main cause of the pathogenesis of impingement syndrome of the shoulder joint and rotator cuff diseases.[2] The length of the acromion has an effect on the acromion-glenoid distance and a shortening of this distance can predispose to impingement syndrome.[3]

The knowledge regarding the various distances of the acromion process might benefit the orthopaedicians during surgical repair around the shoulder joint.[2] It is also helpful to Anthropologists during their study on evolution of acromion.

So, anatomy of the acromion process have a great importance. It is also useful for suitably interpretating the radiological images, during surgical procedures and in pathologies associated with shoulder joint.

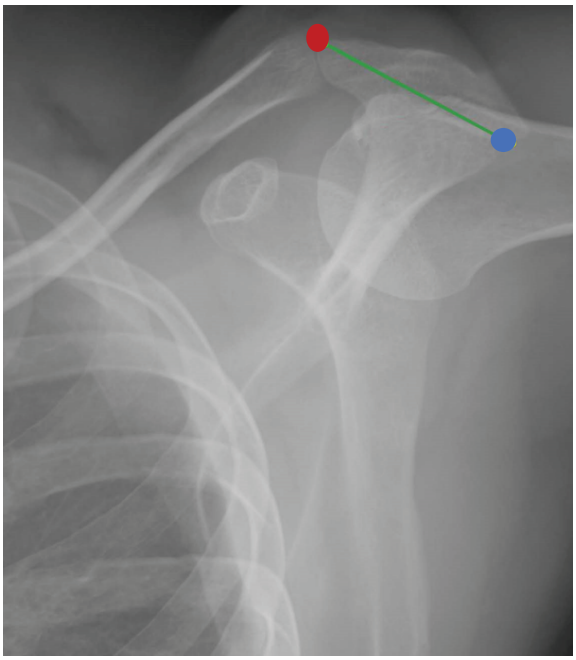
Methods:

This cross-sectional study was conducted in the Department of Anatomy, Dhaka Medical College, Dhaka, during the period from July 2017 to June 2018. Hundred adult Bangladeshi people, 50 males and 50 females, age ranging from 25 to 50 years were included in this study. The subjects

of this study were selected from the Radiology & Imaging Department of Dhaka Medical College & Hospital, Dhaka for the shoulder radiograph of anterior –posterior view advised by their physicians. At the beginning of the study, each subject was briefed about the total plan and purpose of the study. Written informed consent was taken after racial confirmation from them without exploiting any of their weakness or creating undue pressure. Subjects were assured of the confidentiality of the study. The radiograph of anterior-posterior view, oblique and lateral view of left scapula were taken. Then these images were transferred to CD of DVD and different dimensions of acromion process were measured from x-ray film with the help of computer image measuring software. Different variables of acromion process measured by computer with image measuring software (DICOM viewer). The study was approved by the Ethical Review Committee (ERC) of Dhaka Medical College, Dhaka.

Procedure of measurement of length of acromion process

The length of acromion process was measured by drawing a vertical line from most superior point and most inferior point of the acromion process.[5] & it was measured on the lateral view of x-ray of left shoulder. This procedure was done by using measurement tool box of DICOM software with length option.

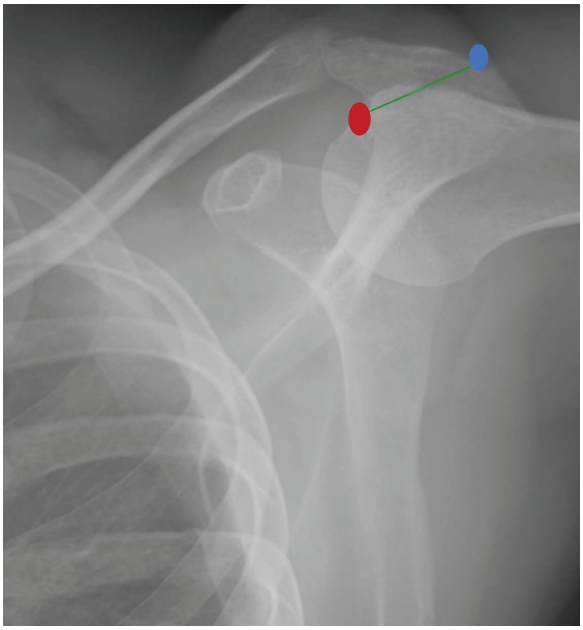


Red dot : Marked on the medial side of the acromion process
Blue dot : Marked on the lateral aspect of the acromion process
Green line : Showing breadth of acromion process

Procedure of measurement of breadth of acromion process

Procedure of measurement of acromio-coracoid distance

The acromio-coracoid distance was measured from one point on the tip of acromion process and another point on the tip of the coracoid process, then a line was drawn joining by these two point. This distance was measured on the oblique view of the left scapula.[6] This procedure was done by using measurement tool box of DICOM soft ware with help of length option. Measurement was taken in cm and then converted into mm by calibration.



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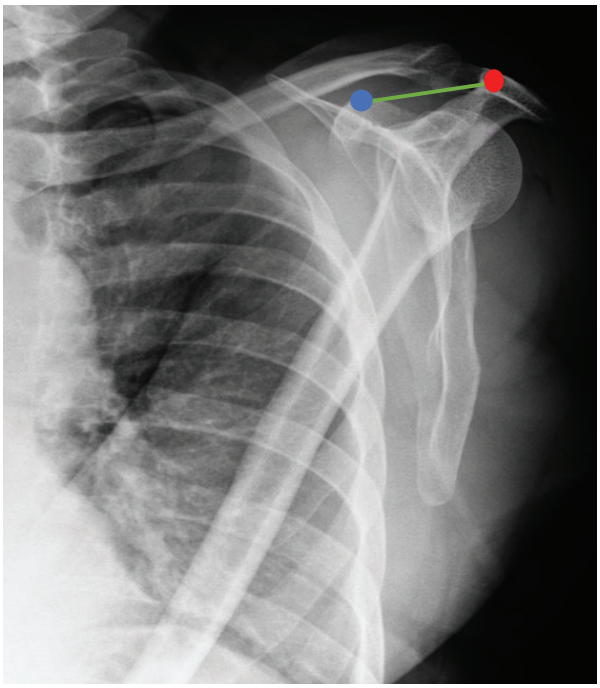
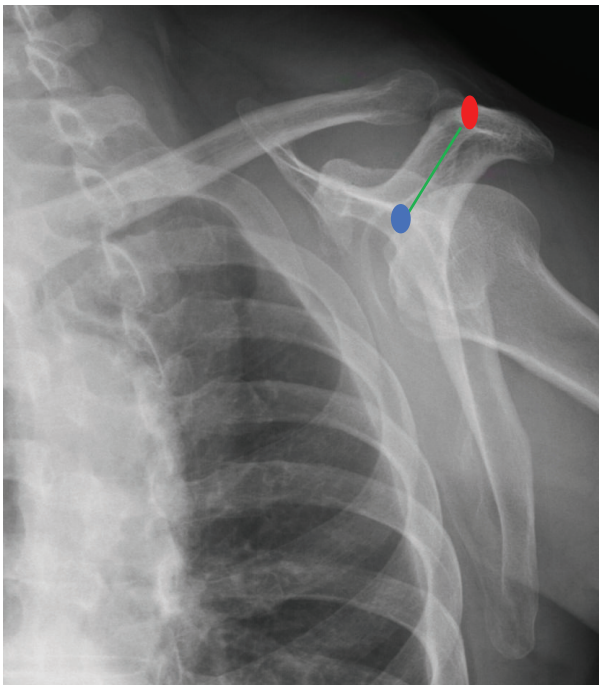


Red dot: Showing on the tip of acromion process
Blue dot: Showing on the tip of coracoid process
Green line: Showing acromio-coracoid distance

Procedure of measurement of acromio-coracoid distance



Red dot: Showing on the tip of acromion process
Blue dot: Showing on the tip of supraglenoid tubercle
Green line: Showing acromio-glenoidal distance

Procedure of measurement of acromio-glenoidal distance

Procedure of measurement of acromio-glenoidal distance

The acromio-glenoidal distance was measured by one point taken on the tip of the acromion process and another point on the tip of supraglenoid tubercle. Then joining these two points by a transverse line was the acromio-glenoidal distance. This distance was done on the oblique view of left scapula.[4] This procedure was done by using measurement tool box of DICOM soft ware with length option.

All data were checked and edited after collection. Statistical tests such as Unpaired Student's 't' tests and proportion tests were done. Statistical significance was accepted at p- value equal to or less than 0.05 ($p \leq 0.05$).

Results:

In male, length of acromion process ranged from 31.40 mm to 40.20 mm and the mean length was 35.62±2.16. In female, length of acromion process ranged from 30.20 mm to 38.40 mm and the mean length was 34.30±2.29 mm. Difference was significant between mean length of acromion process in male and female ($p < 0.004$) (Table-1).

The mean (±SD) breadth of acromion process was 25.91±2.64 mm and 22.83±1.74 mm in male and female respectively. The range of breadth of acromion process was 20.20 mm to 29.90 mm in male and 19.30 mm to 26.50 mm in female. Significant difference ($p<0.000$) of mean breadth of acromion process was observed between male and female. (Table-1).

Table I

Length and breadth of acromion process of left scapula in male and female

Variables	Male (n=50)	Female (n=50)	p value
Length of acromion process (mm)	35.62±2.16	34.30±2.29	0.004*
(Mean±SD)	(31.40-40.20)	(30.20-38.40)	
Breadth of acromion process(mm)	25.91±2.64	22.83±1.74	0.000*
(Mean±SD)	(20.20-29.90)	(19.30-26.50)	

Comparison of values between male and female was done by Unpaired Student's 't'-Test.
*= significant ($p<0.000$) n= sample size.

Table II

Acromio-coracoid distance and acromio-glenoidal distance of left scapula in adult male and female

Variables	Male(n=50)	Female(n=50)	p value
Acromio-coracoid distance(mm) (Mean±SD)	35.07±1.91	26.87±2.27	
	(32.10-39.80)	(24.20-32.40)	0.000*
Acromio-glenoidal distance (mm) (Mean±SD)	25.13±2.36	19.89±2.18	
	(21.30-30.20)	(16.10-24.80)	0.000*

Comparison of values between male and female was done by Unpaired Student's 't'-Test.
*= significant (p<0.000) n=sample size.

The range of acromio-coracoid distance was 32.10 mm to 39.80 mm in male and 24.20 mm to 32.40 mm in female. The mean acromio-coracoid distance was 35.07±1.91 mm and 26.87±2.27 mm in male and female respectively. The acromio-coracoid distance of left scapula was significantly higher (p<0.000) in male than female (Table-II).

In male, acromio-glenoidal distance ranged from 21.30 mm to 30.20 mm and the mean distance was 25.13±2.36 mm. In female, acromio-glenoidal distance ranged from 16.10 mm to 24.80 mm and the mean distance was 19.89 ±2.18 mm. Significant (p<0.000) difference was observed between male and female in mean acromio-glenoidal distance (Table-II).

Discussion:

There are morphological variations in the different parameters of acromion process.

In the present study, the mean length of acromion process was significantly higher in male than female. Morsi, et al[5] reported that mean length of acromion process was significantly (p<0.000) higher in male than female. Singroha, et al[2] performed the study at Department of Anatomy, Haryana. They found that mean length of acromion process was significantly higher in male than female & mean breadth of acromion process was significantly (p<0.000) larger in male than female. They stated the mean length was 47.7±5.85 mm in male and 40.5±3.36 mm in female. The value was higher than present study. Sitha, et al[14] reported that there was difference in mean breadth of acromion process between male and female. Singroha, et al[2] carried out a study in Haryana, they reported mean breadth of acromion process was 26.8±2.58 mm in male and 23.2±2.32 mm in female, value was close to present study.

Singroha, et al[2] reported that mean acromio-coracoid distance was significantly longer in male. The mean distance was 39.4±4.07 mm in male and 34.8±5.99 mm in female. The value was higher than present study.

Sitha, et al[14] also reported that mean distance was significantly (p<0.001) longer in male than female, which was close to our study. The mean value of acromio-glenoidal distance was significantly longer (p<0.000) in male than female. Kavita, et al[9] reported that the mean acromio-glenoidal distance was 26.6 ±0.44 in right side and 27.6±0.36 mm in left side. They did not separate the value between male and female. Sitha, et al[14] stated that the mean value was significantly longer (p<0.026) in male than female in Thai population which was not similar to present study, due to racial cause.[11,12,13]

Sultana, A[10] reported that the acromio-coracoid distance was 36.72 (±5.86) mm and 32.95(±4.09) mm, the acromio-glenoid distance was 29.98 (±3.97) mm and 27.17 (±3.38) mm in male and female respectively, which was close to present study.

Review of existing literature reveals that few works have been done on this topic in other countries. As there is only one published work is available in our country. So, the result of the present study was compared with the findings of other researchers of abroad.

Conclusion:

Significant morphometric differences present in male and female acromion process of left scapula. So, Knowledge of the morphometric parameters of acromion process is important for Orthopaedicians, Anthropologists and Anatomists. Forensic experts might be used this data for the determination of gender. It may also help the Radiologists to carry out the interpretation of images of shoulder joint & its associated disorders.

Limitations:

The present study was conducted only a single institute, at the Radiology Department of Dhaka Medical College Hospital. So the result of the study may not be fully representative of whole community of Bangladesh.

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