Morphometry and Morphology of Acromian Process of Scapula

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Abstract

Introduction: The acromian process of scapula is project forward from lateral end of spinous process of scapula. Coracoacromial ligament is extend between coracoid process and acromian process ,it help in formation of coracoacromial arch, anatomy of this region is important for better understanding of pathology regarding subacromial bursa ,impingement syndrome .

Materials and Methods: Present study was carried out on 74 dry, adult human scapulae 38 left side and 36 right side from teaching collection of anatomy department ,sex of the specimen not known ,Scapular length, width ,acromian process length ,width, thickness ,coracoacromial distance ,acromioglenoid distance was measured with the help of vernier caliper, we also found different shape of acromian process.

Results: We observed 74 scapula out of them 38 scapula are of type –I which was 51.35%,13 scapula of type –II which was 17.57%, 23 scapula of type –III which was 31.08%, we observed mean value acromian length was 4.50±0.52cm, width of acromian process was 2.10±0.26cm, thickness of acromian process was 0.78±0.10cm ,acromicoracoid distance was 3.45±0.53cm, distance between acromian process and supraglenoid tubercle was 2.48±0.40cm.

Conclusion: These findings suggest that the difference in various parameters related to acromian process help in better understanding of anatomy and pathology of coracoacromial arch ,rotator cuff and also helpful to other clinician.

Key Words: *Scapula, Acromian process,*

Introduction

The acromian process projects forwards and continue from the lateral end of the spinous process of scapula on posterior aspect. In Spinous (process) projection lower border of the scapula becomes extend as lateral (posterior) border of the acromian process ,this point is known as acromian angle that form a significant surface marking point.

The upper border of spine of scpula continue as medial border of acromian process ,on acromian process having facet for with lateral end of clavicle bone form plane synovial joint acromioclavicluar joint . subacromial bursa located below the acromian process it separates acromian process and deltoid from supraspiantous tendon. [1] coracoacromial arch formed coracoids process, coracoacromial ligament,anterior part of acromian process . Any pathology whether it is acquired or congenital, in this area reduce the area of this space can cause mechanical impingement.

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This arch is fairly a non-elastic structure and it comprises of a subacromial space that is 1-1.5 cm wide and has the subacromial bursa, strong rotator cuff, and long head of biceps brachi muscle tendon. [2]

The anatomy of the acromian process ,coracoacromial arch, coracoid process and other anatomical structures in this area is of clinical importance, to carry out analysis of scan, carrying out physiotherapy, and surgical aspect related with this shoulder joint. [3]

Knowledge of Acromian process anatomy provide better understanding in infringement syndrome and the pathology of rotator cuff. [4]

Aim

The aim of the current study was to measure the various parameters of acromian process of the scapula and to analyze the morphological aspect of the acromian process for better understanding and management of shoulder pathology.

Material and Methods

The present study was performed in Anatomy Department in Smt.B.K.Shah medical instituite & Research center ,Sumandeep VIdyapeeth university .A total of 74 dry scapula (36 right side and 38 left side) bones were deliberated from teaching collection of the Department of Anatomy. The bones are of belongs to adults and sex and age of the scapula were not recognized . Entirely scapula chosen were dry, ,showed normal anatomical features and deformed bones were excluded from study. All measurement was carried out by the (digital vernier calliper). The data were then entered and scrutinize using the Microsoft softwere.

The following parameters of the acromian process were studied.. All the measurements were taken manually by using of a digital vernier caliper and recorded in centimetres*(cm)*

- **Acromian projection Length(AP diameter)** - Distance along the longaxis from anterior to posterior

- **Acromian projection Width(transverse diameter)** - distance between lateral and medial borders.(maximum far points on this border)

- The coraco-acromial ligament was measured by using method of Edelson and Taitz [5]

- **Coraco acromian distance(C-A distance)** -Distance between acromian processes and tips of coracoid.

- **Acromian thickness(breadth)-** Thickness of anterior aspect was recorded at a point 1 cm lateral to medial border and 1 cm medial to lateral border.

- **Acromio-glenoid distance (A-G distance)** – Distance between two point glenoid tubercle superior aspect and inferior surface of acromian process.

Result

In present study we have taken 74 dry scapulae (36 right side and 38 left side) of unknown sex and age without any gross pathology , from teaching collection from anatomy department ,we observed all 3 types of scapula . (table-1)

Table -1 Different types of scapula according to shape

Type	Right (n=36)	Left (n=38)	Total (n=74)
Type 1(Flat)	20(55.56%)	18(47.37%)	38(51.35%)
Type 2(Curved)	06(16.67%)	07(18.42%)	13(17.57%)
Type 3(Hooked)	10(27.78%)	13(34.21%)	23(31.08%)

On right side ,We observed 20 out of 36 scapula of type –I which was 55.56%,06 out of 36 scapula of type –II which was 16.67%, 10 out of 36 scapula of type –III which was 27.78%(Table-1)

On left side, We observed 18 out of 38 scapula of type –I which was 47.37%,07 out of 38 scapula of type –II which was 18.42%, 13 out of 38 scapula of type –III which was 34.21% (Table-1)

We observed 74 scapula out of them 38 scapula are of type –I which was 51.35%,13 scapula of type –II which was 17.57%, 23 scapula of type –III which was 31.08% (Table-1)

Parameters	Total mean (cm)	Right side (cm)	Left side (cm)
Scapular.length	14.31±1.17	14.21±1.22	14.53±1.13
Scapular.Width	10.30±0.76	10.10±0.77	10.15±0.75

Table: 2 Mean value of scapular measurements

We observed mean value of scapular length on right side was 14.21±1.22 cm,

mean value of scapular length on left side was 14.53±1.13cm, mean value of scapular width on right side was 10.10±0.77cm, mean value of scapular length on left side was 10.15±0.75cm. (Table-2)

Table: 3 Mean value of various parameters of Acromian process

Parameters	mean (cm)	Right side (cm)	Left side (cm)
Length of Acromian (AP diameter)	4.50±0.52 cm	4.55±0.52 cm	4.48±0.53 cm
.Width of Acromian (Transverse diameter)	2.10±0.26 cm	2.05±0.27 cm	2.15±0.24 cm
Thickness of Acromian (breadth)	0.78±0.10 cm	0.73±0.11 cm	0.80±0.08 cm
Coraco acromian (AC) Distance (interval)	3.45±0.53 cm	3.41±0.55 cm	3.49±0.52 cm
Acromo-glenoid Distance (interval)	2.48±0.40 cm	2.45±0.44 cm	2.52±0.36 cm

Table -4 Comparision of types of scapula with previous studies

Type %	Chandi gupta et al [6]	Coskun et a l [3]	Singh et al [7]	Shilpi gosavi et al[8]	Saha et al[9]	Musa et al[10]	Schetino et al[11]	Current study
I	32	10	22.5	13.3	28	37	5.20	51.35
II	22	73	38.8	81.88	67	48.7	57.9	17.57
II	46	17	38.8	4.72	05	13.7	36.9	31.08

In our study we have measured various parameters ,found various shape and compare with other studies we have found 38(51.35%) out of 74 scapula of type I scapula, this value is higher than what observed in study of chandni gupta et al[6] found ,singh at al[7] ,musa et al[10] 32%,22.5%, 37% respectively .Coskun at al[3], shilpi gosavi et al[8] reported type I scapula 10%,13.3% respectively . (Table-4)

We Have found 17.57 % scapula of type II scapula, this value is lower than what observed in study of chandni gupta et al[6] found ,singh at al[7] ,musa et al[10] 22%,38.8%, 48.7% respectively .Coskun at al[3] ,shilpi gosavi et al[8] reported type II scapula 73%,81.88% respectively. (Table-4)

We Have found 31.08 % scapula of type III scapula, this value is lower than what observed in study of chandni gupta et al[6] found ,singh at al[7] , Schetino et al[11] 46%,38.8%, 36.9% respectively .Coskun at al[3] , Shilpi gosavi et al[8] reported type III scapula 17%,4.72% respectively. (Table-4)

Table -5 Comparision of various parameters of scapula with previous studies

Measurement (mm)	Mansur et al[12]	Paraskevas et al[2]	Musa et al[10]	Coskun et al[3]	Singh et al[7]	Shilpi gosavi et al[8]	Current study
Measurement Of Length (AP diameter)	46.01mm	46.1mm	45.85mm	44.7mm	46.1mm	43.7mm	45.0mm
Measurement Of Width (transverse diameter)	26.93mm	22.3mm	23.02mm	-	23.2mm	22.78mm	21.0mm
Measurement Of Thickness (breadth)	-	8.8mm	-	-	6.6mm	6.9mm	7.8mm
A-C distance	39.21mm	28.1mm	15.48mm	17.8mm	37.5mm	26.9mm	34.5mm
G-A distance	31.9mm	17.7mm	-	-	27.0mm	22.68mm	24.8mm

Figure -1 Length of acromian process measure by vernier calliper

Figure -2 Breadth of acromian process by vernier caliper

Figure -3 Thickness of acromian process of scapula

In present study we found the length of the acromian was 45.0±0.52 mm' the comparision of various parameters of acromian process with previous study done in table 5. The width (transverse diameter) of the acromian projection in the current study shows much resemblance with previous studies. Edelson and Taitz[5] had recorded that the thickness(breadth) and width(transverse diameter) of Acromian projection have no relationship with pathological and physiological changes. We found thickness of acromian process was 7.8 mm which was compared with what recorded by Paraskevas et al[2] (8.8 mm) that was higher as compared to the what observed by shilpi gosavi et al[8] & Singh et al[7] 6.9 mm and 6.6 mm respectively.

Sangiampong et al[13] found pathology that reduce the subacromial space, causes impingement(compression) and the interval between the tendon of supraspinatous and the lower part of the acromian on front aspect , is decrease in position of 90 degree abduction with internal rotation .

Some of the parameters recorded of scapular morphometry shows difference with sex and age, and it clinically important.

Conclusion

The result of our study done on 74 dry scapula shows predominant type I scapula, we have measured various parameters of acromian process which was nearly similar to found in previous study ,the coracoacromian distance

and coracoglenoid distance measured and compare with previous studies shows not much difference, this study helpful for orthopedics surgeon, physiotherapist, radiologist and other clinician for better understanding of anatomy and pathology of acromian process.

Ethical Clearance- Taken from Sumandeep Vidyapeeth committee

Source of Funding- Self

Conflict of Interest -nil

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