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Acromial Morphology and Subacromial Architecture in a South African Population

Morfología Acromial y Arquitectura Subacromial en una Población Sudafricana

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SUMMARY: The acromion is classically described as one of the three scapular processes. Its antero-inferior aspect has been identified as the prime region of rotator cuff pathology. The purpose of this study was to determine the morphologic state of the acromion and the relative subacromial architecture within a South African population. The sample series comprised the morphological observation of one hundred and eighty-two scapulae specimens (n= 182). The classification scheme as stated by Bigliani et al. (1986) was employed. The morphometric architecture of the subacromial space was also investigated (n= 120). (a) Acromial Type: (i) Type I (flat inferior surface) 34.6%; (ii) Type II (curved inferior surface) 51.1%; (iii) Type III (hooked inferior surface) 14%. (b) Shape of the subacromial space: (i) rhomboid 60.8% (ii) triangular 10%, (iii) trapezoid 29.2%. Since this study investigated the acromial morphology and its association with the relevant demographic factors specific to the South African population, it may prove beneficial to the South African population as a whole. In addition, statistically significant differences were obtained for the correlation of several morphometric and morphological parameters of the subacromial architecture with age, sex, acromial type and shape of subacromial space. A unique trapezoidal subacromial space was also observed. As the variable acromial types and subacromial morphology have been reported to lead to the narrowed subacromial space and subsequent subacromial syndromes, the association between the respective morphometric and morphological parameters may provide predictive values to assist in the diagnosis and assessment of the cause of rotator cuff disease.

KEY WORDS: Acromion; Morphology; Subacromial architecture; Morphometry.

INTRODUCTION

The acromion is considered to be an osteological landmark constituting one of the three processes of the scapula (Standring, 2008). Prescher (2000) identified the acromion as the summit of the shoulder at its attachment to the clavicle. The acromion, which usually protrudes forward as it curves almost rectangularly from the acromial angle at the lateral aspect of the scapular spine, also represents the postero-superior boundary of the subacromial space (Prescher; Rockwood *et al*., 2009) (Fig. 1). Subsequently, the subacromial space is defined by four different bony landmarks, viz. the supraglenoid tubercle, acromial angle, anterior tip of the inferior surface of acromion and coracoid processes (Sperner, 1995; Standring) (Fig. 1).

Bigliani *et al*., (1986) classified the morphologic state of the acromion according to three types. Type I acromia presented with a flat inferior surface (17.2%), Type II acromia were characterized by a curved inferior surface (42.9%) and Type III acromia portrayed a hooked inferior surface (39.3%) (Bigliani *et al*., 1986; Rockwood *et al*., 2004). Despite the proposal of a fourth acromial type (convex inferior surface) by Gagey *et al*. (1993) and Natsis *et al*. (2007), it has not been related to rotator cuff tendinopathy.

The variable morphology of the acromion has been identified as an extrinsic factor contributing to rotator cuff tendinopathy (Bigliani *et al*., 1986). According to Kane *et al*. (2006), individuals with Type I acromia (22%) had the lowest risk for rotator cuff impingement syndrome. However, individuals with Type III acromia (8.3%) had the highest correlation with subacromial pathology and full thickness rotator cuff tears (Seitz *et al*., 2011).

There also appears to be a paucity in the literature regarding the architectural parameters of the subacromial space. Sperner reported three different shapes of the

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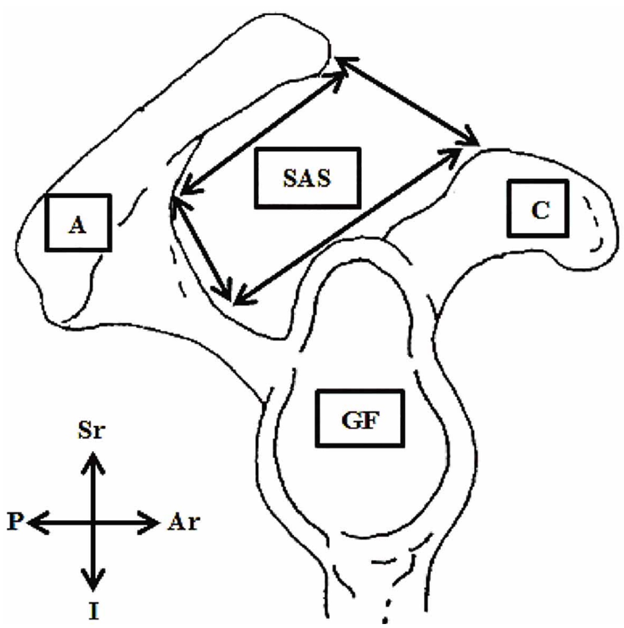

Fig. 1. Lateral view of right subacromial space (Adapted from Paraskevas *et al*., 2008). A= Acromion; Ar= Anterior; C= Coracoid process; GF= Glenoid fossa; I= Inferior; P= Posterior; SAS= Subacromial space, Sr= Superior.

subacromial space, viz. rhomboid (68.7%), kite-shaped (23.3%) and triangular (8%). In contrast with the other aforesaid shapes, the rhomboid subacromial space is considered to provide the largest plane surface as it allows the rotator cuff to slide effortlessly within it (Sperner).

Narrowing of the subacromial space caused by the variant morphological and morphometric parameters is closely related to rotator cuff tendinopathy (Potau *et al*., 2008). The aspect of the supraspinatus tendon that is pathologically affected by a confined subacromial space ultimately corresponds to the critical zone, a region of compromised vascular supply (Potau *et al*.; Standring).

Therefore, the aim of this study was to determine the acromial morphology and the associated subacromial architecture within the South African population.

MATERIAL AND METHOD

The morphologic state of the acromion was examined through the visual and palpable evaluation of one hundred and eighty-two scapulae specimens (n= 182), of which one hundred and twenty were dry scapulae and sixty-two were adult cadaveric specimens. In addition, the morphological and morphometric subacromial architecture of the dry scapulae was also investigated (n= 120). This study was conducted at the Department of Clinical Anatomy, University of KwaZulu-Natal, Durban, South Africa in accordance with Chapter 8 of the National Health Act No. 61 of 2003. The distribution of demographic factors was noted and considered (Race: 131 Black, 51 White; Sex: 109 Males, 73 Females; Age range: 12-97 years old).

The classification scheme as proposed by Bigliani *et al*. was adopted. Based upon the specific shape of the subacromial space, three standard formulae were used to determine the area of the subacromial space:

1. Area of a regular triangle.

Heron's formula for Area= $^2\sqrt{}$semi-perimeter [(semi-perimeter - side 1) x (semi-perimeter - side 2) x (semi-perimeter-side 3)]

* Semi-perimeter = (side 1 + side 2 + side 3)/2

Sides 1, 2 and 3: Distance between inferior surface of anterior acromial tip and spinous process; Distance between supraglenoid tubercle and spinous process; Length of spinous process.

2. Area of a regular trapezoid

[(base 1 + base 2) x height]/2

* Bases 1 and 2, and height: Acromio-glenoidal length; Distance between inferior surface of anterior acromial tip and spinous process; Length of spinous process.

3. Area of regular rhombus

base x height

* Base and height: Distance between inferior surface of anterior acromial tip and spinous process; Length of spinous process.

All procedures described in this study were approved by the relevant institutional authority (Ethical Clearance Approval Number: BE280/13). Statistical analysis included the comparisons of laterality, age, sex and race with acromial type and subacromial architecture. It was performed using SPSS version 22.0 (SPSS Inc., Chicago, Illinois, USA). A p value of <0.05 was considered to be statistically significant. In addition, age was considered to be a continuous variable and analyzed as such. The formula used to calculate weighted mean was: S nx/n, where n= sample number and x= incidence.

RESULTS

A summary of the morphometric and morphologic parameters is displayed in Table I.

Morphometry of subacromial architecture: The dimensional parameters regarding the subacromial architecture were analyzed in relation to the demographic factors of the population in question.

Laterality. In this study, all morphometric parameters of the subacromial architecture were recorded to be greater on the right side (Table I).

Sex. Male individuals were seen to present with relatively increased subacromial morphometry than female individuals (Table I). As a result, the comparison of sex with all morphometric parameters yielded statistically significant p values (Table I).

Race. All morphometric parameters appeared to be higher in White individuals (Table I).

Age. There was a significant correlation between acromio-glenoidal length and age (p= 0.000) (Table I).

Morphology of the acromion and subacromial space: Three morphologic states of the acromia were observed, viz. Type I acromia (flat inferior surface) (34.6%), Type II acromia (curved inferior surface) (51.1%) and Type III acromia (hooked inferior surface) (14%).

Trapezoid (29.2%), rhomboid (60.8%) and triangular (10%) subacromial spaces were identified. In addition to the classification of acromial type and identification of the shape of the subacromial space, the area of the subacromial space was quantified in accordance with the latter. Demographic influences regarding the relative morphology were also taken into account.

Laterality

Acromial Type. Although Type I acromia (flat inferior surface) were most frequent on the right side, Types II (curved inferior surface) and III (hooked inferior surface) acromia appeared to be numerous on the left side (Table I).

Shape of Subacromial Space. Trapezoid, rhomboid and triangular subacromial shapes were all predominant on the left side (Table I).

Area of Subacromial Space. The area of the subacromial space was recorded to be greater on the right side (Table I).

Sex

Acromial Type. Types I (flat inferior surface), II (curved inferior surface) and III (hooked inferior surface) acromia were most prevalent in males (Table I).

Shape of Subacromial Space. An equal prevalence of triangular subacromial spaces were seen in males and females, while trapezoid and rhomboid subacromial spaces were most common in males (Table I).

Area of Subacromial Space. Male individuals presented with increased areas of the subacromial space when compared with female individuals which was reflective upon a statistically significant p value of 0.016 (Table I).

Race

Acromial Type. Types I (flat inferior surface), II (curved inferior surface) and III (hooked inferior surface) acromia were more numerous in the Black race group than the White race group (Table I).

Shape of Subacromial Space. Black individuals were observed to have a greater prevalence of trapezoid, rhomboid and triangular subacromial shapes (Table I).

Area of Subacromial Space. The area of the subacromial space in the White race group was markedly increased (Table I).

Shape of Subacromial space

Morphometric parameters. Trapezoid subacromial spaces generally presented with increased acromio-glenoidal lengths, acromio-coracoid distances and lengths of spinous processes (Table I). The comparison of the acromio-coracoid distance with the shape of the subacromial space yielded a statistically significant p value of 0.005 (Table I).

Although the distance from the supraglenoid tubercle to the spinous process was greatest in rhomboid subacromial spaces, the acromial length and the distance from the inferior surface of the anterior acromial tip to the spinous process was highest in triangular spaces (Table I). Subsequently, the relationship of the acromial length with the shape of the subacromial space yielded a statistically significant p value of 0.033 (Table I).

Acromial Type. Rhomboid subacromial spaces presented with the highest prevalence of Types I (flat inferior surface)

Table I. Morphometric and morphological parameters of the subacromial architecture.

Parameters		Morphometric: Dimensions of subacromial space: Acromial length	Acromio-glenoidal length	Acromio-coracoid distance	Distance from: Inferior surface of anterior acromial tip to spinous process	Supraglenoid tubercle to spinous process	Length of spinous process	Morphological: Acromial Type: I	II	III	Shape of subacromial space: Trapezoid	Rhomboid	Triangle	Area of subacromial space (mm^2)
Side	Right	43.68±7.9	20.96±3.2	25.63±4.3	34.69±5.41	21.38±3.18	19.30±2.71	34	46	11	17	36	5	631.52±218.6
	Left	41.37±7.8	20.88±4.5	24.24±4.4	33.20±5.74	21.21±3.99	18.83±2.64	29	47	15	18	37	7	581.86±229.5
P Value		0.112	0.929	0.086	0.144	0.788	0.344		0.600			0.785		0.227
Sex	Female	38.66±6.4	20.04±2.8	23.50±4.1	32.51±4.33	19.80±3.60	18.31±2.44	28	34	11	14	28	6	547.41±197.9
	Male	45.19±7.8	21.53±4.5	25.93±4.3	34.93±6.17	22.32±3.23	19.58±2.72	35	59	15	20	46	6	647.61±233.9
P Value		0.000*	0.028*	0.003*	0.013*	0.000*	0.010*		0.597			0.793		0.016*
Race	Black	42.33±7.9	20.91±3.9	24.90±4.4	33.81±5.62	21.26±3.62	19.01±2.69	41	67	23	33	71	12	599.84±224.1
	White	48.23±5.0	21.14±4.0	25.87±5.7	37.95±3.87	22.18±2.82	20.27±1.57	22	26	3	1	3	0	805.40±143.1
P Value		0.145	0.910	0.671	0.147	0.619	0.255		0.113			0.750		0.072
Shape of subacromial space	Trapezoid	44.03±6.9	21.15±3.5	26.01±3.3	34.85±6.28	21.48±2.90	19.74±2.32	8	17	10	---	---	-	716.24±169.4
	Rhomboid	41.13±8.2	21.09±4.2	25.03±4.6	33.36±5.43	21.51±3.84	18.80±2.87	33	29	9	---	---	-	631.92±159.1
	Triangle	46.61±7.4	19.28±3.2	21.25±4.3	34.88±4.32	19.48±3.69	18.68±2.20	10	11	1	---	---	-	133.69±69.38
P Value		0.033*	0.316	0.005*	0.362	0.183	0.207		0.020*			---		0.000*
Acromial Type	I	38.77±8.4	20.68±3.8	25.32±4.4	32.15±5.68	21.49±3.70	18.31±2.77	---	---	---	8	33	10	581.21±182.2
	II	44.56±6.7	20.39±3.8	24.15±4.6	34.78±5.19	21.13±3.56	19.48±2.59	---	---	---	17	29	11	602.07±251.8
	III	44.52±7.6	22.75±4.0	26.20±3.6	35.22±5.86	21.35±3.63	19.45±2.49	---	---	---	10	9	1	667.12±223.1
P Value		0.001*	0.052	0.144	0.034*	0.887	0.074		---			0.020*		0.343
Age P Value		0.208	0.000*	0.778	0.518	0.079	0.185		0.359			0.435		0.004*

*Significant P Value.

and II (curved inferior surface) acromia (Table I). Type III (hooked inferior surface) acromia were predominant in individuals with trapezoid subacromial spaces (Table I). The comparison of the acromial type with the shape of the subacromial space resulted in a statistically significant p value of 0.020 (Table I).

Area of Subacromial Space. Trapezoid subacromial spaces appeared to have the greatest area of the subacromial space (Table I).

Acromial Type

Morphometric parameters. The acromio-glenoidal length, acromio-coracoid distance and distance from the inferior surface of the anterior acromial tip to the spinous process were highest in individuals with Type III (hooked inferior surface) acromia (Table I). The comparison of the distance from the inferior surface of the anterior acromial tip to the spinous process with acromial type yielded a statistically significant p value of 0.034 (Table I).

The distance from the supraglenoid tubercle to the spinous process was largest in individuals with Type I (flat inferior surface) acromia while acromial length and length of the spinous processes was most increased with Type II (curved inferior surface) acromia (Table I). As a result, the association of the acromial length and acromial type presented with a statistically significant p value of 0.001 (Table I).

Area of Subacromial Space. Individuals with Type III (hooked inferior surface) acromia were recorded to have the largest area of the subacromial space (Table I).

Age. There was a statistically significant difference between the area of the subacromial space and age (p = 0.004) (Table I).

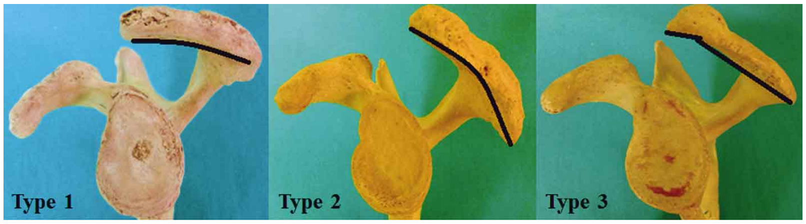

Fig. 2. Acromial morphology. Type I. Flat inferior surface. Type II. Curved inferior surface. Type III. Hooked inferior surface.

Fig. 3. Shape of Subacromial space.

Table II. Review of literature summarizing incidence of acromial types.

Author (Year)	Sample size (n)	Incidence (%) (x)		
		Type I	Type II	Type III
Bigliani *et al.* (1986)[a]	140	17.1	42.9	39.3
Morrison & Bigliani (1987)[b]	200	18	41	41
Edelson & Taitz (1992)[c]	280	22	62	16
Getz *et al.* (1996)[c]	394	22.8	68.5	8.6
Nicholson *et al.* (1996)[c]	420	32	42	26
Panni *et al.* (1996)[d]	80	42.5	25	32.5
Schippinger *et al.* (1997)[e]	31	67.7	32.3	0
MacGillivray *et al.* (1998)[c]	98	40	52	8
Kim *et al.* (1999)[c]	120	29.2	46.7	24.2
Wang *et al.* (2000)[a]	32	6	66	28
Hirano *et al.* (2002)[f]	91	36.3	24.2	39.6
Worland *et al.* (2003)[a]	120	7.5	49.2	43.3
Green *et al.* (2004)[a]	15	0	73.3	26.7
Arenas *et al.* (2005)[a]	87	4.7	51.6	43.5
Kane *et al.* (2006)[c]	72	22	72	8.3
Sangiampong *et al.* (2007)[g]	154	3.2	93.5	3.2
Natsis *et al.* (2007)[a]	423	12.1	56.5	28.2
Paraskevas *et al.* (2008)[c]	88	26.1	55.6	18.1
Potau *et al.* (2008)[c]	112	22.3	76.8	0.9
Collipal *et al.* (2010)[a]	420	8	50	42
Saha *et al.* (2011)[c]	200	28	67	5
Schetino *et al.* (2013)[a]	57	5.2	57.9	36.9
Singh *et al.* (2013)[b]	129	22.5	38.8	38.8
Akram *et al.* (2014)[a]	60	13.4	45	41.6
Gupta *et al.* (2014)[f]	50	32	22	46
Mohamed & Abo-Sheisha (2014)[c]	56	28.6	44.6	23.2
Weighted Mean		**20.5**	**53.9**	**25.3**
Current study[c]	182	34.6	51.1	14.0

Trend in Acromial Incidence: a= TI < TIII < TII; b= TI < TII & TIII; c= TIII < TI < TII; d= TII < TIII < TI; e= TIII < TII < TI; f= TII < TI < TIII; g= TI & TIII < TII.

DISCUSSION

The present study investigated factors that are completely unique to the South African population. The comparisons of numerous morphometric and morphological parameters of the subacromial architecture with age, sex, acromial type and shape of subacromial space yielded statistically significant p values.

Morphometry of subacromial architecture

Laterality. Although this study reported that all morphometric parameters were increased on the right side only, other studies have identified different tendencies. Collipal *et al*. (2010) and Singh *et al*. (2013) found the acromial length to be longer on the right side which was in accordance with findings of this study. On the contrary, Gupta *et al*. (2014) reported a larger left acromial length. The larger acromio-coracoid distance and acromio-glenoidal length which were seen on the right side in this study corroborated the findings of Gupta *et al*., while Singh *et al*. observed these parameters to be greater on the left side.

Sex. The present study documented relatively greater subacromial morphometry in male individuals. This substantiated the results of Nicholson *et al*. (1996) and Paraskevas *et al*. (2008) who reported that the acromial length, acromio-coracoid distance and acromio-glenoidal length were higher is male individuals. In light of the statistically significant p values obtained from the comparison of sex with all morphometric parameters, it may be postulated that male individuals in the South African population present with larger subacromial morphometric parameters.

Race. The distinctively higher morphometric parameters seen in White individuals in this study may suggest that the White race group native to South Africa generally has larger subacromial measurements than that of the Black race group.

Age. The statistically significant p value of 0.000 deduced from the comparison between age and the acromio-glenoidal length may be reflective of increasing morphometric parameters with advancing age.

Morphology of the acromion and subacromial space. Although many studies have reported the prevalence of acromial types in the respective population groups, no study has investigated the acromial morphology and its association with the relevant demographic factors in the South African population. Therefore, this study may prove beneficial to the South African population at large.

A comprehensive review of the literature resulted in the identification of seven trends regarding the frequency of the three acromial types (Table II). In this study, the incidence of acromial types reflected a trend of ascending values from Type III to Type I to Type II acromia, ie. Type III (14%), Type I (34.6%) and Type II (51.1%) (Table II). This trend in acromial type incidence was in accordance with that reported by other authors (Edelson & Taitz, 1992; Getz *et al*., 1996; Nicholson *et al*.; MacGillivray *et al*., 1998; Kim *et al*., 1999; Kane *et al*.; Paraskevas *et al*.; Potau *et al*.; Saha *et al*., 2011; Mohamed & Abo-Sheisha, 2014) (Table II).

Type II acromia was observed in 51.1% of cases and compared favorably with a weighted mean of 53.9 extracted from the literature (Table II). Despite the standard acromial type prevalence as popularized by Bigliani *et al*., Type III acromia are considered to be least prevalent in humans, a finding that was confirmed in 14% of cases of the present study and was in accordance with a calculated weighted mean of 25.3 (Table II). In addition, the presence of the hooked Type III acromion has been identified as the causative factor in supraspinatus tendinopathy (Anetzberger *et al*., 2004).

The lack of morphological and morphometric information describing and quantifying the subacromial space appears to be a major drawback in the operative procedures of the glenohumeral region. Azzoni *et al*. (2004) stated that the severity of rotator cuff pathologies is directly proportional to the decreasing magnitude of the subacromial space. The rhomboidal and triangular subacromial spaces as reported by Sperner (1995) were identified in this study. Furthermore, trapezoidal subacromial spaces were also observed, a finding which appears to be unique as it has not been described in the literature reviewed.

Laterality

Acromial Type. This study revealed a high frequency of Type I acromia (flat inferior surface) on the right side, whilst Types II (curved inferior surface) and III (hooked inferior surface) acromia were most prevalent on the left side. However, in the Thai study conducted by Sangiampong *et al*. (2007), Types I and III acromia were more common on the right side whilst Type II acromia appeared most frequently on the left side.

Shape of Subacromial Space. The predominance of all shapes of the subacromial space on the left side observed in this study may suggest an asymmetric tendency within the South African population.

Area of Subacromial Space. Although the current study quantified the area of the subacromial space to be larger on the right side, Azzoni *et al*., stated that prevalence of rotator cuff tendinopathy is subsequently greater on the dominant side.

Sex

Acromial Type. The current study identified the highest incidence of all three acromial Types in male individuals. This was markedly different from the findings of Paraskevas *et al*. and Mohamed & Abo-Sheisha, both of whom recorded the high prevalence of Types II and III acromia in male individuals while Type I acromia commonly presented in female individuals. Getz *et al*. observed the sex distribution of Types I and II acromia to be predominant in females and males, respectively. Consequently, Akram *et al*. (2014) found that shoulder impingement syndrome is generally more pronounced in female than male individuals.

Shape of Subacromial Space. In this study the equivalent frequencies of triangular subacromial spaces observed in both male and female individuals may be reflective of a uniform sex distribution regarding this specific shape within the South African population.

Area of Subacromial Space. In view of the larger areas of the subacromial space seen in male individuals and the statistically significant p value of 0.016, it may be postulated that South African males generally present with larger subacromial spaces. This finding may be justified by the Italian study conducted by Azzoni *et al*., who found the magnitude of the subacromial space to be distinctively smaller in female individuals.

Race

Acromial Type. The high frequency of Types I (flat inferior surface), II (curved inferior surface) and III (hooked inferior surface) acromia in the Black race group may be related to the racial distribution of the sample size.

Shape of Subacromial Space. The greater prevalence of all three shapes of the subacromial space in the Black race group may be representative of the larger number of Black individuals within the sample series.

Area of Subacromial Space. Since the White race group presented with a distinctively increased area of the subacromial space, it may be postulated that this observation is native to the White South African race group.

Shape of Subacromial space

Morphometric parameters. The statistically significant p values of 0.005 and 0.033 recorded for the comparison of the shape of the subacromial space with the acromio-coracoid distance and acromial length, respectively, may indicate that these two specific parameters are key instruments in distinguishing the different shapes of the subacromial space.

Acromial Type. Since a statistically significant p value of 0.020 was recorded for the comparison of acromial type with the shape of subacromial space, it may be postulated that the shape of the subacromial space is ultimately dependent on the acromial type.

Area of Subacromial Space. Although, the present study reported that trapezoid subacromial spaces had the greatest area, Sperner (1995) identified the rhomboid subacromial space to present with the largest plane surface.

Acromial Type

Morphometric parameters. The statistically significant p values of 0.034 and 0.001 recorded for the comparison of acromial type with the distance from the inferior surface of the anterior acromial tip to the spinous process and acromial length, respectively, may suggest that the determination of these two morphometric parameters may assist with the classification of the specific acromial types. However, while the horizontal disposition of a flatter acromion presenting with an increased acromial length may provide a larger "bone shelter" over the humeral head, it is also considered to be related to subacromial spur formation, rotator cuff degeneration and other subacromial syndromes (Edelson & Taitz).

Area of Subacromial Space. Although it is understood from a mere graphical representation of the low tilting hooked Type III acromion that the magnitude of the subacromial space is greatly decreased, thus predisposing the individual to shoulder impingement, in this study Type III acromia peculiarly presented with largest area of the subacromial space.

Age. In the study conducted by Edelson (1995), Type III hooked acromia were completely absent in subjects under the age of 30 years. However, an increase in age has been identified to be accompanied by an increase in the incidence of Type III acromia (Edelson; Collipal *et al*.). Such an observation was substantiated in the current study as Type III acromia presented only in a single case in subjects under the age of 30 years. Edelson stated that the hooked Type III acromion presenting in individuals below the age of 30 years, may be the result of ossification in the insertion site of the coracoacromial ligament as the growth of new bone was discovered at this site upon observation, thus suggesting a mere developmental phenomenon. However, the exact role of such phenomena in older patients presenting with a high incidenceof Type III acromia and a subsequently narrowed subacromial space is yet to be confirmed. Therefore, in the present study the statistically significant difference of 0.004 yielded from the correlation of age with the area of the subacromial space may suggest that the magnitude of the subacromial space is largely dependent upon the age of the individual.

Although this study enabled the authors to confirm the existence of statistically significant differences between the demographic factors of the South African population and the relevant morphometric and morphological subacromial parameters, there appears to be much controversy surrounding the latter, as their roles as causative and/or resultant factors in rotator cuff pathologies require further clinical investigation.

CONCLUSION

The findings of this study may contribute to a body of knowledge regarding the array of rotator cuff diseases that is common to the subacromial region. Although Type II acromia appeared to be predominant, Type III acromia were least prevalent. The prevalence of acromial types may assist in the deduction of a correlative relationship for subacromial pathology. Since the excision of the variant Type III hooked acromion is considered to be the fundamental objective in the operative treatment of impingement syndrome, the early detection of specific acromial types may also be predictive of partial- or full- thickness rotator cuff tears. It may be postulated that the unique finding of the trapezoid subacromial space may present with a sizable subacromial magnitude thus preventing compression of the rotator cuff muscle complex. The diverse appearance of acromial types and subacromial spaces identified in this study may equip the clinician with the relevant information to prevent misinterpretation of imaging resources. In addition, levels of significance were obtained for the correlation of several morphometric and morphological parameters of the subacromial architecture with age, sex, acromial type and shape of subacromial space. Since this study couples morphometry and morphology of the subacromial architecture, it may provide predictive values to determine the success of conventional procedures for therapeutic management. Furthermore, it may assist in the subsequent reduction of degenerative changes affecting the contents within the subacromial space.

NAIDOO, N.; LAZARUS, L.; OSMAN, S. A. & SATYAPAL, K. S. Morfología acromial y arquitectura subacromial en una población sudafricana. ***Int. J. Morphol., 33(3)***:817-825, 2015.

RESUMEN: El acromion se describe clásicamente como uno de los tres procesos escapulares. Su aspecto antero-inferior ha sido identificado como la región principal de la patología del manguito rotador. El propósito de este estudio fue determinar el estado morfológico del acromion y la arquitectura subacromial relativa dentro de una población de Sudáfrica. La muestra incluyó la observación morfológica de ciento ochenta y dos escápulas (n= 182). Fue empleado el esquema de clasificación según lo reportado por Bigliani *et al*. (1986). La arquitectura morfométrica del espacio subacromial también fue investigada (n= 120). (a) tipo acromial: (i) tipo I (superficie inferior plana) 34,6%; (ii) tipo II (superficie inferior curva) 51.1% y (iii) Tipo III (superficie inferior enganchada) 14%. Forma del espacio subacromial: (i) romboide 60,8%; (ii) triangular 10%, y (iii) trapezoide 29,2%. Debido a que este estudio investigó la morfología acromial y su asociación con los factores demográficos pertinentes específicos de la población sudafricana, puede resultar beneficioso para la población de Sudáfrica. Además, se obtuvieron diferencias estadísticamente significativas para la correlación de varios parámetros morfológicos de la arquitectura subacromial con la edad, sexo, tipo acromial y la forma del espacio subacromial y morfométrico. También se observó un único espacio subacromial trapezoidal. Como se ha informado de la variable acromial tipos y morfología subacromial para dirigir al espacio subacromial estrechado y síndromes subacromial posteriores, la asociación entre los respectivos parámetros morfológicos morfométricos puede proporcionar valores predictivos para ayudar en el diagnóstico y evaluación de la causa de la enfermedad del manguito rotador.

PALABRAS CLAVE: Acromion; Morfología; Arquitectura subacromial; Morfometría.

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