STUDY OF CORRELATION BETWEEN BIGLIANI'S ACROMION TYPES AND SHOULDER PROBLEMS

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ABSTRACT

Purpose of the study: *Acromion Morphology have been implied to have a major role in shoulder pathology especially caused by affecting subacromial space. Among Acromion Morphology studied includes – Acromion Index, Acromion Types, and Acromion Slope etc. Acromion Types as classified according to Bigliani is a faster way to differentiate Acromion on a plain X-ray. Purpose of the study was to assess the effect of Acromion type on shoulder problems.*

Material and Methods: *100 Patients of above age 40 coming to orthopaedic OPD for shoulder problems (Impingement or rotator cuff pathology) were examined. Their Acromion type were assessed on the basis of x-ray of shoulder (supraspinatus outlet view). Acromion type was then classified according to Bigliani classification.*

Results: *There were 100 patients in the study – 58 males and 42 females. There were 44 type I, 55 Type II and 01 Type III Acromion types accordingly to Bigliani's Classification. Mean age of study group was 56.67 ± 6.57.However in Impingement group patients were younger (55.4 ± 6.53) as compared to rotator cuff group patients (58.84 ± 6.06).There were more females in Type I Acromion group and subsequently number of males outnumbered females in Acromion Type II and Type III. There were 63 patients in Impingement group and 37 in rotator cuff group. Right sided shoulders were affected in 68 patients and 32 patients had their left shoulders affected. 73 affected shoulders were of dominant sides.*

Conclusion: *As Acromion Type changes from Type I to Type III, then symptoms of impingement and rotator cuff pathology start to appear at a younger age. This warrants aggressive approach of management of these shoulder pathology in Acromion type II and type III.*

Keyword: *Acromion Types, Bigliani, Impingement,*

INTRODUCTION

The shoulder joint is a complex joint consisting of four joints, two spaces, numerous stabilizing ligaments and more than 30 muscles and their respective tendons. The shoulder joint requires synchronized movements to function properly. One of the most important structure around shoulder joint is Acromion process and subacromial space.

This space is filled by rotator cuff tendons – supraspinatous, infraspinatous tendon and teres minor tendon. Subacromial impingement and rotator cuff pathology are common problems of shoulder and underlying causes for these two are still poorly understood. Either intrinsic degenerative changes in the tendons or extrinsic mechanical compression by the acromion had been matter of debate for aetiological reasons for many decades.

In 1949, Armstrong suggested that compression of the bursa and rotator cuff tendons under the acromion causes the supraspinatus syndrome [1, 2]. Later on, Neer (1983) stated that 95% of cuff tears are caused by mechanical impingement[2,3]. Acromioplasty is still the standard operative procedure for impingement lesions, and there has been a substantial increase in its incidence [2,3].. Although the indication for acromioplasty is based on clinical evaluation of the patient. This clinical diagnosis is generally supported by typical changes in acromial morphology on standard radiographs[2,4,5,6,7,8,9,10,11]. Acromial type was classified according to Bigliani et al. (1986) – Type I is a flat undersurface, Type II is a curved undersurface, and Type III is a hooked undersurface of the acromion on outlet-view radiographs[7].

The association between acromion morphology, subacromial impingement and rotator cuff pathology is well documented[2, 12]. In some studies, a type-III acromion has been found to be associated with a higher prevalence of rotator cuff tears[27, 12, 13] whereas not all authors have found this[2, 14]. Despite the numerous studies that have been carried out in an attempt to support or refute Neer's original theory of extrinsic mechanical impingement as the primary aetiology of rotator cuff disease, the role of the acromion is still unclear. [2]

MATERIAL AND METHODS

Patients: We took data of 100 patients who were of above age 40 and attended orthopaedic OPD for shoulder pain consistent for rotator cuff pathology and impingement which were confirmed by tests for same – Impingement tests according to Neer and Hawkins, and Rotator cuff tests (Jobe test, internal and external rotation, belly-press test, and lift off test). Patient were

advised X-ray of affected shoulder including Supraspinatus Outlet view. Acromion Type was assessed on this view and Classified according to Bigliani's Classification[7].

Acromial type: Acromial type was classified according to Bigliani et al. (1986) – Type I is a flat undersurface, Type II is a curved undersurface, and Type III is a hooked undersurface of the acromion on outlet-view radiographs[7]. Acromion Type were then analysed with patients diagnosis, age, dominant hand, affected side.

STATISTICAL ANALYSIS

The study was statistically analysed with SPSS software (version - 22). Level of significance was kept at $p<0.05$(Confidence Interval - 95%). Acromion type was correlated to age, sex, affected and dominant side, and diagnosis using Spearman non parametric correlation test. The Mean and Standard deviation were calculated for age.

RESULTS

After analysing the data of 100 patients – there were two groups. One with patients who predominantly tested for positive impingement test (Impingement Group) and another was with patients who predominantly tested for positive test for rotator cuff pathology (Rotator Cuff Group). Thus further analysis was done with data along two groups- Impingement Group and Rotator Cuff Group. (Table – 1, 2, 3, 4)

Table: 1

	Impingement Group			Rotator Cuff Group			Total		
	M	F	Total	M	F	Total	M	F	Total
Bigliani Type I	9 (9%)	23 (23%)	32 (32%)	5 (5%)	7 (7%)	12 (12%)	14 (14%)	30 (30%)	44 (44%)
Bigliani Type II	24 (24%)	7 (7%)	31 (31%)	19 (19%)	5 (5%)	24 (24%)	43 (43%)	12 (12%)	55 (55%)
Bigliani Type III	0 (0%)	0 (0%)	0 (0%)	1 (1%)	0 (0%)	1 (1%)	1 (1%)	0 (0%)	1 (1%)
TOTAL	33 (33%)	30 (30%)	63 (63%)	25 (25%)	12 (12%)	37 (37%)	58 (58%)	42 (42%)	100 (100%)

Table: 2

Bigliani type	Sex		Age	
	M	F	Impingement group	Rotator Cuff Group
I	14 (14 %)	30(30 %)	60.9 ± 6.53	66.45 ± 4.03
II	43 (43 %)	12(12 %)	49.7 ± 6.55	55.75 ± 3.00
III	1(1 %)	0(0 %)	0	49 ± 0

Table: 3

	Impingement Group				Rotator Cuff Group				Total			
Age	55.40 ± 6.53				58.84 ± 6.06				56.67 ± 6.57			
Sex	M – 33				M – 25				M – 58			
	F – 30				F – 12				F – 42			
Affected Side		M	F	Total		M	F	Total		M	F	Total
	R	23	19	42	R	18	8	26	R	41	27	68(68%)
	L	10	11	21	L	7	4	11	L	17	15	32(32%)
Dominant Side Affected	M – 25 (25%)				M – 20(20%)				M – 45 (45%)			
	F – 20 (20%)				F – 8(8%)				F – 28 (28%)			
	Total - 45(45%)				Total - 28(28%)				Total - 73(73%)			

Table: 4

Correlations							
Spearman's rho		**Age**	**Sex**	**Type**	**Dominant Side**	**Affected Side**	**Diagnosis**
Age	*Correlation Coefficient*	1.000	.314**	-.796**	.068	.103	.231*
	Sig. (2-tailed)		.001	.000	.503	.309	.021
Sex	*Correlation Coefficient*	.314**	1.000	-.472**	-.102	.068	-.149
	Sig. (2-tailed)	.001		.000	.311	.503	.140
Type	*Correlation Coefficient*	-.796**	-.472**	1.000	-.075	-.004	.190
	Sig. (2-tailed)	.000	.000		.456	.966	.058
Dominant Side	*Correlation Coefficient*	.068	-.102	-.075	1.000	.334**	.014
	Sig. (2-tailed)	.503	.311	.456		.001	.888
Affected Side	*Correlation Coefficient*	.103	.068	-.004	.334**	1.000	.229*
	Sig. (2-tailed)	.309	.503	.966	.001		.022
Diagnosis	*Correlation Coefficient*	.231*	-.149	.190	.014	.229*	1.000
	Sig. (2-tailed)	.021	.140	.058	.888	.022	
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

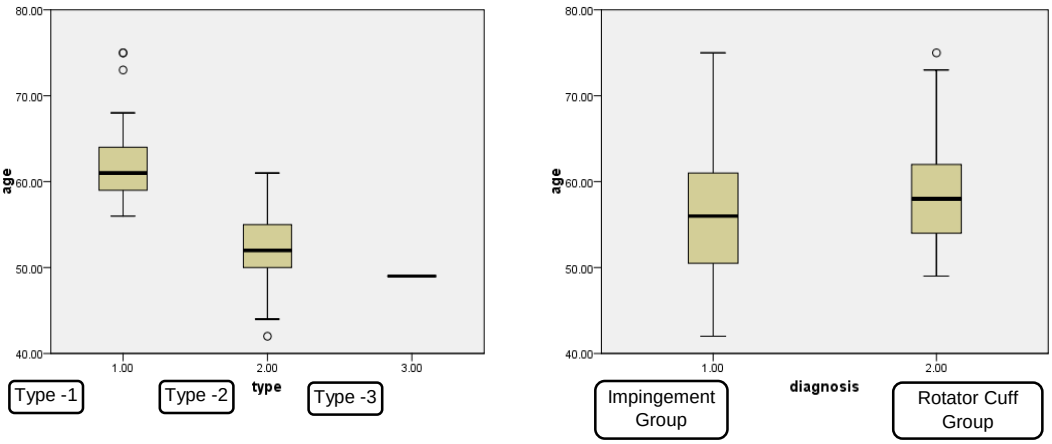

Figure 1: Boxplot showing significant findings.

Patient Demographics:

A. SEX – In this study there were 58(58%) males and 42 (42 %) females. In Impingement Group there were 33 (33%) males and 30 (30 %) females and in rotator cuff group there were25 (25%) males and 12(12%) females. (Table – 2)

B. AGE – Mean Age of All 100 patients was 56.67 ± 6.57 In Impingement Group the mean age was55.40 ± 6.53 and in rotator cuff group the mean age was58.84 ± 6.06. (Table – 3)

C. SIDE AFFECTED – There were 68 (68%) patient with right side affected and 32(32%) patient with left side affected. (Table – 3)

D. DOMINANT SIDE AFFECTED – There were in total 73 (73%) patients haver dominant side affected. There were 45(45%) patient with Dominant Side Affected In Impingement Group and patient with 28(28%) Dominant Side Affected in rotator cuff group. (Table – 3)

E. ACROMION TYPES - There were 44 (44%) patient with Bigliani Type I, 55 (55%) patient with Bigliani Type II and 1 (1%) patient with Bigliani Type III. With respect to Impingement Group, there were 32 (32%) patient with Bigliani Type I, 31 (31%) patient with Bigliani Type II and 0 (0%) patient with Bigliani Type III and in Rotator cuff group there were 12 (12%) patient with Bigliani Type I, 24 (24%) patient with Bigliani Type II and 1 (1%) patient with Bigliani Type III. (Table – 1)

F. CORRELATION – Spearman Correlation (Non Parametric) test was applied and correlation between patient demographics, acromion type, dominant and affected side and diagnosis was analysed. Significant correlation was found between age, type and diagnosis(Table -4)

DISCUSSION

In our study highest number of acromion was of type II followed by Type I and least number was of Type III. The result of our study is similar to study of Yazici et al[15], Getz et al[16] and Shah et al[17], Nigar et al[18], Paraskevas et al[19] and Balke et al[2]. But it differs from study of Bigliani et al[7] and Natsis et al [20] (II>III>I). However our study has limitation of having only 1 patient with type III.

In our study patients were of younger age in either group with type II or III acromion as compared to Type I. There was only single type III acromion in our study and that too in rotator cuff pathology group and patient was comparative younger. It helps us to form an opinion that as type of acromion goes higher there is small subacromial space making patient symptomatic at younger age. However this assumption needs further well designed large cohort study.

We did not find any significant correlation between acromion type and age similar to as mentioned by Banas et al8, Getz et al16, Vahakari et al21 and Balke et al.[2]

However male to female ratio changed (M >Type III and F> Type I) as type of acromion changed towards Type III as already mentioned by Getz et al[16] and Paraskevas et al[19].

In the present study, the patients with subacromial impingement were younger compared to rotator cuff pathology group. This finding was to be expected as the incidence of rotator cuff tears increases with age as reported by Banas et al[8], Yamaguchi et al[22], Balke et al[2].

There were limitations in our study as the patient designated to each group were classified according to clinical examination and not on the basis of MRI. So this has its limitation in stricter terms but this is also the strong point of this study. As in our society patient has to bear the cost of MRI which is a costly investigation. Thus only by basis of clinical and radiographical examination we can decide which patient to aggressively investigate with MRI.

Another limitation was that only one aspect of Acromion Morphology i.e. type was taken into consideration. So the results were somehow bound to be changed albeit slightly when more number of acromion morphology characters were applied on the study like – Acromion Slope, Acromion Index etc.

CONCLUSION

We can summarize our study that though acromion type is not the only indicator to be looked upon as the decision maker regarding shoulder pathology but it serves as a valuable guide in deciding which patient to be treated aggressively. As acromion type goes from Type I to Type III i.e. towards higher side the incidence of impingement and rotator cuff pathology appears to appear at younger age in both groups so that they can be aggressively evaluated and their progression towards rotator cuff pathology can be delayed by suitable and timely intervention.

AUTHOR'S CONTRIBUTION

The study was designed by MD, AV. Patients screening, data collection, documentation, and review was done by MD, AV. Radiographic assessment done by MD.MD, AV wrote the manuscript.

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CONFLICT OF INTEREST

None

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