

Original article:

Prognostic factors affecting clinical outcome following rotator cuff repair

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Abstract:

Background: Adults of all ages are affected by rotator cuff pathology. Numerous studies have been done to identify the prognostic factors that affect the healing of cuff tears following repair. Here we have taken small to medium cuff tears to identify various prognostic factors affecting its healing as there are very few studies to determine the various intrinsic mechanism that can effect the outcome of the repair in small to medium cuff tears.

Methods and materials: 19 patients with MRI proved small to medium rotator cuff tears where taken up for study. Factors like diabetes ,age,type of acromion,AC joint arthropathy,fatty degenerations were taken into consideration. Patients with adhesive capsulitis , fractures, massive tears were excluded .Pre and at follow up period of 6 months post operative Oxford and UCLA score were done.

Results: A prospective study with 19 patients is undertaken to study the functional outcome of rotator cuff repair. In our study average age of the patient participated was between 51-60 years with males being predominant .70% of the patients had right side affected. 55 % of the patients had concomitant AC joint arthropathy, and 45 % had fatty degeneration.60% of the patients had diabetes mellitus.58% of the patients had stage 2 tear retraction.10 out 19 patients had type 2 acromion and medium-sized tears. Fisher's exact test done showed no association between prognostic factors and functional outcome of the surgery.

Conclusion: We conclude that there is no significant association with Prognostic factors and clinical outcome of the rotator cuff repair

Key words: prognostic, clinical outcome.

Introduction

Among shoulder disorders ,rotator cuff tears are most common pathology. Patients with this condition commonly end up with pain, weakness and disability of the affected shoulder hence, basically effecting is day to day activities. Due to advance diagnostic tools like MRI and minimally invasive operative techniques ,the rotator cuff repair has become more popular. Eventhough there are numerous studies regarding association of prognostic factors like tear size, tear retraction, fatty degeneration etc with massive rotator cuff tears , there are no enough studies to link the same prognostic factors with small to medium rotator cuff tears. Hence , the study was taken up to find any kind of association of various prognostic factors with outcome of rotator cuff repair.(1)

Subjects and methods:

▣ **STUDY TYPE:** Prospective observational study

STUDY SETTING: Hospital-based study.

SOURCE: Patients presenting to Orthopedics OPD with symptoms and signs suggestive rotator cuff tear

STUDY PERIOD: The study was done from November 2016 to March 2018

SAMPLE SIZE: Based on effect size of 0.8, the sample size was calculated using the formula $n = \frac{\sigma^2}{E^2} * \{Z_{1-\alpha/2} + Z_{\beta}\}^2$ Where α is 5%, power= 80% E (effect size) =0.8, $Z_{1-\alpha/2}=1.96$ $Z_{\beta}=0.841$, $\sigma=1.1$, n is sample size, which is estimated to be 15.

SAMPLE SELECTION:

The study is a prospective and observational analysis of patients treated surgically for rotator cuff tears. All patients with small to medium full-thickness rotator cuff tears, diagnosed with MRI and at least with six months follow up were taken up for study. The patients were assessed with Oxford and UCLA scoring at the time of admission and six months postoperatively. Patients who had less than six months follow up, and those who had associated fractures with rotator cuff tears were excluded. All the patients fulfilling the following inclusion criteria were taken into study irrespective of age, sex and gender.

Inclusion criteria: All patients with full-thickness rotator cuff tear.

Stage-1 tear: If tear edge is lying over greater tuberosity and diameter is <1cm in greatest diameter.

Stage-2 tear: If the tear exposes the humeral head but does not retract to glenoid articular surface and diameter is between 1cm and 3cm.

Exclusion criteria:

Glenohumeral arthritis

Adhesive capsulitis

Paralysis of affected shoulder girdle muscle

History of fracture instability or septic shoulder

Stage -3 and stage -4 tear: Tears that extends to glenoid or retracts medial to glenoid and diameter >3cm in greatest diameter.

The protocol included evaluation of patients according to his symptoms and his functional ability to do his activities of daily living. A proforma was designed which was filled preoperatively and on subsequent visits postoperatively at six months. The muscle strength and range of motion were assessed. For this study purpose, we have employed UCLA (University of California Los Angeles) shoulder scoring and Oxford shoulder score index for evaluating the functional outcome pre and post-operatively.

Follow up

Following surgery, patients are put on shoulder immobilizer along with 30 degree abduction and were told to continue the immobilizer for six weeks. Right from post op day one patients were started on pendulum exercises, scapular protraction- retraction exercises and were told to follow the rehabilitation protocol accordingly for six months.

2.2 Statistical analysis:

Collected data was analysed by both descriptive and inferential method. In the descriptive method, mean standard deviation was obtained to access the two types of score in before and after the intervention. Frequencies and percentages were calculated to category wise various parameters. Fischer exact was used to find the association of various prognostic factors like age, gender, affected side and others with functional outcome of rotator cuff repair. P value < 0.05 will be considered as statistically significant.

Results:

In our study, average age of the patient participated was between 51-60 years with males being predominant .70% of the patients had right side affected. 55 % of the patients had concomitant AC joint arthropathy, and 45 % had fatty degeneration.60% of the patients had diabetes mellitus.58% of the patients had stage 2 tear retraction.10 out 19 patients had type 2 acromion and medium-sized tears. With these data available, Fisher's exact test was done to find any association of prognostic factors with the functional outcome of the surgery. We could find no significant association between prognostic factors and clinical outcome. The details are listed in the tables and graphs below.

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Table 1: Prognostic factors versus post op UCLA score (Percentage wise)

		POST - OP UCLA SCORE					
		Poor-Fair			Good - Excellent		
		Count	Column N %	Row N %	Count	Column N %	Row N %
Age	40 and below	0	.0%	.0%	4	22.2%	100.0%
	41 - 50	0	.0%	.0%	7	38.8%	100.0%
	51 - 60	1	100.0%	11.1%	7	38.8%	88.9%
Gender	F	1	100.0%	11.1%	8	42.1%	88.9%
	M	0	.0%	.0%	10	57.9%	100.0%
Affected side	L	1	100.0%	16.7%	5	26.3%	83.3%
	R	0	.0%	.0%	13	73.7%	100.0%
Acromioclavicular(AC) joint arthropathy.	ABSENT	0	.0%	.0%	8	44.4%	100.0%
	PRESENT	1	100.0%	9.1%	10	55.5%	90.9%
Fatty degeneration	ABSENT	0	.0%	.0%	10	55.5%	100.0%
	PRESENT	1	100.0%	11.1%	8	44.4%	88.9%
Tear retraction	1	1	100.0%	12.5%	7	42.1%	87.5%
	2	0	.0%	.0%	11	57.9%	100.0%
Type of acromion	1	1	100.0%	11.1%	8	42.1%	88.9%
	2	0	.0%	.0%	10	57.9%	100.0%
Diabetes mellitus	ABSENT	0	.0%	.0%	7	42.1%	100.0%
	PRESENT	1	100.0%	8.3%	11	57.9%	91.7%
Tear size(in cm)	2 and below	0	.0%	.0%	9	50%	100.0%
	Above 2	1	100.0%	10%	9	50%	90.0%
	Below 3						

Type of acromion	1	1	100.0%	11.1%	3	50.0%	33.3%	5	38.5%	55.6%
	2	0	.0%	.0%	3	50.0%	27.3%	7	61.5%	72.7%
Diabetes mellitus	ABSENT	0	.0%	.0%	2	33.3%	25.0%	6	46.2%	75.0%
	PRESEN T	1	100.0%	8.3%	4	66.7%	33.3%	6	53.8%	58.3%
Tear size (in cm)	2 and below	3	.0%	.0%	3	50.0%	50.0%	3	30.0%	50.0%
	Above 2 Below 3	1	100.0%	9.1%	3	50.0%	27.3%	6	70.0%	63.6%

Table 2: Prognostic factors versus post op oxford score

		POST OP OXFORD SCORE								
		moderate to severe			mild to moderate			satisfactory		
		Count	Column N %	Row N %	Count	Column N %	Row N %	Count	Column N %	Row N %
Age	40 and below	0	.0%	.0%	1	16.7%	25.0%	3	23.1%	75.0%
	41 - 50	0	.0%	.0%	1	16.7%	14.3%	5	46.2%	85.7%
	51 - 60	1	100.0%	11.1%	4	66.7%	44.4%	4	30.8%	44.4%
Gender	F	1	100.0%	11.1%	3	50.0%	33.3%	4	38.5%	55.6%
	M	0	.0%	.0%	3	50.0%	27.3%	8	61.5%	72.7%
Affected side	L	1	100.0%	16.7%	0	.0%	.0%	4	38.5%	83.3%
	R	0	.0%	.0%	6	100.0%	42.9%	8	61.5%	57.1%
Acromioclavicular joint arthropathy,	ABSENT	0	.0%	.0%	3	50.0%	33.3%	6	46.2%	66.7%
	PRESENT	1	100.0%	9.1%	3	50.0%	27.3%	6	53.8%	63.6%
Fatty degeneration	ABSENT	0	.0%	.0%	3	50.0%	27.3%	7	61.5%	72.7%
	PRESEN	1	100.0%	11.1%	3	50.0%	33.3%	5	38.5%	55.6%
	T	1	100.0%	11.1%	3	50.0%	33.3%	5	38.5%	55.6%
Tear retraction	2	0	.0%	.0%	3	50.0%	27.3%	7	61.5%	72.7%

Type of acromion	1	1	100.0%	11.1%	3	50.0%	33.3%	5	38.5%	55.6%
	2	0	.0%	.0%	3	50.0%	27.3%	7	61.5%	72.7%
Diabetes mellitus	ABSENT	0	.0%	.0%	2	33.3%	25.0%	6	46.2%	75.0%
	PRESEN T	1	100.0%	8.3%	4	66.7%	33.3%	6	53.8%	58.3%
Tear size (in cm)	2 and below	3	.0%	.0%	3	50.0%	50.0%	3	30.0%	50.0%
	Above 2 Below 3	1	100.0%	9.1%	3	50.0%	27.3%	6	70.0%	63.6%

Table 3: Influence of prognostic factors on the outcome of rotator cuff repair

	Fishers exact test p	
Age	0.468	Not Significant
gender	0.471	Not Significant
affected side	0.069	Not Significant
Tear retraction	0.422	Not significant
ACJ arthropathy,	0.642	Not Significant
fatty degeneration	0.471	Not Significant
type of acromion	0.471	Not Significant
diabetic mellitus	0.612	Not Significant
tear size	0.539	Not Significant

Discussion

In our study, most of the subjects belonged to the age group between 40 to 60 years with a mean age of 52.5+/-8.21. Similar studies were done by Cole et al(2) and Burks et al(3) who also had a mean age of 56 and 57 years respectively. Factors like the age of the patient had no significant role in our study. Bennet et al(4) had similar observations in their study. The main reason why age did not affect in our study could be because most of the patients were less than 60 years. Many studies have been done regarding age being a predictor of clinical outcomes of rotator cuff repair, as tissue viability decreases with age.

Jose Otávio Reggi Pécora et al(5) did a study similar to ours where they measured various intrinsic and surgery related factors affecting the outcome of the cuff repair. The patients who were planned for surgery were evaluated using the UCLA scoring system and MRI preoperatively, and postoperative follow up period of 12 months. The variables like age, gender, affected tendon and side, type of acromion

were taken into consideration. The mean age of the patients was 54.9+/-8years which is identical to ours. The pre-op UCLA score of their study was 13.17+/-3.77 and 12 months post operatively score was 28.73 +/-6.09. As the clinical outcome was better postoperatively in the elderly, they concluded that age is a standalone predictor of the outcome. There was no significant correlation between various parameters and the clinical outcome. The mean age, pre-operative and post-operative UCLA score of our study were similar to the results obtained from their study.

Daniel Goutallier et al(6) . did a study on the fatty degeneration of the cuff muscles affecting the outcome of the surgery. They stated that the fatty degeneration is mainly caused following a tear of the tendons. They also stated that the process of ageing has no role in the fatty degeneration of tendons. However, the shoulder should be free from osteoarthritis or any neurological impairment. They concluded that the tears with fatty degeneration more than grade 2 are susceptible for recurrent tears resulting in a poor outcome. In our study, 9 out of 19 patients had fatty degenerations along with rotator cuff tears, of which 8 had a good functional outcome. In our study, we were not able to quantify the degree of fatty degeneration.

In our study, we had tried to find an association between type of acromion as classified by Bigliani to that with clinical outcome post cuff repair .we had nine patients with type 1 and ten patients with type 2 acromion, the latter having more chance of impinging rotator cuff due to its curved shape.(7) None of our patients had type 3 hooked acromion. The type of acromion was determined by a single radiologist following MRI of the affected shoulder. All 11 patients with type 2 acromion had a good functional outcome. A similar study was done by Gartsman and O'Connor(8) and McDonald et al (9) where they concluded that clinical outcome of the patients with type 2 and type 3 acromion, who underwent rotator cuff repair and acromioplasty had same results as patients type 1 acromion who underwent only rotator cuff repair. This was in par with our study we could find no association of acromion type with clinical outcome following rotator cuff repair.

We have also compared our study to a study done by Abtahi AM et al(10) where they had compared various studies to find the effect of various pre-operative parameters on arthroscopic rotator cuff repair. They concluded that many patients had excellent outcomes in regards to pain relief and the ability to perform daily activities. They stated that patients with a high functional need like manual labourers had a high risk for poor outcome or failure of surgery. The study also concludes that even though age, larger tear size, tear retraction, diabetes causes poor tendon healing, there is considerable improvement in the ability to perform daily activities and tremendous pain relief. Our study showed no association of prognostic factors with clinical outcome as almost all of our patients had significant improvement in Oxford and UCLA score postoperatively.

Conclusion:

In conclusion, through our study we could find no association with various prognostic factors with clinical outcome following rotator cuff repair. However more number of subjects and longer study period is required to confirm the association.

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