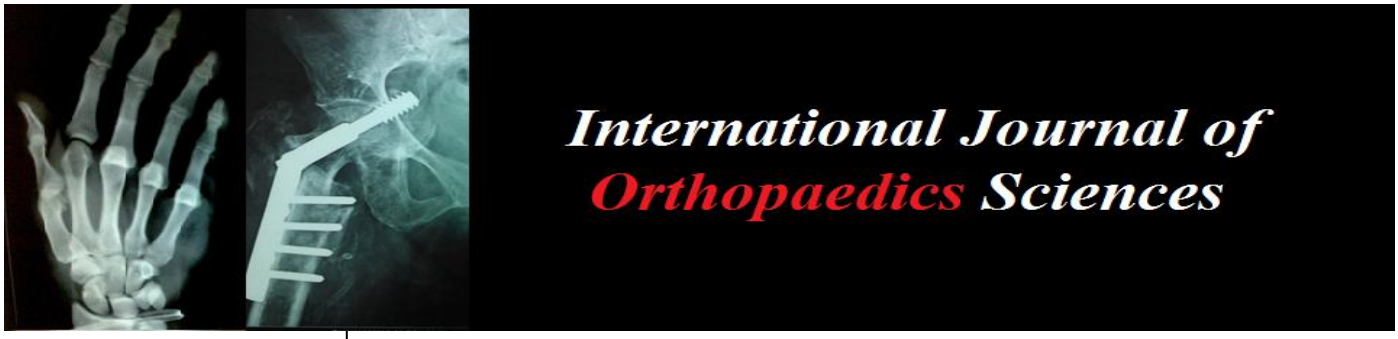

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A comparative study of functional outcome following the arthroscopic rotator cuff repair with and without subacromial decompression in type 1 acromion patients: A prospective study

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Abstract
Objectives: A rotator cuff tear is a common cause of pain and disability among adults. People who do repetitive lifting or overhead activities like painters, carpenters, etc., and athletes like tennis players and baseball pitchers are particularly at risk for rotator cuff tears. Though subacromial impingement is more common in patients with Type III (Hooked) acromion than Type I (Flat) acromion but our study was to evaluate any significant difference in patients treated with subacromial decompression to those who are treated without decompression in Type 1 acromion patients.
Materials and methods: A prospective study of 30 patients with rotator cuff tears were divided into 2 groups i.e., Group 1 consisting of 15 patients and are treated with subacromial decompression and Group 2 consisting of another 15 patients who are treated by without subacromial decompression at SGITO, Bengaluru from November 2017 to June 2019. Clinical / Functional assessment was done using ASES, QUICK DASH and ROWE soring systems and patients was followed at regular intervals of 1, 3 & 6 months & 1-year post-op.
Results: Our study showed predominant male population (60%), traumatic etiology (66.7%) and partial thickness tears (56.7%). At the end of 1 year follow up, Ases, Rowe & Quick Dash Scores was (90.33%), (92.33%) & (10.78%) respectively who are treated by acromioplasty and (90.41%), (91.67%) & (11.83%) respectively who are treated by non-acromioplasty. The mean time for improvement in symptoms in both groups are about 6 months.
Conclusion: Our study concludes, that there was no significant statistical difference and clinical or functional outcome in both the study groups in terms of pain, muscle strength, range of movements except for flexion wherein statistical difference was found however there was no significant difference in functional / clinical outcome. Also, our study concludes that Age, Sex, Etiology of tear and Type of tear was not found to be a significant factor which affects the clinical/functional outcome.

Keywords: Rotator cuff repair; Type 1 acromion; DASH--disability of arm, shoulder and hand score; ASES-American shoulder and elbow surgeons

1. Introduction
Rotator cuff tears are a common cause of shoulder pain and dysfunction encountered in the OPD. The Rotator cuff undergoes progressive degenerative changes with increasing age and may lead to partial tear to finally complete rupture of the rotator cuff. The spectrum of these disorder ranges from inflammation to massive tearing of the rotator cuff musculo-tendinous unit. A rotator cuff tear is a commonly encountered problem in orthopaedic department. After age of 40 years, approximately 30% of patients will have rotator cuff tears, and after age 60 yrs, there will be cuff tears in upto 80% of patients. A rotator cuff tear is a common cause of pain and disability among adults. People who do repetitive lifting or overhead activities like painters, carpenters, etc., and athletes like tennis players and baseball pitchers are particularly at risk for rotator cuff tears. Though subacromial impingement is more common in patients with Type III (hooked) acromion than Type I (Flat) acromion but our study was to evaluate any significant difference in patients treated with subacromial decompression to those who are treated without decompression in Type 1 acromion patients. Arthroscopic results have shown less postoperative pain, morbidity, infections and a more rapid improvement in shoulder motion.

It is essential that the merits and demerits associated with this technique should be balanced depending on the individual condition of the patient and the degree of experience gained.

2. Materials and methods

2.1 Objectives

1 To evaluate any significant difference in improvement of pain, muscle power, ability to do activities of daily living and range of motion after arthroscopic rotator cuff repair with and without subacromial decompression.
2 To analyze the effect of age, sex, etiology and type of tear on the clinical/functional outcome.

2.2 Methodology: This prospective study, was conducted at Sanjay Gandhi Institute of Trauma and Orthopedics, Bangalore in Department of Orthopedics on patients who were admitted with rotator cuff tears confirmed by MRI from November 2017 to June 2019. Informed consent was obtained and ethical committee clearance was obtained for the same.

2.3 Inclusion criteria

1. All patients who are clinically and radiologically diagnosed with rotator cuff tears.
2. Patient between 18 and 70 years of age
3. Rotator cuff tears involving either gender.
4. All patients with type I Acromion.
5. Consent to participate and follow up in post-operative period.

2.4 Exclusion criteria

1. Irreparable cuff tears.
2. Labral pathology.
3. Degenerative arthritis of glenohumeral joint.
4. Previous surgery to the same shoulder.
5. Symptomatic arthritis of acromio clavicular joint.

With extrinsic compression by Coracoacromial arch causing cuff tear, **Neer** advocated Acromioplasty which involved taking down anterolateral edge of acromion along with release of Coracoacromial ligament from its attachment from the anterolateral edge of acromion to prevent further damage to cuff and protect cuff after repair of tear. Emerging current consensus is that if acromion is of type 3 or it has downward projecting acromial spur, acromioplasty is indicated. It clears the SA space of downward protruding spurs or tip of type 3 acromion which can endanger the integrity of repaired cuff. However, type 1 should be left alone and type 2 remains debatable. Three standard portals are used during arthroscopic rotator cuff repair (anterior, lateral subacromial, posterior).Cuff tears was sutured by using Fiber Tape (ARTHREX) 2mm wide and suture anchor Swive Lock SELF PUNCHING (ARTHREX) 4.75MM X 24.5MM. Clinical / Functional assessment was done using ASES, QUICK DASH and ROWE soring systems and patients was followed at regular intervals of 1, 3 & 6 months & 1 year post-op.

Rehabilitation protocol

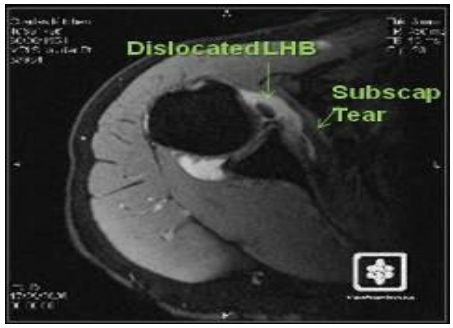
Phase I-Passive range of motion (Prom phase) (0-6 weeks)
(1) Pendulum hangs; (2) Elbow, wrist and hand AROM; (3) Scapula strengthening exercises; (4) Passive forward flexion and external rotation up to 90 and 30 degrees respectively; (5) Arm sling up to 6 weeks

Phase II-Active range of motion (Arom) (6-12 weeks)
(1) Discontinue sling; (2) Begin passive range of motion in other planes; (3) Abduction in scapular plane; (4) External rotation at multiple angles of abduction; (5) Progress from assisted active rom to active rom

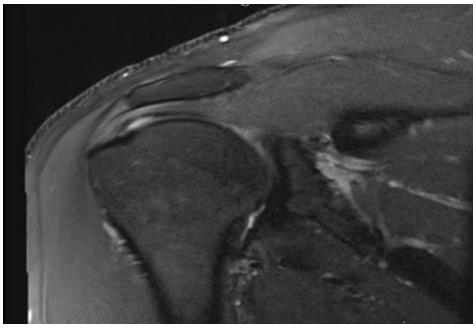
Phase III - 12 weeks onwards strengthening phase
(1) Dynamic stabilization exercises; (2) Thera band strengthening

MRI of affected shoulder is taken.
MRI showing rotator cuff tear (A) Full thickness tear (B) partial tear (C) Subscapularis tear

(A) Full thickness tear



(B) partial tear



(C) Subscapularis tear

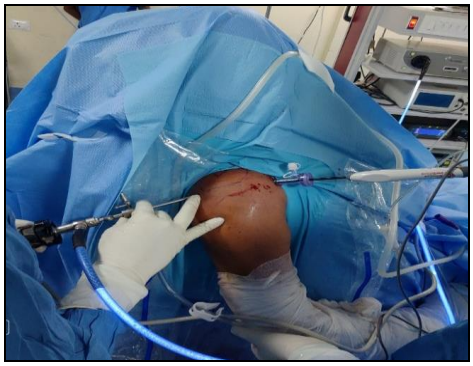


Fig 1: Portal entry in beech chair position suture anchor

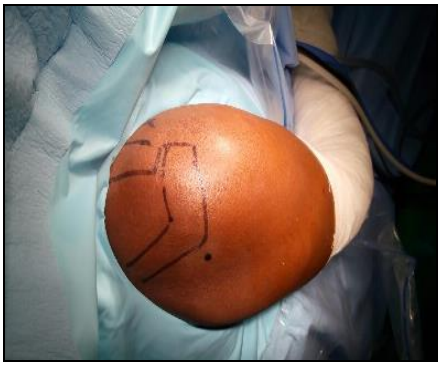


Fig 2. Preoperative marking

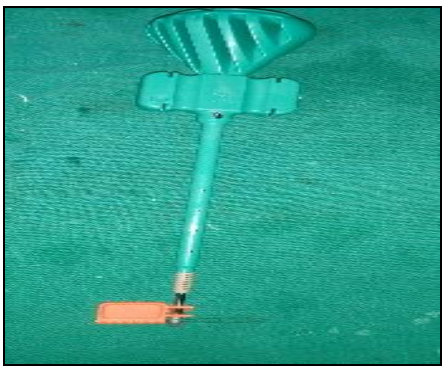


Fig 3. Arthrex swivelock

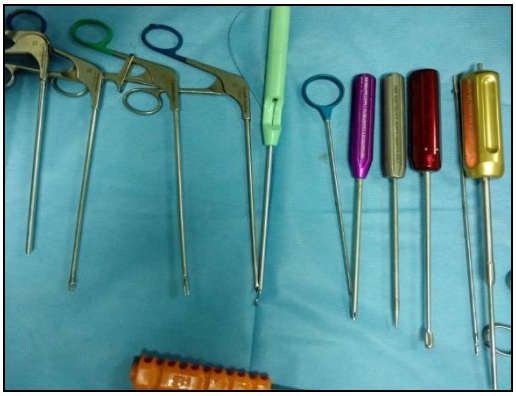


Fig 4: Arthroscopic instruments

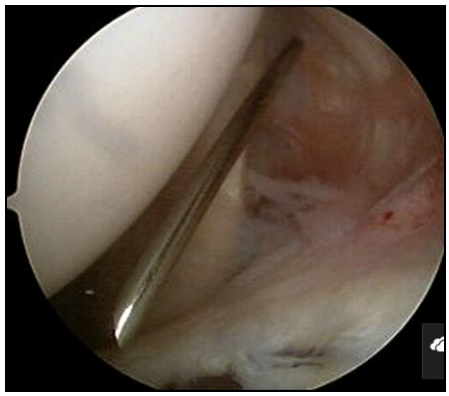


Fig 5: Developing portal

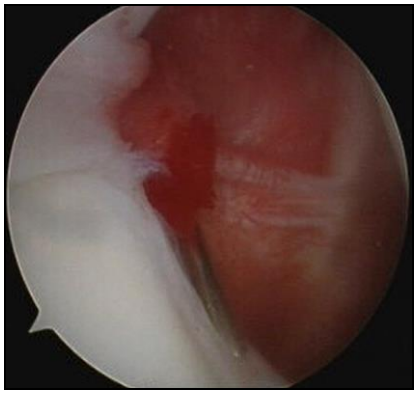


Fig 6: Bone bed preparation

Fig 4: Forward flexion

Fig 5: Abduction

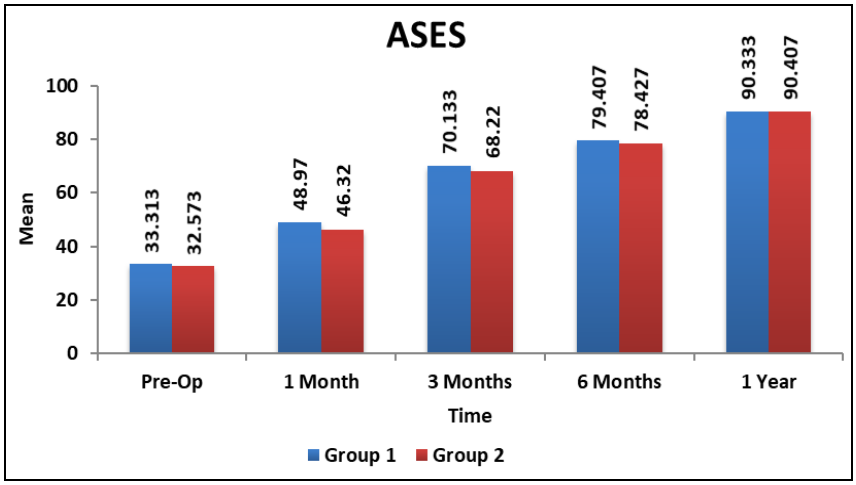
Fig 6: Overhead abduction & flexion

Fig 10: External rotation

Fig 11: Internal rotation

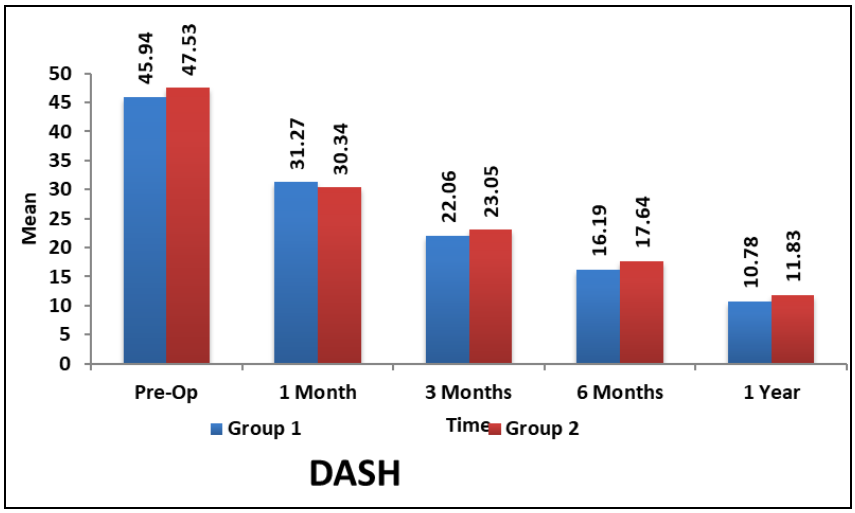
Results

A comparative study with 30 patients is undertaken at Sanjay Gandhi Institute of Trauma & Orthopedics, Bengaluru, to study the functional outcome of Arthroscopic rotator cuff repair with and without subacromial decompression.



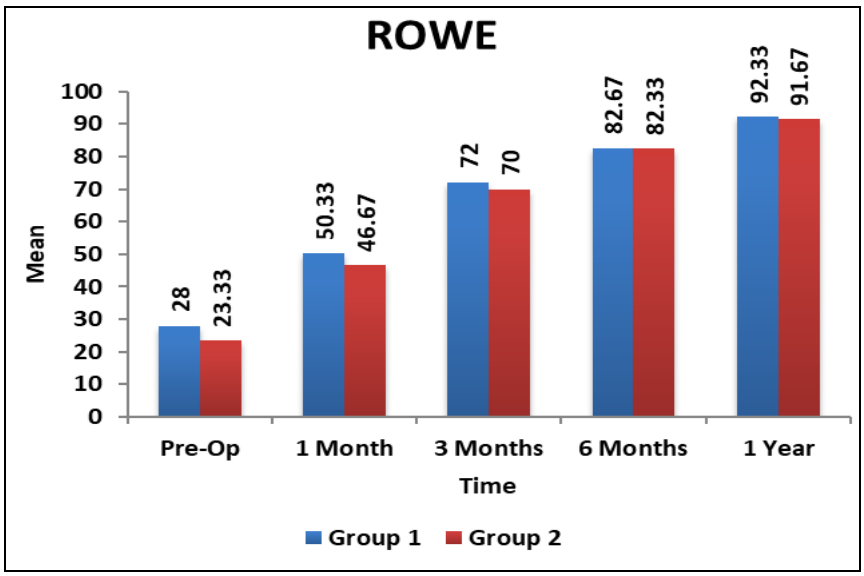
Graph 1: showing distribution of ASES score at different follow ups

The ASES score has improved from 33.31 pre-op (group I) to 90.33 (group I) and from 32.57 pre-op (group II) to 90.41 (group II) at the end of follow-up.



Graph 2: showing distribution of DASH score at different follow ups

The QUICK DASH score has improved from 45.94 pre-op (group I) to 10.78 (group I) and from 47.53 pre-op (group II) to 11.83 (group II) at the end of follow up.



Graph 3: showing distribution of ROWE score at different follow ups

The ROWE score has improved from 28 pre-op (group 1) to 92.33 (group 1) and from 23.33 pre-op (group 2) to 91.67 (group 2) at the end of follow up.

Group I- Acromioplasty; Group II- non Acromioplasty

Table 1: Showing Master Chart Parameters

Parameters		Procedure Done		Total	Chi Square Test	
		1	2		Chi Square Value	P-Value
Age	31 – 40 yrs.	4	4	8	-	0.52(NS)#
		26.7%	26.7%	26.7%		
	41 – 50 yrs.	6	5	11		
		40.0%	33.3%	36.7%		
	51 – 60 yrs.	2	5	7		
		13.3%	33.3%	23.3%		
	61 – 70 yrs.	3	1	4		
		20.0%	6.7%	13.3%		
Sex	Males	9	9	18	0	1.00(NS)
		60.0%	60.0%	60.0%		
	Females	6	6	12		
		40.0%	40.0%	40.0%		
Diagnosis	Left Infraspinatus Tear	0	2	2	-	0.44(NS)#
		0.0%	13.3%	6.7%		
	Left Supraspinatous Tear	4	4	8		
		26.7%	26.7%	26.7%		
	Right Infraspinatous Tear	1	3	4		
		6.7%	20.0%	13.3%		
	Right Supraspinatus + Infraspinatus Tear	1	1	2		
		6.7%	6.7%	6.7%		
	Right Supraspinatus Tear	9	5	14		
		60.0%	33.3%	46.7%		
Etiology	Degenerative	6	4	10	0.60	0.44(NS)
		40.0%	26.7%	33.3%		
	Trauma	9	11	20		
		60.0%	73.3%	66.7%		
Type Of Tear	Full Thickness	6	7	13	0.14	0.71(NS)
		40.0%	46.7%	43.3%		
	Partial	9	8	17		
		60.0%	53.3%	56.7%		
Symptom	Inability to Lift Shoulder	9	10	19	0.14	0.71(NS)
		60.0%	66.7%	63.3%		
	Pain in Shoulder	6	5	11		
		40.0%	33.3%	36.7%		

Table 2: Showing different types of tests done on individual patients

		Procedure Done		Total	Chi Square Test	
		1 With acromioplasty	2 Without acromioplasty		Chi Square value	p-value
Impingement Test	Negative	5	10	15	3.33	0.07(NS)
		33.3%	66.7%	50.0%		
	Positive	10	5	15		
		66.7%	33.3%	50.0%		
Hawkins Test	Negative	5	15	20	15.00	<0.001*
		33.3%	100.0%	66.7%		
	Positive	10	0	10		
		66.7%	0.0%	33.3%		
Empty Can Test	Negative	5	6	11	0.14	0.71(NS)
		33.3%	40.0%	36.7%		
	Positive	10	9	19		
		66.7%	60.0%	63.3%		
Belly Press Test	Negative	14	14	28	-	1.00(NS)#
		93.3%	93.3%	93.3%		
	Positive	1	1	2		
		6.7%	6.7%	6.7%		
External Rotation Stress Test	Negative	11	8	19	1.29	0.26(NS)
		73.3%	53.3%	63.3%		
	Positive	4	7	11		
		26.7%	46.7%	36.7%		
Speed Test	**Negative**	12	14	26	-	0.60(NS)#
		80.0%	93.3%	86.7%		
	Positive	3	1	4		
		20.0%	6.7%	13.3%		
Yergasons	Negative	13	14	27	-	1.00(NS)#
		86.7%	93.3%	90.0%		
	Positive	2	1	3		
		13.3%	6.7%	10.0%		

4. Discussion

In our study of 30 patients, we assessed the functional outcome in terms of pain, range of movements and other baseline shoulder functions in those patients who are subjected to acromioplasty to those patients who are operated without acromioplasty.

In our study, the mean age of the patients was 53.5yrs which was found to be almost similar as compared to other studies. 8 Patients in the age group of 20-40yrs (26.7%) out of which 4 underwent acromioplasty & another 4 operated by non-acromioplasty and 11 patients in the age group of 41-50yrs (36.7%) out of which 6 underwent acromioplasty & another 5 operated by non-acromioplasty and 7 patients in the age group of 51-60 yrs (23.3%) out of which 2 underwent acromioplasty & another 5 operated by non-acromioplasty and finally there are 4 patients in the age group of 61-70yrs (13.3%) out of which 3 underwent acromioplasty & another 1 operated by non-acromioplasty.

In our study consisting of total 30 patients, 18 were males (60%) out of which 9 underwent acromioplasty remaining 9 underwent non acromioplasty and 12 females (40%) out of which 6 underwent acromioplasty remaining 6 underwent non acromioplasty. As compared to other studies, our study also has male preponderance.

In our study consisting of total 30 patients, 20 were traumatic (66.7%) out of which 9 underwent acromioplasty, remaining 11 operated by non-acromioplasty procedure and rest 10 were Degenerative (33.3) out of which 6 underwent acromioplasty and remaining 4 operated by non-acromioplasty procedure.

In our study, we had 17 partial thickness tears (56.7%) out of which 9 patients underwent subacromial decompression, remaining 8 were treated by without subacromial decompression and 13 full thickness tears (43.3%) out of which 6 patients underwent subacromial decompression, remaining 7 were treated by without subacromial decompression.

There was significant improvement of flexion from 129.0 (group 1) preoperatively to 148.67 (group 1) & from 131.0 (group 2) preoperatively 154.33 (group 2) at 1yr and though there was a statistically significant difference, but in functional outcome there was no much significant difference in both the type of procedures.

There was significant improvement of Abduction from 129.0 (group 1) preoperatively to 155.0 (group 1) & from 129.67 (group2) preoperatively to154.67 (group 2) at 1yr and there was no statistical significant difference in functional outcome in both the type of procedures (i.e., with and without subacromial decompression).

There was significant improvement of External rotation from 49.0 (group 1) preoperatively to 76.33 (group 1) & from 50.0 (group 2) preoperatively to 76.67 (group 2) at 1yr and there was no statistical significant difference in functional outcome in both the type of procedures (i.e., with and without subacromial decompression).

There was significant improvement of Internal rotation from 41.67(group 1) preoperatively to 71.33 (group 1) & from 40.33 (group 2) preoperatively to 70.00 (group 2) at 1yr follow up and there was no statistical significant difference in functional outcome in both the type of procedures (i.e., with and without subacromial decompression).

Table 3: showing comparison of mean age with other studies

Study	Mean Age (YRS)
Sugaya *et al*.	57.7
Park *et al*.	57
Cole *et al*	57
Burks *et al*	56
Our study	53.5

Table 4: showing comparison of gender distribution

Study	Males (%)	Females (%)
Kim [53]	58.9	38.8
Galatz [25]	59	39.4
Our study	60	40

Table 5: showing comparison of Etiology of tears

Study	Traumatic (%)	Degenerative (%)
Braune *et al*.	43.4	56.5
Goutallier D *et al*.	38.9	61.1
Our study	66.7	33.3

Table 6: showing comparison of types of tear

Study	Partial Thickness (%)	Full Thickness (%)
Karin S Peters [55]	60.9	39.1
Deutsch A *et al* [59]	61.8	38.2
Our study	56.7	43.3

There were no infections, neurovascular injuries, instances of postoperative shoulder stiffness, or other complications requiring intervention.

5. Conclusion

Our study concludes that there is no significant statistical difference in the functional outcome following the arthroscopic rotator cuff repair with and without subacromial decompression in type I Acromion patients.

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