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## Results of single row versus double row arthroscopic repair in massive rotator cuff tear

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### Abstract

**Introduction:** Rotator cuff disease is a painful condition with a multifactorial aetiology in which severe or chronic impingement of the rotator cuff tendons on the under- surface of the coracoacromial arch is often a significant factor. Although not a life-threatening condition, RC tears may cause significant pain, weakness, and limitation of motion. A shoulder disorder can increase functional dependency in the elderly due to difficulties in completing activities of daily living and in young it causes absenteeism from work, decreased productivity and consequential socioeconomic loss. In recent years, arthroscopy is gaining a steady popularity among Indian orthopaedic surgeons. While more complete arthroscopic or arthroscopic-assisted rotator cuff repairs are done day by day, the literature on this subject is relatively sparse. We undertook the present study to evaluate functional outcome of total arthroscopic repair of rotator cuff tear using UCLA and ASES scores at Government Institute.

**Aim:** This study was carried out to assess the results in terms of functional outcome and patient satisfaction of arthroscopic repair of rotator cuff tear.

**Materials and Methods:** "Results of single row versus double row arthroscopic repair in massive rotator cuff tear" is a prospective cohort study conducted for 30 months from July 2015 to December 2017, on 30 patients admitted and operated for rotator cuff tear at Civil Hospital Ahmedabad affiliated to B J Medical College. The functional outcome was assessed by two scoring systems: UCLA (University of California at Los Angeles) [12, 13, 14] and ASES (American Shoulder and Elbow Surgeon) scores [15] and constant Murley score.

**Results and Discussion:** In our study, we have included only arthroscopically operated rotator cuff tears. Comparison with open, miniopen approaches is thus not possible. We have found 100% success rates in terms of improvement in UCLA, ASES and Constant scores. Mean preop UCLA scores (8.53), ASES (9.91) and Constant (9.83) scores were improved upto UCLA (30.63), ASES (76.98) and Constant (86.9) at end of 12 months follow-up. In our study we have compared results of single row and double row techniques using functional outcome, surgical time and expence. We have compred our results with BMC review conducted by Tudisco *et al*.

**Conclusion:** In current orthopaedics practice, arthroscopic repair of rotator cuff tear offers excellent results in terms of functional outcome with minimal morbidity.

**Keywords:** Single row versus, double row arthroscopic repair, massive rotator cuff tear

### Introduction

Rotator cuff disease is a painful condition with a multifactorial aetiology in which severe or chronic impingement of the rotator cuff tendons on the under- surface of the coracoacromial arch is often a significant factor [1]. Rotator cuff tears (RCT) are a common contributing factor of occupational disability and impair quality of life. Rotator cuff tears are often the cause of debilitating shoulder pain, reduced shoulder function, and compromised joint mechanics with clinical manifestations of shoulder stiffness, weakness, instability and roughness.

The incidence of Rotator Cuff (RC) tears is expected to increase with the growth of an aging population that is more active and less willing to accept functional limitations. Larger tear size and occurrence of bilateral RC tears also increase with age [1]. Although large proportion of patients with RC tears are asymptomatic, research has shown that over 50 percent of individuals with asymptomatic RC tears will develop pain over an average of 2.8 years [5].

Although not a life-threatening condition, RC tears may cause significant pain, weakness, and limitation of motion [1].

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A shoulder disorder can increase functional dependency in the elderly due to difficulties in completing activities of daily living and in young it causes absenteeism from work, decreased productivity and consequential socioeconomic loss [3]. Magnetic resonance imaging (MRI) studies have shown partial or complete tears in only 4 percent of patients under 40 years of age compared with 54 percent of patients over 60 years of age [3]. For this reasons, current debate on management of Rotator cuff tears (RCT) has shifted to earlier operative treatment with maximum functional outcome possible.

Credits for describing rotator cuff tendon and its ruptures goes to J.G. Smith dating back to 1834 [2]. In 1924, Meyer published his attrition theory for this ruptures. Codman, in his classic monograph, discussed observations on supraspinatus ruptures and described its repair. This was the first successful repair to be reported.

In 1931, Burman was first to do shoulder arthroscopy, however this remain disputed [3, 8].

Over the next three decades, open repair of rotator cuff became increasingly popular with introduction of various techniques. However, results remained variable and largely unsatisfactory. After the rise of shoulder arthroscopy, assisted miniopen rotator cuff repair was pursued by orthopaedic surgeons. In 1972, Neer gave understanding about Impingement syndrome [7]. Fundamental principles about rotator cuff repair, described by Cordasco and Bigliani [11]; whether open or miniopen or arthroscopic have been largely remained the same.

1. Adequate subacromial decompression
2. Maintaining the integrity of the deltoid origin
3. Mobilizing torn tendons and performing an interval slide when indicated
4. Repairing tendons to bone
5. Carefully supervising and staging postoperative rehabilitation

The first arthroscopic cuff repairs were reported by Johnson using a staple technique in 1992 [10]. Since then, there has been tremendous evolution in understanding of biomechanics of shoulder joint, miniaturization and technological advances in arthroscopic equipments which has inclined more and more orthopaedic surgeons towards arthroscopic rotator cuff repair. Arthroscopic repair also supersedes over open and mini open approaches in having high clinical and operative accuracy, preservation of deltoid attachment, less morbidity, full visualization of glenohumeral joint, decreased postoperative adhesive capsulitis, less postoperative pain, early rehabilitation, and less infection rates.

With present advances and understanding, even massive tears (>5 cm) which were considered once irreparable could be approached arthroscopically using mobilisation and interval sliding techniques. Inadequacies of past are answered with newer suture materials, double row anchors, newer knot configurations, high resolution visualization, etc. While arthroscopy has changed paradigms on diagnosis, predictability and treatment options of rotator cuff tear, it should serve as an adjunct and not as a replacement to surgeon's clinical skills for diagnosis.

In recent years, arthroscopy is gaining a steady popularity among Indian orthopaedic surgeons. While more complete arthroscopic or arthroscopic-assisted rotator cuff repairs are done day by day, the literature on this subject is relatively sparse. We undertook the present study to evaluate functional outcome of total arthroscopic repair of rotator cuff tear using UCLA and ASES scores at Government Institute.

**Aim:** This study was carried out to assess the results in terms of functional outcome and patient satisfaction of arthroscopic repair of rotator cuff tear.

### Materials and Methods

“Results of single row versus double row arthroscopic repair in massive rotator cuff tear” is a prospective cohort study conducted for 30 months from July 2015 to December 2017, on 30 patients admitted and operated for rotator cuff tear at Civil Hospital Ahmedabad affiliated to B J Medical College.

Patient selection was carried out on the basis of the following inclusion and Exclusion criteria:

### Inclusion Criteria

- Patient having massive tear in supraspinatus and infraspinatus tendon on clinical examination confirmed on MRI
- Repair of rotator cuff tear solely by arthroscopic techniques.
- Informed consent to participate in study and follow up for postoperative rehabilitation.

### Exclusion Criteria

- Patients with associated shoulder pathology like SLAP, frozen shoulder, fracture etc.
- Previously operated rotator cuff repair patients with failure
- Irreparable tears
- Patients with subscapularis tear
- Patients with cuff tear arthropathy
- Patients not willing for strict adherence to postoperative rehabilitation protocol

### Methodology

The protocol included eliciting history regarding age, sex, functional loss, onset, duration and progress of symptoms. Clinical examination of patients to assess muscle strength, range of motion were done. Preoperative UCLA and ASES and constant scores were determined. A proforma was designed which is to be filled by the patient himself/herself preoperatively and on subsequent visits postoperatively at 3, 6, 12 weeks, 6 months and 1 year. The patient would fill the subjective data by themselves while the muscle strength and range of motion were assessed by the surgeon and documented. The functional outcome was assessed by two scoring systems: UCLA (University of California at Los Angeles) [12, 13, 14] and ASES (American Shoulder and Elbow Surgeon) scores [15] and constant Murley score.

### Clinical Evaluation

Radiological evaluation of admitted patient by True AP shoulder xray and MRI was carried out. Final diagnosis was made only by intra-op findings. Proper counseling regarding pathology and arthroscopic procedure was given to patient. His/her willingness for participation in study and postoperative Rehabilitation was confirmed. Preoperative fitness for general anesthesia/regional block was obtained by consultation with physician and anesthetist. Preoperative major profile was carried out. This included: Hemogram (Complete blood count, total leucocyte count, platelet count, differential leucocyte count), Renal function tests (Serum Urea, Serum Creatinine, Serum Sodium and potassium), Liver function tests (Serum bilirubin, SGPT, SGOT), HIV and HBsAg screening. Electrocardiogram, Chest radiograph.

**Pre-operative Protocol**

Before day of surgery, patient was kept NBM (nil by mouth) for minimum of 8 hours. Shaving and scrubbing of local part with chlorhexidine was done before administering anesthesia. Urinary catheterization was done. Cephosulbactam (Cefoperazone+Sulbactam) was given intravenously (1.5 gram diluted in 10 cc NS) 30 min prior to surgery. Postoperatively, Elbow, wrist movement, scapular retraction and finger grip was started at post op. day 1. Patient was given a shoulder immobilizer in 30 degree abduction for 6 weeks. Oral antibiotics and analgesics were started on next day after day 1 spirit dressing. Discharge was given on 3rd postop day. Pendulum exercises were begun from 10th postop day. The Institutional Rehabilitation Program for RCR is described below.

**Institutional Rehabilitation Program for Rotator Cuff Repair**

**1. Start on 5th day**

- Sling on and off for 1st 3 weeks.
- All Elbow, wrist, Hand exercises
- No Isometric rotator cuff and deltoid exercises
- Posture correction
- Scapular strengthening exercises
- Zero external rotation.

**2. After 6 weeks – Active assisted**

- Improve 20 degree weekly
- Start Active assisted shoulder exercises – No restriction
- Progress to active as much as pain allows
- Correct abnormal movement patterns.
- Capsular stretching.
- Rotator cuff Therab and after scapular control

- Scapular stabilization programme.

**Milestones**

- Wk – 4: Passive ROM 50 % of pre op
- Wk – 8: Passive ROM 60 % of Pre op
- Wk – 12: Passive ROM 75 % of Pre op
- Wk – 16: Passive ROM 100 % of Pre op.

**Results**

**1. Gender distribution of patients**

**Table 1:** Gender distribution of patients

Gender	Number	Percentage
Male	15	50
Female	15	50

**2. Distribution of Etiology of Rotator cuff tear**

**Table 2:** Distribution of Etiology of Rotator cuff tear.

Etiology	Number	Percentage
Trauma	24	80
Degenerative	6	20

**3. Predominant symptom in Rotator Cuff tear**

**Table 3:** Predominant symptom in Rotator Cuff tear

Predominant Symptom	Number	Percentage
Pain over arm	14	46.66
Inability to lift arm	16	53.33

Evaluation by UCLA score

**Table 4:** Evaluation by UCLA score

	UCLA Score					
	AT presentation	3 weeks	6 weeks	12 weeks	6 months	1 year
Min-Max	3-18	3-23	9-29	18-30	23-37	24-33
Mean±SD	8.53±3.94	15.56±5.13	20.5±4.74	24.6±3.21	29.2±3.31	30.63±2.51

**4. Evaluation by ASES score**

**Table 5:** Evaluation of ASES score

	ASES Score					
	At Presentation	3 weeks	6 weeks	12 weeks	6 months	1 year
Min-Max	0-17	15-48.3	37-85	50-89	61.6-89	62.25-89
Mean±SD	9.91±5.36	30.26±8.76	52.86±15.11	66.34±10.62	73.98±8.19	76.98±8.19

**5. Evaluation by constant murley score**

**Table 6:** Evaluation by constant murley score

	Constant Murley Score					
	At presentation	3 weeks	6 weeks	12 weeks	6 months	1 year
Min-Max	1-19	16-41	35-63	46-80	55-90	56-92
Mean±SD	9.83±6.31	29.1±8.12	49.86±9.19	66.6±9.05	80.76±8.86	86.9±9.66

## 6. Comparison between single row versus double row repair

**Table 7:** Comparison between single row versus double row repair

	Single row	Double row	P value
Age	51.46±7.93	50.4±9.21	0.74
UCLA score pre operative	8.935.02	8.13±2.55	0.59
UCLA score postoperative	30.4±2.97	30.872.03	0.62
ASES score preoperative	9.87±6.31	9.88±4.2	0.99
ASES score postoperative	79.88±19.63	79.88±7.19	0.99
Constant score preoperative	6.46±4.45	11.8±4.97	0.17
Constant score postoperative	83.6±10.44	83.86±12.54	0.94
Surgery time(minutes)	89.86±7.72	111.07±17.89	0.0002
Surgery expense(Rs.)	37333±9976.16	52800±6073.361	<0.0001

### Discussion

Rotator cuff disease includes a wide spectrum of pathology from minimal bursal or articular side irritation and tendonitis to severe degenerative rotator cuff arthropathy. Our study shows that there is significant improvement in functional outcome as measured by UCLA scores and ASES scores after arthroscopic repair of rotator cuff tears.

The description for outcome with Sex as a variable are limited in literature. Our study shows incidence of rotator cuff tear 50 % in male and 50 % in female.

We found no significant difference in postoperative result. The almost equal sex distribution is also shared by other studies carried out by Kim, Boileau, and Galatz [16]. They also reported no statistical significance between sex and

postoperative functional outcome. This view is also in accordance with wide studies by Harryman *et al.* and Watson *et al.* [4] In our study, we have included only Arthroscopically operated rotator cuff tears. Comparison with open, miniopen approaches is thus not possible. We have found 100 % success rates in terms of improvement in UCLA, ASES and Constant scores. Mean preop UCLA scores (8.53), ASES (9.91) and Constant (9.83) scores were improved upto UCLA (30.63), ASES (76.98) and Constant (86.9) at end of 12 months follow-up. We have compared our results with Cochrane review article conducted by Paul saridikas, BS and Grant jonesat Ohio state university which reviewed teMen articles systemically.

Study	Number of Patients	Follow up	UCLA at Presentation	UCLA at follow up
Burks <i>et al.</i>	40	12 Months	11.6	28.6
Charousset <i>et al.</i>	66	27.6(24-37) Months	12.7	Not reported
Francheschi <i>et al.</i>	52	22.5(18-25) Months	11.5	32.9
Grasso <i>et al.</i>	72	24.8 months	10.4	26.7
Sugaya <i>et al.</i>	80	41.3 months	Not reported	32.4
Our study	30	12 months	8.53	30.63

Thus in accordance with other wide studies, our study shows significant improvement in functional outcome after arthroscopic rotator cuff repair.

In our study we have compared results of single row and

double row techniques using functional outcome, surgical time and expence. We have compred our results with BMC review conducted by Tudisco *et al.* [17]

	P value in our study	Tudisco <i>et al.</i> [17]
Age	0.74	0.27
UCLA score pre operative	0.59	-
UCLA score postoperative	0.62	-
ASES score preoperative	0.99	-
ASES score postoperative	0.99	-
Constant score preoperative	0.17	0.40
Constant score postoperative	0.94	0.33
Surgery time(minutes)	0.0002	0.001
Surgery expense(Rs.)	<0.0001	0.00006

Mean ± standard deviation

Thus according to our study and other studies there is no significant difference between functional outcomes in single row and double row techniques but there is significant difference in surgical time and expence.

### Conclusion

In current orthopaedics practice, arthroscopic repair of rotator cuff tear offers excellent results in terms of functional outcome with minimal morbidity. Added advantages of this approach is decreased postoperative pain, deltoid preservation, full joint visualization, cosmetic appeal, minimal hospital stay and early rehabilitation. This has

evolved arthroscopy from mere diagnostic tool to surgical tool.

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