

Original Article

Results of arthroscopic rotator cuff repairs in patients with comorbid disability of other extremities

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ABSTRACT

Objectives: We hypothesized that arthroscopic rotator cuff repair improves functional and clinical outcomes in the patients with comorbid disability in the extremities.

Materials and Methods: In a retrospective study, data were collected for eleven patients (six males and five females) from a tertiary care hospital from 2010 to 2018. All the patients underwent arthroscopic rotator cuff repair after confirmed clinical and radiological diagnosis. All the patients were operated on by a single surgeon. UCLS scores and ultrasound imaging were used for pre-operative and post-operative clinical and radiological evaluation, respectively. The mean follow-up was of 3 years. Statistical analysis was carried out using SPSS software and statistical significance was considered at $P < 0.05$.

Results: Out of 11 patients, seven patients had massive cuff tears, two patients had medium cuff tears, and two patients had small cuff tears. Out of 11 patients, three patients were contralateral side amputees, four patients were wheelchair-bound due to post-poliomyelitis muscle weakness, one patient had opposite side hand amputation, and three patients had same side hemiplegia secondary to cerebrovascular stroke. The dominant side was involved in eight patients and the non-dominant side was involved in three patients. Functional range of motion, the visual analog scale for pain, and satisfaction and UCLS scores improved significantly after arthroscopic cuff repairs. Ultrasound evaluation after a mean of 14 ± 3 months revealed complete healing in 88% of cases and partial healing in 12% of cases.

Conclusion: Arthroscopic rotator cuff repair improves functional and clinical outcomes in patients with comorbid disability in the extremities. Careful and meticulous clinical acumen, surgical planning, technique, and post-operative rehabilitation program are important for excellent outcomes in arthroscopic cuff repairs, especially in these functionally high-demanding patients.

Keywords: Arthroscopic rotator cuff repair, Disability, Ultrasound, Rehabilitation

INTRODUCTION

Rotator cuff tears are quite common shoulder injuries often than thought. These injuries are frequently overlooked and neglected by both patients as well as the clinician. It requires a dedicated team approach of surgeons, musculoskeletal radiologists, and rehabilitation physiotherapists to have excellent outcomes in patients with rotator cuff injuries. Logic backed by scientific evidence and astute clinical judgment is absolutely important to clinically diagnose shoulder injuries in these patients before they are subjected to a multitude of unnecessary investigations to rule out pathology around the cervical spine and brachial plexus. Specially-abled patients constitute about 1% of the world population. The causes of their disabilities can be

congenital aplasia or hypoplasia of limbs, developmental neuromuscular abnormalities such as poliomyelitis, amputations due to trauma or gangrene, brain infarction causing hemiplegia, and spinal cord injuries leading to hemiplegia.^[1] These are all disabling situations that lead to morbidity, psychological and social distress, and financial loss to the family as well as the country. Treating this group of patients becomes more challenging due to patients' overuse of their unaffected shoulders. Delay and disuse of the shoulder with cuff tear lead to silent fatty degeneration of the cuff muscles and calcific degeneration of the tendons. This group of patients with a single functioning upper limb should be treated as a precious limb.^[2] Imprecise diagnosis or delay in repair can render the only functional

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limb disabled, making the situation more complex. Hence, they require extra care in terms of surgical repair and post-operative rehabilitation.^[3] Due to pre-existing limb disability, upper or lower, it is expected that this cohort of patients will exert excessive pressure on the good upper limb.^[4] We hypothesize that arthroscopic cuff repairs provide better functional and clinical outcomes to patients with comorbid disabilities of the extremities.

MATERIALS AND METHODS

In a retrospective study, data were collected for eleven patients (six males and five females) from a tertiary care hospital from 2010 to 2018. The inclusion criteria included all adult patients with rotator cuff tear with comorbid disability of any of the four extremities and giving consent to participate in the study. The exclusion criteria included patients below 18 years of age, patients with rotator cuff tears without any comorbid disability of extremity, and patients not giving consent for the study. All the patients underwent arthroscopic rotator cuff repair after confirmed clinical and radiological diagnosis. The clinical examination included a passive and active range of motion of the affected shoulder and clinical tests to know the strength of supraspinatus, infraspinatus, subscapularis, deltoid, and supinator muscles. Furthermore, radiographs of true anteroposterior and outlet views were done as a basic requirement to know the proximal humeral migration, status of glenohumeral, and acromioclavicular joints, acromial spurs, and bone quality. Pre-operative magnetic resonance imaging was done for confirming the diagnosis, to know the extent of cuff tears and muscle atrophy with fat infiltration, and for pre-operative planning. All the patients were operated on by a single surgeon. All the patients were operated on under regional block followed by general anesthesia in a beach chair position. Double-row arthroscopic rotator cuff repair was done using triple loaded Polyether ether ketone suture anchors, as shown in [Figure 1]. UCLS scores and ultrasound imaging were used for pre-operative and post-operative clinical and radiological evaluation, respectively. The mean follow-up was of 3 years.

Statistical methods

Statistical analysis was carried out with the help of SPSS (version 20) for the Windows package (SPSS Science, Chicago, IL, USA). The description of the data was done in form of arithmetic mean \pm SD for quantitative data while in the form of frequencies (%) for qualitative (categorical) data. $P < 0.05$ was considered significant. For quantitative data, Mann-Whitney U-test was used to test the statistical significance of the difference between means of variables among two independent groups. Wilcoxon test was used to test the statistical significance of difference means between paired groups.

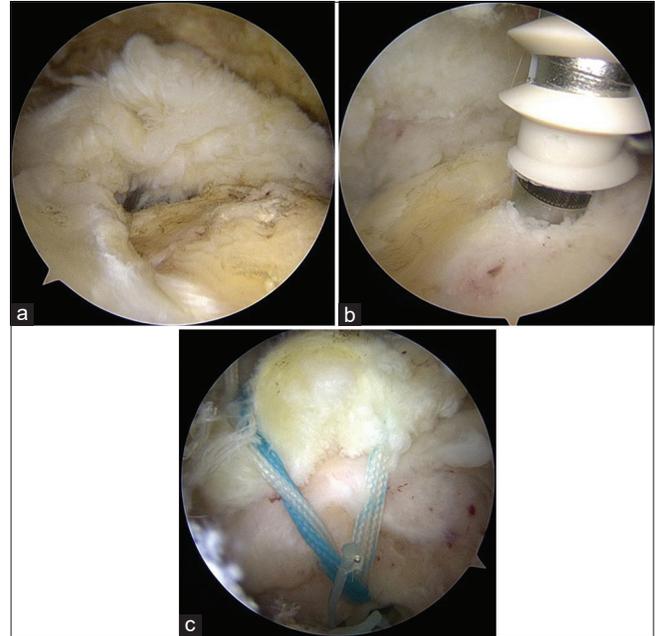


Figure 1: (a) Arthroscopic view of rotator cuff tear, (b) triple loaded polyether ether ketone suture anchor used for fixation, and (c) double row arthroscopic rotator cuff repair.

RESULTS

There were six males and five females operated with arthroscopic cuff repair on ten shoulders. The average age for males was 60.57 ± 12.25 years and for females was 55 years, as shown in [Table 1]. The average weight of these patients was found to be 186.84 ± 10.5 lbs. and the average height was 1.66 ± 0.8 m. Three patients had opposite side below elbow amputation, one patient had a right-hand amputation, three patients had left side hemiparesis secondary to cerebrovascular stroke, and four patients were paraplegic secondary to poliomyelitis (PPRP). Seven patients were operated on the left side and three patients were operated on on the right shoulders. Eight patients were operated on their dominant shoulders and two patients were operated on non-dominant shoulders. The average follow-up was of 24 ± 7 months (range 9–68 months). Two patients had re-tears confirmed on ultrasonography. One of them was continued in a rehab program and was found satisfied with the final functional outcome. The other patient was re-operated and had a satisfactory post-operative UCLS score with a healed tear on ultrasound. One patient developed opposite shoulder cuff arthropathy and was advised reverse shoulder arthroplasty for the same. Body mass index (BMI) was found to be higher in all the patients with an average BMI of 30.59 ± 4.37 . Four patients were found to be obese (BMI >30), while the rest of the three patients were found to be overweight (BMI >25). Functional range of motion, visual analog scale (VAS) for pain, and satisfaction and UCLS scores improved significantly

Table 1: Demographics and results of all operated patients.

S. No.	Name	Age	Gender	Weight (kg)	Height (cm)	Body mass index	Affected shoulder	Comorbid extremity	UCLS Score Pre-operative (out of 35)	UCLS Score Post-operative (out of 35)	Outcome on ultrasonography	Follow up (months)
1	NMV	55	M	85.2	165	31.2	Left	Post-polio residual paralysis	9	27	Healed	68
2	MEB	71	M	83.5	184	26.23	Left	Post-polio residual paralysis	12	30	L: Healed, R: Reverse shoulder replacement	43
3	PDM	45	M	94.4	165	34.82	Left	Right below elbow amputation	15	22	Retear	30
4	MS	55	F	87.1	157	34.48	Right	Post-polio residual paralysis	14	31	Operated and healed	22
5	NH	68	M	81.2	157	32.46	Right	Left below elbow amputation	11	24	Re-tear	18
6	HAP	51	M	79.6	174	26.67	Left	Right hand amputation	16	29	Conserved	10
7	PG	79	M	77.8	166	28.31	Right	Left Cerebrovascular stroke	12	29	Healed	9
8	BHS	50	F	89.9	159	35.67	Right	Post-polio residual paralysis	11	27	Healed	11
9	NMP	43	F	78.9	162	30.15	Right	Left cerebrovascular stroke	12	29	Healed	10
10	AGB	56	F	86.4	154	35.76	Left	Right below elbow amputation	12	30	Healed	6
11	SMM	49	F	85.2	158	34.08	Right	Left cerebrovascular stroke	11	31	Healed	15

after arthroscopic cuff repairs from pre-operative 12 ± 3.1 to post-operative 27.43 ± 4.2 out of a total score of 35. Using a non-parametric Wilcoxon signed-rank test for paired data on pre-operative and post-operative UCLS scores, it was seen that there is a significant ($P = 0.017$) difference between the two, indicating a significant increase in the score. American Shoulder and Elbow Surgeons Shoulder Score (ASES) were also found to improve from 38.13 ± 9.3 preoperatively to 82.29 ± 12.6 postoperatively. Ultrasound evaluation after a mean of 14 ± 3 months revealed complete healing in 78% of cases and partial healing in 10% cases and re-tear in 12% of cases. Using Mann-Whitney U-test for independent groups, it is found that there is no significant difference in age and BMI among healed and non-healed patients. [Figure 2] shows the functional and clinical outcome of one of our patients after 18 months of follow-up.

DISCUSSION

As per our results, we found that males with comorbid disabilities of other extremities were more often diagnosed and treated for rotator cuff tears as compared to females. This may be due to more chances of overuse of the unaffected shoulders by males who are the main earning members of the family. The rotator cuff tear was found on the dominant upper limb in the majority of the patients ($n = 8, 80\%$). This may be due to overuse of the dominant shoulder due to the affection of the other extremities.^[5] The average age of tear in our patients was found to be around 60 years. This age group already is prone to diabetes, hypothyroidism, osteoporosis, anemia, and degenerative changes with fatty infiltration of the cuff muscles leading to higher chances of tear and re-tear. BMI of all the operated patients was found to be on the higher side either overweight or obese. This may be due to diabetes, hypothyroidism, and other metabolic disorders.^[6] High BMI has a propensity for rotator cuff tears and poor surgical outcomes. Arthroscopic cuff repair is a minimally invasive surgery with faster and better healing supported by a proper rehabilitation program.^[7] Finally, it helps the patient to regain the confidence to carry out activities of daily living without pain and with full function. This is especially more useful to improve social, financial, and psychological quality of life for patients with comorbid disabilities of the other extremities.^[8] Although very few articles are reported in the literature, we found our results comparable to those studies [Table 2]. The limitation of the study is the small sample size which affects the overall outcome of the study and more such studies are required to explain its significance.

CONCLUSION

Arthroscopic rotator cuff repair improves functional and clinical outcomes in patients with comorbid disability in the extremities. VAS, ASES, and UCLS scores improved significantly from pre-operative scores. Careful and

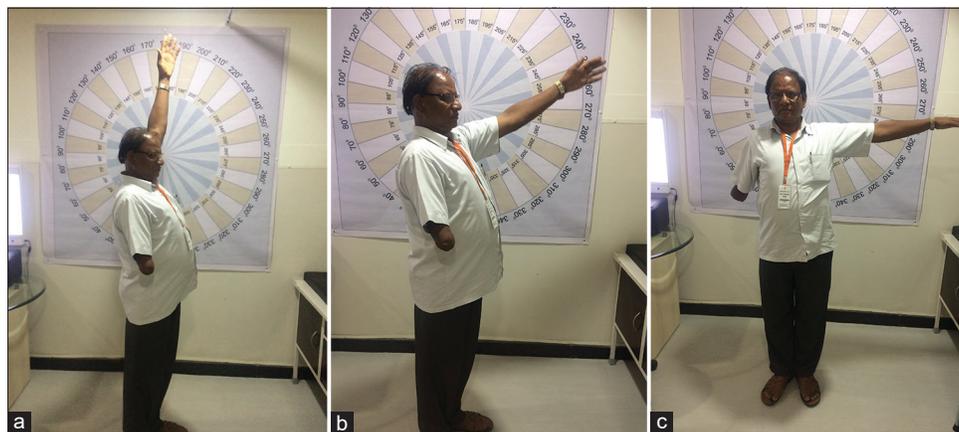


Figure 2: (a) 71 years gentleman with 20 years post-traumatic right below elbow amputation has satisfactory functional and clinical outcome after arthroscopic rotator cuff repair of his left shoulder, (b) Patient has full range of overhead abduction and external rotation of his operated left shoulder, (c) Patient has satisfactory adduction with internal rotation of his operated left shoulder.

Table 2: Comparison of pre-operative and post-operative American shoulder and elbow score with other articles in the literature.

S. No.	Authors	American Shoulder and Elbow Score ASES (Pre-op)	American Shoulder and Elbow Score ASES (Post-op)
1	Oh <i>et al.</i> (Clinics in Orthopedic Surgery, 2017)	47 (19–61)	81 (57–100)
2	Akbar <i>et al.</i> (Journal of Shoulder and Elbow surgery, 2011)	63.4	71.5
3	Jung <i>et al.</i> (Journal of Shoulder and Elbow Surgery, 2015)	53 ± 14	85 ± 11
4	Our series (2018)	38.13 ± 9.3	82.29 ± 12.6

meticulous clinical acumen, surgical planning, technique, and post-operative rehabilitation program are important for excellent outcomes in arthroscopic cuff repairs, especially in these functionally high-demanding patients.

Authors contributions

Dr. Ashish Babhulkar is the chief operating surgeon. Dr. Aditya Agrawal is the main writer for the manuscript and the corresponding author. Dr. Vimal Kumar and Dr. Prateek were the main assistants to the chief operating surgeon. Dr. Arun helped with statistical analysis.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Akbar M, Brunner M, Balean G, Grieser T, Bruckner T, Loew M, *et al.* A cross-sectional study of demographic and morphologic features of rotator

cuff disease in paraplegic patients. *J Shoulder Elbow Surg* 2011;20:1108-13.
 2. Jung HJ, Sim GB, Heon IH, Kekatpure AL, Sun JH, Chun JM. Reconstruction of rotator cuff tears in wheelchair-bound paraplegic patients. *J Shoulder Elbow Surg* 2015;24:601-5.
 3. Woollard JD, Bost JE, Piva SR, Fitzgerald GK, Rodosky MW, Irrgang JJ. The ability of preoperative factors to predict patient-reported disability following surgery for rotator cuff pathology. *Disabil Rehabil* 2017;39:2087-96.
 4. Oh JH, Kim W, Kim JY, Rhee YG. Outcomes of rotator cuff repair in patients with comorbid disability in the extremities. *Clin Orthop Surg* 2017;9:77-82.
 5. Kim JH, Hong IT, Ryu KJ, Bong ST, Lee YS, Kim JH. Retear rate in the late postoperative period after arthroscopic rotator cuff repair. *Am J Sports Med* 2014;42:2606-13.
 6. Kluger R, Bock P, Mittlbock M, Krampla W, Engel A. Long term survivorship of rotator cuff repairs using ultrasound and magnetic resonance imaging analysis. *Am J Sports Med* 2011;39:2071-81.
 7. Codsi MJ, Rodeo SA, Scalise JJ, Moorehead TM, Ma CB. Assessment of rotator cuff repair integrity using ultrasound and magnetic resonance imaging in a multicenter study. *J Shoulder Elbow Surg* 2014;23:1468-72.
 8. Prickett WD, Teehey SA, Galatz LM, Calfee RB, Middleton WD, Yamaguchi K. Accuracy of ultrasound imaging of the rotator cuff in shoulders that are painful postoperatively. *J Bone Joint Surg Am* 2003;85:1084-9.

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