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Evolving Strategies for Rotator Cuff Repair: From Incision to Innovation – Mini-open versus Arthroscopic Repair: A Retrospective Study with Short-term Functional Outcome Assessment

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Abstract

Introduction: Rotator cuff tears are a leading cause of shoulder dysfunction. While both mini-open and arthroscopic repair techniques are widely used, arthroscopy offers potential advantages including a minimally invasive approach, reduced postoperative pain, and earlier initiation of rehabilitation.

Materials and Methods: A retrospective analysis was conducted on 38 patients with isolated rotator cuff tears (23 arthroscopic, 15 mini-open). Functional outcomes were assessed using Visual Analogue Scale (VAS) for pain, Constant-Murley Score, and range of motion (ROM: flexion, abduction, external and internal rotation) at baseline, 6 weeks, 3 months, and 6 months post-operatively.

Results: Both groups demonstrated statistically and clinically meaningful improvements in VAS, Constant-Murley Score, and ROM across the follow-up intervals. The arthroscopic group showed slightly better short-term outcomes, particularly in pain reduction and recovery of forward flexion and abduction; gains in external and internal rotation were similar between groups. A small number of complications were observed (including superficial infection and postoperative stiffness/adhesive capsulitis), which were manageable with standard care.

Conclusion: Both arthroscopic and mini-open rotator cuff repairs provide effective short-term functional recovery. Arthroscopic repair produced marginally superior early outcomes in pain relief and elevation (flexion/abduction) and may be preferred when rapid rehabilitation and minimal early morbidity are priorities. Complications were infrequent and readily treatable.

Keywords: Rotator cuff tear, arthroscopic repair, mini-open repair, visual analogue scale (VAS), constant-murley score.

Introduction

Rotator cuff tears are the most common cause of shoulder pain and disability, often leading to functional limitation and impaired quality of life. Surgical repair is indicated when conservative measures fail, with the primary goal of restoring tendon integrity, reducing pain, and improving shoulder mobility [3, 5].

Over the years, surgical strategies for rotator cuff repair have evolved from traditional open and mini-open techniques to minimally invasive arthroscopic approaches. Mini-open repair continues to offer the advantage of direct tendon visualization and secure fixation, but it requires partial deltoid splitting, which may contribute to postoperative pain and delayed rehabilitation [6, 20].

Arthroscopic repair has gained popularity due to its minimally invasive nature, avoiding deltoid detachment, resulting in less soft tissue trauma, and reduced postoperative pain. The superior intra-articular visualization allows for more precise tendon assessment and concomitant pathology management. Importantly, patients undergoing arthroscopic repair are often able to begin early rehabilitation protocols, potentially leading to faster functional recovery [1, 2, 6, 9].

Although both techniques are widely practiced, their comparative effectiveness in terms of short-term outcomes—particularly pain relief, functional recovery, and restoration of range of motion—remains debated. This retrospective study was designed to assess and compare the short-term functional outcomes of arthroscopic and mini-open rotator cuff repair at 6 weeks, 3 months, and 6 months follow-up.

Materials and Methods

This retrospective study included 38 patients with MRI-confirmed, rotator cuff tears. Patients underwent either:

- Arthroscopic repair (n=23) or

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- Mini-open repair (n=15)

Inclusion Criteria
- Age 30–70 years
- Symptomatic rotator cuff tear
- Associated subscapularis/infraspinatus tear

Exclusion Criteria
- Advanced glenohumeral arthritis
- Previous shoulder surgery

Surgical Technique
All procedures were performed under regional interscalene block with or without general anaesthesia, with the patient placed in the beach-chair or lateral decubitus position depending on surgeon preference.
- **Arthroscopic repair (n=23):** A standard diagnostic arthroscopy was first performed through posterior and anterior portals to evaluate the glenohumeral joint and associated pathology. The subacromial space was visualized after bursectomy, and subacromial decompression was carried out if impingement was evident. The supraspinatus tear edges were debrided to freshen the footprint. Anchors were placed at the greater tuberosity, and sutures were passed through the tendon using a suture passer and tied arthroscopically, ensuring restoration of footprint coverage. Deltoid integrity was preserved throughout.
- **Mini-open repair (n=15):** A deltoid-splitting approach was used following diagnostic arthroscopy and limited subacromial decompression if needed. A 3–5 cm incision was made over the anterolateral shoulder. The deltoid fibers were carefully split in line, without detachment from the acromion. The tear was visualized directly, mobilized, and repaired with suture anchors placed at the greater tuberosity. Mattress or simple sutures were used to secure the tendon to bone. Care was taken to minimize soft tissue dissection and preserve deltoid function.[1,2,11]

Rehabilitation Protocol
All patients followed a structured, supervised rehabilitation program under the guidance of a physiotherapist.
- **Immobilization:** The operated arm was supported in an abduction sling for 4 weeks to protect the repair.
- **Early Passive Motion:** Pendulum (Codman's) exercises were initiated from postoperative day 2 (POD2) in all patients to prevent stiffness, improve circulation, and promote joint nutrition without stressing the repair [13, 15].

- **Passive ROM:**
  - **Arthroscopic Group:** Gentle passive range of motion (forward flexion, abduction, external rotation within tolerance) was initiated at 2 weeks.
  - **Mini-open Group:** Passive ROM was delayed until 3–4 weeks to protect the deltoid split and repair.

- **Active-Assisted Motion:** Began at 4–6 weeks postoperatively in both groups, using pulleys, wands, and contralateral arm assistance.
- **Active Motion and Strengthening:** Active ROM was permitted from 6 weeks onwards. Isometric strengthening started at 8–10 weeks, followed by isotonic exercises for rotator cuff and periscapular muscles.
- **Advanced Rehabilitation [6, 20]:** By 12–16 weeks, functional strengthening, proprioceptive training, and activity-specific drills were introduced.
  Return to heavy manual work and non-contact sports was generally permitted after 5–6 months, depending on patient recovery and surgeon clearance.

Outcome Measures
- **Pain:** Visual Analogue Scale (VAS, 0–10)
- **Function:** Constant-Murley Score
- **Range of Motion (ROM):** Flexion, abduction, external rotation, internal rotation

Follow-up Intervals
- Preoperative
- Postoperative 6 weeks
- Postoperative 3 months
- Postoperative 6 months

Complications were noted and managed appropriately: superficial infections with oral antibiotics, and joint stiffness/adhesive capsulitis with supervised aggressive physiotherapy.

Results
Both groups showed marked improvement in VAS, Constant-Murley Score, and ROM over time. At 6 months, the arthroscopic group had slightly better results, particularly in pain reduction and recovery of forward flexion and abduction, while gains in external and internal rotation were comparable [4, 8, 12].

Complications: A few patients developed superficial infection (more in the mini-open group), managed successfully with oral antibiotics. Postoperative stiffness and adhesive capsulitis occurred in some patients, managed with aggressive physiotherapy. These patients showed less VAS improvement (infection) and less ROM recovery (stiffness/capsulitis) compared to uncomplicated cases.

Additionally, two cases of anchor pull-out were observed. These occurred in elderly patients with diabetes mellitus and hypertension, most likely due to senile osteoporosis and compromised bone quality. This highlights the role of systemic factors in fixation failure.

A clear correlation was also seen between diabetes and other complications. Patients with diabetes had higher rates of superficial infection and postoperative stiffness/adhesive capsulitis, consistent with impaired wound healing and a known predisposition to capsular fibrosis in diabetics.

Table 1: Summary of outcomes in arthroscopic and mini-open groups.

Surgery Type	VAS Pre-op	VAS 6M	CMS Pre-op	CMS 6M	ROM Pre-op	ROM 6M
ARTHROSCOPIC	7.2	1.7	38.7	82.4	97.0	152.8
MINI-OPEN	7.8	3.7	35.9	73.4	98.4	143.3

*(*VAS -visual analogue scale, CMS-constant-murley score, ROM-range of motion)*

Discussion
This study confirms that both mini-open and arthroscopic repairs result in significant improvement in short-term outcomes following rotator cuff repair. Arthroscopic repair demonstrated marginally superior improvements in pain reduction and recovery of flexion/abduction, consistent with literature emphasizing the advantages of minimally invasive

approaches.

Our data also demonstrate systemic influences on complication patterns. Diabetes mellitus was strongly associated with superficial infection and postoperative stiffness/adhesive capsulitis, in line with prior evidence. Moreover, both anchor pull-out cases were seen in elderly diabetic patients with hypertension, likely due to senile osteoporosis and diabetes-related bone quality deterioration. These findings emphasize the importance of careful patient optimization and anchor selection in high-risk groups.

Complications were uncommon but clinically relevant. Patients with superficial infection had less VAS improvement due to persistent early discomfort; however, these infections resolved with oral antibiotics. Patients with postoperative stiffness and adhesive capsulitis had limited ROM recovery, though most improved with aggressive physiotherapy. Despite these issues, overall functional recovery remained positive, and no re-operations were required.

Figures 1–4. Panel Showing Comparative Outcomes:

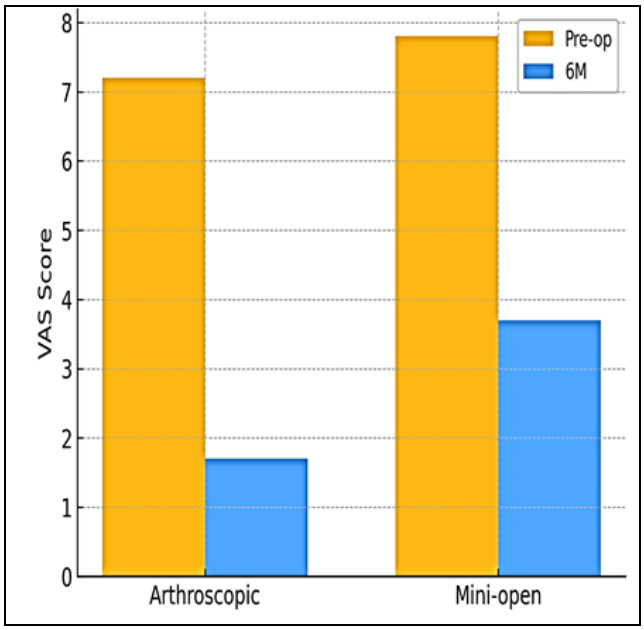

Fig 1: VAS

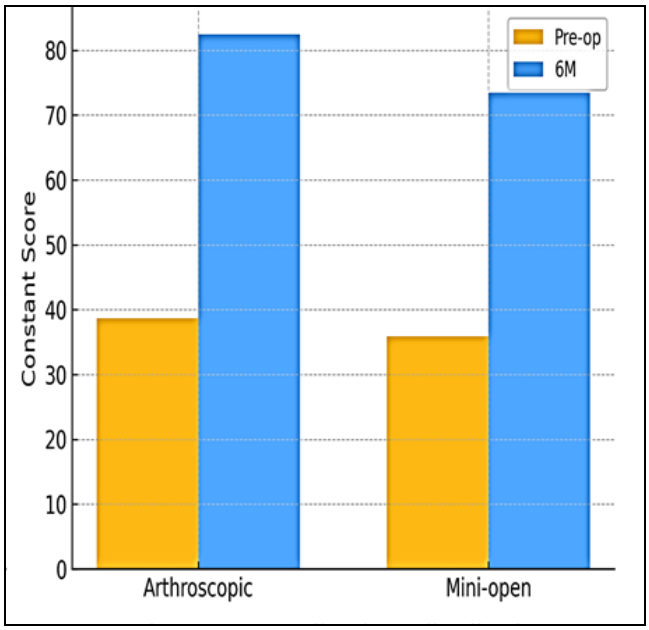

Fig 2: Constant score

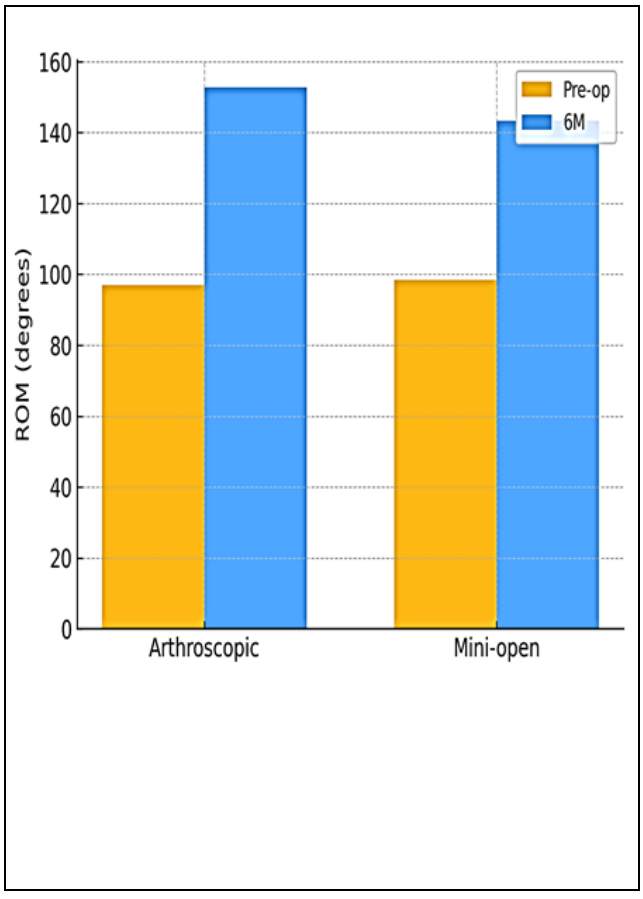

Fig 3: ROM

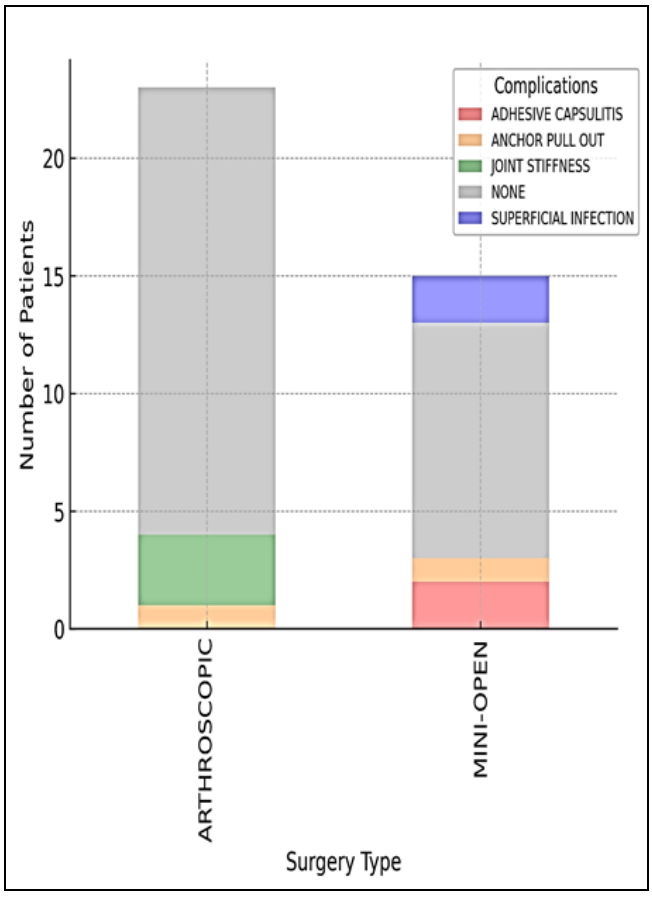

Fig 4: Complications in Arthroscopic vs Mini-open groups

Conclusion

Both arthroscopic and mini-open repairs provide significant short-term improvements in pain, function, and ROM. Arthroscopic repair offered slightly better outcomes in pain relief and recovery of flexion/abduction, likely due to less soft tissue trauma and earlier rehabilitation. Complications, though infrequent, affected outcomes: infections reduced VAS gains, while stiffness and capsulitis limited ROM recovery. These were successfully treated with oral antibiotics and aggressive physiotherapy, respectively. Overall, arthroscopic repair is preferable where early recovery and reduced morbidity are prioritized.

Declarations

Patient Consent: Written informed consent for treatment and publication of anonymized clinical details/images was obtained from all patients.

Ethical Approval: Conducted in accordance with institutional policies and the Declaration of Helsinki; institutional approval/exemption documented.

Conflicts of Interest: On behalf of all authors, the corresponding author states that there is no conflict of interest.

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References

1. Gartsman GM. Arthroscopic rotator cuff repair. Clin Orthop Relat Res. 2001; (390):95-106.
2. Burkhart SS, Danaceau SM, Pearce CE. Arthroscopic rotator cuff repair: analysis of results by tear size and repair technique. Arthroscopy. 2001; 17(9):905-912.
3. Cofield RH. Rotator cuff disease of the shoulder. *J Bone Joint Surg Am*. 1985; 67(6):974-979.
4. Gerber C, Fuchs B, Hodler J. The results of repair of massive tears of the rotator cuff. *J Bone Joint Surg Am*. 2000; 82(4):505-515.
5. Ellman H, Hanker G, Bayer M. Repair of the rotator cuff. End-result study of factors influencing reconstruction. *J Bone Joint Surg Am*. 1986; 68(8):1136-1144.
6. Ide J, Maeda S, Takagi K. Arthroscopic transtendon repair of partial-thickness articular-side tears of the rotator cuff: anatomical and clinical study. *Am J Sports Med*. 2005; 33(11):1672-1679.
7. Mohtadi NG, Hollinshead RM, Sasyniuk TM, Fletcher JA, Chan DS, Li FX. A randomized clinical trial comparing open to arthroscopic acromioplasty with mini-open rotator cuff repair for full-thickness rotator cuff tears: disease-specific quality of life outcome at an average 2-year follow-up. *Am J Sports Med*. 2008; 36(6):1043-1051.
8. Oh JH, Kim SH, Ji HM, Jo KH, Bin SW, Gong HS. Prognostic factors affecting anatomic outcome of rotator cuff repair and correlation with functional outcome. Arthroscopy. 2009; 25(1):30-39.
9. Verma NN, Dunn W, Adler RS, Cordasco FA, Allen A, MacGillivray JD, *et al*. All-arthroscopic versus mini-open rotator cuff repair: a retrospective review with minimum 2-year follow-up. Arthroscopy. 2006; 22(6):587-594.
10. Harryman DT, Mack LA, Wang KY, Jackins SE, Richardson ML, Matsen FA. Repairs of the rotator cuff. Correlation of functional results with integrity of the cuff. J Bone Joint Surg Am. 1991; 73(7):982-989.
11. DeHaan AM, Axelrad TW, Kaye E, Silvestri L, Puskas BL, Foster TE. Does double-row rotator cuff repair improve functional outcome of patients compared with single-row technique? A meta-analysis. *Am J Sports Med*. 2012; 40(5):1176-1185.
12. Galatz LM, Ball CM, Teefey SA, Middleton WD, Yamaguchi K. The outcome and repair integrity of completely arthroscopically repaired large and massive rotator cuff tears. *J Bone Joint Surg Am*. 2004; 86(2):219-224.
13. Jost B, Pfirrmann CW, Gerber C. Clinical outcome after structural failure of rotator cuff repairs. *J Bone Joint Surg Am*. 2000; 82(3):304-314.
14. Bishop JY, Santiago-Torres JE, Rimmke N, Flanigan DC. Smoking predisposes to rotator cuff pathology and shoulder dysfunction: a systematic review. Arthroscopy. 2015; 31(8):1598-1605.
15. Kim KC, Rhee KJ, Shin HD, Kim YM. Arthroscopic repair of large rotator cuff tears: outcome and analysis of factors associated with healing failure or poor postoperative function. *Am J Sports Med*. 2012; 40(4):786-793.
16. Makhni EC, Swart E, Steinhaus ME, Mather RC, Levine WN, Bach BR. Cost-effectiveness of arthroscopic rotator cuff repair versus reverse total shoulder arthroplasty in elderly patients with massive rotator cuff tears. Arthroscopy. 2016; 32(9):1771-1780.
17. Kukkonen J, Joukainen A, Lehtinen J, Mattila KT, Tuominen EK, Kauko T, *et al*. Treatment of nontraumatic rotator cuff tears: a randomized controlled trial with two years of clinical and imaging follow-up. *J Bone Joint Surg Am*. 2015; 97(21):1729-1737.
18. Henn RF, Kang L, Tashjian RZ, Green A. Patients with worker's compensation claims have worse outcomes after rotator cuff repair. *J Bone Joint Surg Am*. 2008; 90(10):2105-2113.
19. Chen L, Cao S, Lin S, Xu C. Open versus arthroscopic rotator cuff repair: a systematic review and meta-analysis of randomized controlled trials. Ann Transl Med. 2015; 3(10):126.
20. Millett PJ, Wilcox RB, O'Holleran JD, Warner JJ. Rehabilitation of the rotator cuff: an evaluation-based approach. *J Am Acad Orthop Surg*. 2006; 14(11):599-609.