

Original Research Article

Comparative study of functional outcomes of open versus arthroscopic surgery of lateral epicondylitis in a tertiary care hospital

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ABSTRACT

Background: Lateral epicondylitis, a degenerative tendinopathy due to microtears in extensor tendons caused by repeated pronation-supination is commonly managed by NSAIDs, physiotherapy, local steroid injections and braces. Although most are self limited, some recalcitrant cases lead to chronic pain and reduction in quality of life. Surgical management by open or arthroscopic means is a viable option but there is a gap of knowledge in current literature regarding superiority of one over the other.

Methods: A total of 32 patients with recalcitrant lateral epicondylitis admitted from March 2019 to August 2020 were enrolled and randomized into two groups, receiving either open or arthroscopic debridement of diseased tendons of extensor carpi radialis longus, brevis and communis. Patients were assessed for pain, functional outcome and complications with a 6 month follow-up.

Results: VAS score for pain and DASH score for functional outcome improved in all patients after surgery and there was no difference between the two groups. Although mean duration of surgery was significantly longer by arthroscopy, time to return to work was significantly shorter in this group ($p < 0.001$). Difference in complication rate was not statistically significant.

Conclusions: Based on this study, surgical management both open and arthroscopic are equally effective for recalcitrant lateral epicondylitis in terms of pain, functional score and patient satisfaction; arthroscopy however shows an earlier return to work. Either can be chosen depending on available skill, equipment and patient demands.

Keywords: Lateral epicondylitis, Tennis Elbow, Arthroscopy elbow, Extensor carpi radialis brevis, Nirschl procedure

INTRODUCTION

Lateral epicondylitis, commonly known as tennis elbow was initially considered an inflammatory disease. Nirschl however described the histopathology of this condition as a 'degenerative tendinopathy', occurring as a failed attempt to repair the microtears caused in extensor tendons of the elbow.^{1,2} The disease causes pain over lateral condyle of humerus extending to back of the forearm sometimes causing reduced grip strength.

Only 10% of the patients associate tennis playing with the disease.³ The disease does have a work-related risk

factor associated with repeated flexion-extension, pronation-supination and use of hand tools.

Most cases are managed conservatively with NSAIDs, physiotherapy, local steroid injection, bracing, platelet rich plasma or autologous blood injection. Management of recalcitrant cases is poorly understood leading to chronic pain and reduced quality of life. Surgical debridement by open or arthroscopic techniques have been recommended if conservative management fails.⁴

There is a gap of knowledge in current literature regarding the superiority of open or arthroscopic methods

with respect to functional outcome, post-operative morbidity, surgery time and complications. Purpose of this study is to compare the surgical techniques of tennis elbow for managing recalcitrant cases.

METHODS

This was a hospital based, prospective, comparative study. The study was conducted in Calcutta national medical college and hospital, West Bengal, India with clearance from ethics committee and written consent from every patient.

The study population consisted of a total of 32 patients of both sexes aged 20-70 years with recalcitrant lateral epicondylitis admitted between March 2019 and August 2020. Patients with recurrent episodes (more than 3 episodes), history of physiotherapy and NSAIDs for minimum 3 months and history of at least one local steroid injection with no symptomatic relief were included in this study. Cases with symptoms less than 6 months, associated elbow arthritis, bony injury or abnormality, cervical spondylitis with radiating pain to elbow, neurovascular deficit and concomitant medial epicondylitis were excluded.

All patients were clinically examined for point tenderness 5mm anterior and distal to lateral epicondyle, Cozen's test and Mill test. Lateral epicondylitis was diagnosed clinically. Examination of neck and upper limb was done to rule out neurovascular deficit, spondylitis and bony deformity followed by radiographs to confirm the same. Patients diagnosed with lateral epicondylitis were started on conservative management with activity modification, NSAIDs, tennis elbow brace followed by a local injection of lignocaine with depot methylprednisolone acetate if this fail. Patients not improving on this protocol with at least 6 month duration of symptoms were offered surgery. 32 patients were included and randomly assigned open or arthroscopic procedure.

Open surgery as per modified Nirschl procedure used a 5 cm curved incision centered over lateral epicondyle up to deep fascia exposing extensor carpi radialis longus (ECRL), extensor digitorum communis (EDC) and extensor carpi radialis brevis (ECRB). Fibrillated and discoloured portions were debrided, lateral epicondyle was decorticated with osteotome and the remaining normal tendons were sutured to fascia or periosteum (Figure 1).

Arthroscopic procedure done in lateral position began by inserting an 18G needle through direct lateral portal just proximal and posterior to radiocapitellar joint and injecting 20-30 ml saline to inflate the joint. Superomedial portal located 2 cm proximal and medial to medial epicondyle and 1 cm anterior to intermuscular septum was then established. Trochar and sheath was introduced anterior to intermuscular septum maintaining contact with anterior aspect of humerus, directed towards

radial head. Diagnostic arthroscopy was done to identify the pathological lesion which was then accessed through superolateral portal 2 cm proximal and 1cm anterior to lateral epicondyle. The capsule was resected, under surface of ECRB identified and diseased areas ablated with radiofrequency ablator (Figure 2).

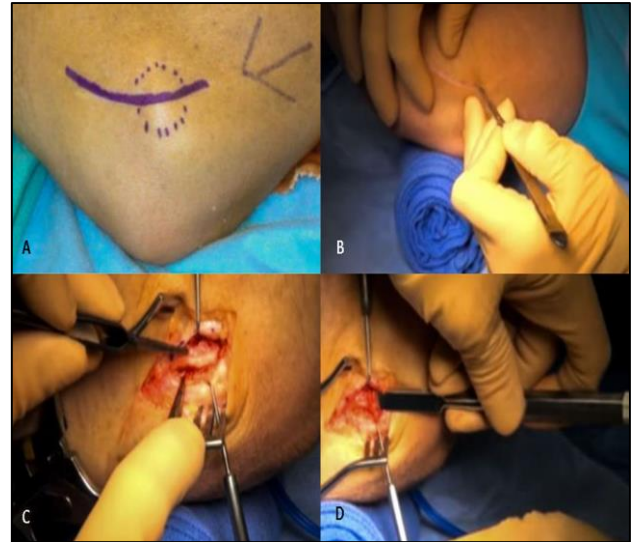


Figure 1 (A-D): Operative steps of open surgery. Surface marking, skin incision, debridement of diseased tissue and decortication of lateral epicondyle.

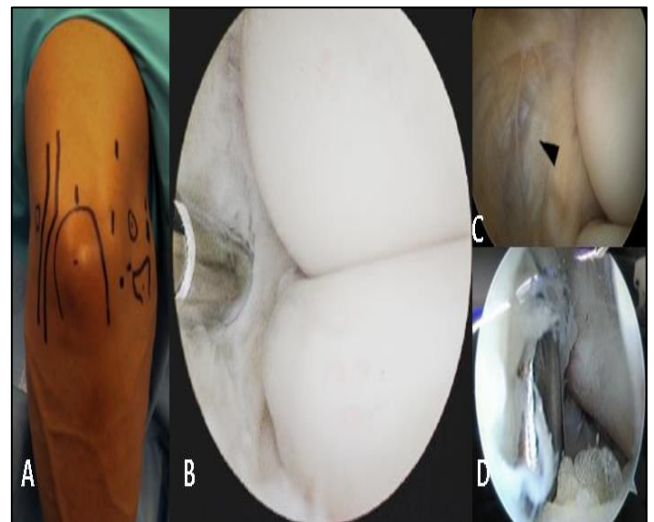


Figure 2 (A-D): Operative steps of arthroscopic surgery. Surface marking and portal sites, view of radiocapitellar joint from anteromedial portal, diseased portion of ECRB seen from anteromedial portal and radiofrequency ablator used for debridement.

Both groups received the same rehabilitation protocol (Table 1). Patients were followed up at 2 week, 4 week, 3 month and 6 month and assessed for pain (by VAS), functional outcome (by DASH score), patient satisfaction and complications.

Table 1: Institutional rehabilitation protocol following surgery for lateral epicondylitis.

Week 0-2	Week 2-4	Week 4-6	Week 6-12
Limb placed in shoulder arm pouch in 90-degree flexion elbow ROM encouraged as pain is tolerated	Arm pouch discontinued after stitch removal ROM exercises continued oedema control therapy	Progress to full range of motion strengthening exercises for function and endurance	Goal dependent rehabilitation and return to sports

Statistical analysis was done using IBM SPSS software 24.0. Pearson's Chi square test were used for comparison across groups of categorical variables whereas continuous variables were compared using independent t test. Confidence interval of 95% was chosen with $p < 0.05$ taken to be statistically significant.

RESULTS

A total of 32 patients with recalcitrant lateral epicondylitis with failed conservative management fulfilled the inclusion and exclusion criteria but 2 were lost to follow up, so 30 patients were included in analysis.

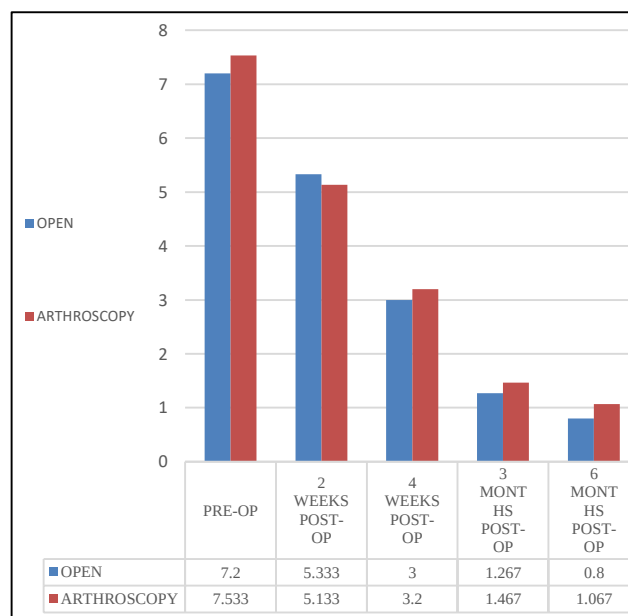
Patients were randomized into 2 groups (15 each), one group receiving open surgery while other receiving arthroscopic surgery. Mean age of the patients was 41.4 years ($SD \pm 5.934$) with 16 male and 14 female patients. Right elbow was found to be significantly more affected ($p < 0.05$). As per inclusion criteria, patients with a minimum 6 months of symptoms were included and mean duration of symptoms in the study population was 9 months ($SD \pm 2.421$). Mean duration of follow-up after surgery was 12.2 months ($SD \pm 2.981$) in open surgery group and 10.86 months ($SD \pm 3.137$) in arthroscopic surgery group ($p = 0.121$). There was no statistically significant difference in demographics between the two groups (Table 2).

Table 2: Comparison of demographics of study population.

Parameters	Open group	Arthroscopy group	P value
Age (Mean ± SD) (Years)	41.267±5.934	41.533±7.070	0.68
Gender (Count)			
Male	9	7	0.71
Female	6	9	
Side affected (Count)			
Right	11	12	0.0034 (Right vs left)
Left	4	3	
Duration of symptoms (Mean ± SD) (Months)	8.4±1.957	9.6±2.746	0.09
Duration of follow-up (Mean ± SD) (Months)	12.2±2.981	10.86±3.137	0.121

The mean duration of surgery in open surgery group was 25.133 minutes ($SD \pm 2.356$) and in arthroscopic surgery group was 34.867 minutes ($SD \pm 4.257$). The difference in the duration of surgery was found to be statistically significant ($p < 0.01$) (Figure 1).

Pain was assessed by VAS score and compared using independent sample T test pre-operatively as well as post-operatively at 2-week, 4-week, 3 month and 6 month follow-up. The VAS Score improved in the study population from a mean pre-operative score of 7.367 ($SD \pm 0.850$) to a mean score of 0.933 ($SD \pm 0.980$) 6 months after surgery (Figure 3). The mean VAS score pre-operatively and 6 months after surgery in open group was 7.2 ($SD \pm 0.775$) and 0.8 ($SD \pm 1.082$) respectively and in arthroscopy group was 7.533 ($SD \pm 0.915$) and 1.067 ($SD \pm 0.884$) respectively. There was no significant difference in VAS Score between the 2 groups ($p = 0.081$).

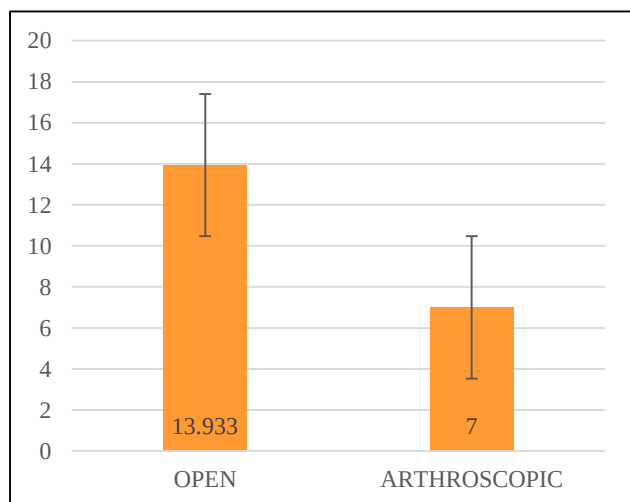
**Figure 3: VAS score of study population.**

Functional status was assessed using DASH score pre-operatively and 6 months post-operatively. Mean DASH Score of the study population improved from pre-operative score of 40.954 ($SD \pm 3.679$) to 12.2 ($SD \pm 1.739$) 6 month post-operatively. The difference in DASH score between the 2 groups was not found to be statistically significant ($p = 0.379$) (Table 3). Elbow range of motion was within normal limits pre-operatively and post-operatively in both groups.

Table 3: Comparison of study parameters between two groups.

Parameters	Open group	Arthroscopy group	P value
Duration of surgery (Minutes)	25.133±2.356	34.867±4.257	0.000000053
VAS score (Mean ± SD)			
Pre-op	7.2±0.775	7.533±0.915	0.081
2 weeks post-op	5.333±1.345	5.133±1.407	
4 week post-op	3 ± 0.926	3.2±1.207	
3 months post-op	1.267±1.033	1.467±0.834	
6 months post-op	0.8±1.082	1.067±0.884	
DASH score (Mean± SD)			
Pre-op	40.167±3.686	41.74±3.622	0.379
6-month post-op	12.1±1.720	12.3±1.812	
Elbow ROM			
Pre-op	Normal	Normal	--
Post-op	Normal	Normal	
Return to work (Weeks) (Mean ± SD)	13.933±1.624	7 ± 1.254	0.0000000192
Patient satisfaction			
Very satisfied	6	10	0.341
Somewhat satisfied	7	4	
Not satisfied	2	1	
Complication			
No. of patients with complication	3	1	0.283
Complication rate	20%	6.67%	

In open surgery group, the mean time to return to work was 13.933 weeks (SD±1.624) whereas the arthroscopy group, it was 7 weeks (SD±1.254). Time to return to work was significantly less in arthroscopic surgery group ($p<0.01$) (Figure 4).

**Figure 4: Mean time to return to work in study population.**

Patient satisfaction rate was assessed using an ordinal scale of very satisfied, somewhat satisfied and not satisfied but the difference between 2 groups was not significant ($p=0.341$).

In open surgery group, 3 out of 15 patients had suffered complications (two superficial wound infections, one seroma). In arthroscopic surgery group, only one out of

15 patients suffered complication (PIN neuropraxia). This difference was not found statistically significant ($p=0.283$).

DISCUSSION

Recalcitrant lateral epicondylitis still remains a largely untreated and ignored disease causing significant reduction in quality of life. Considered a degenerative tendinopathy by Nirschl, it has a work related risk factor associated with repeated pronation-supination and use of hand tools.¹ Rest, NSAIDs, physiotherapy and local steroid with or without local anaesthetic are effective in managing majority of cases of lateral epicondylitis, some recalcitrant cases are resistant to the conventional treatment.⁵

Open or arthroscopic debridement of degenerated tendons is suggested as a treatment option for these recurrent and recalcitrant cases but current literature lacks evidences regarding the superiority of one procedure over other.⁴

Our study consisted of 32 patients of recalcitrant tennis elbow, with minimum symptom duration of 6months who were randomized into 2 groups receiving either open or arthroscopic surgery. 2 patients were lost to follow up, so 30 patients (Mean age 41.4, SD±6.414) with 15 in each group were included in final analysis. The 23 patients out of 30 had their right elbow affected and the remaining had left elbow affected ($p=0.003$). Sanders et al found a similar higher prevalence in right side as right hand being the more common dominant hand in general population is more prone to microtears of ECRB due to repeated exertion.⁶

The mean duration of surgery in open surgery group was 25.13 minutes (SD±2.356) while in arthroscopic surgery group, it was 34.87 minutes (SD±4.257). It was found that arthroscopic surgery for lateral epicondylitis took significantly longer operating time, compared to open surgery ($p \leq 0.001$). This correlates with the studies conducted by Clark et al and Wang et al who found a mean difference in duration of surgery to be 11.45 minutes.^{7,8}

Riff et al reported that a greater proportion of patients were pain free in open surgery group than arthroscopic and percutaneous surgery group.⁹ Both Clark et al and Wang et al however found no significant difference between VAS scores.^{7,8} In this study, VAS score improved in all patients from pre operative 7.367 (SD ± 0.850) to 0.933 (SD±0.980) at 6 months post-operatively. Both arthroscopic and open procedures reduced pain significantly with no appreciable difference ($p=0.081$).

The mean pre-operative DASH score improved from 40.95 (SD±3.679) to 12.2 (SD±1.739) 6months post-operatively. There was no statistically significant difference between DASH scores of 2 groups ($p=0.379$) which is in agreement with other studies.^{7,8,10,11}

The mean time required to return to work in open surgery group was 13.933 weeks (SD±1.624) and in arthroscopic surgery group, it 7 weeks (SD±1.254). This difference was found statistically significant ($p < 0.001$). This difference is probably owing to fact that open surgery is associated with longer incision related pain and scarring. Greco et al and Lai et al also found similar results while Riff et al found no significant difference.^{9,12,13}

Patients were satisfied with both open and arthroscopic surgery ($p=0.341$). In open surgery group, 6 patients were very satisfied, 7 were somewhat satisfied and 2 were not satisfied with overall outcome whereas in arthroscopic surgery group, 10 patients were very satisfied, 4 were somewhat satisfied and 1 was not satisfied with overall outcome. In open surgery group, 2 patients developed wound infection, one of them requiring debridement while 1 patient developed seroma. In arthroscopic surgery, 1 patient developed PIN neuropraxia which improved with medication and physiotherapy.

The study however had a few limitations. This study was done with 30 patients, and the results may not be applicable for a larger population. Also, the mean duration of follow-up was 11.533 months (6-16 months), hence long-term effects of surgery and recurrence could not be studied.

CONCLUSION

The findings of this study suggests that both open and arthroscopic debridement of common extensor tendons are effective in the management of recalcitrant lateral epicondylitis in terms of improvement of pain and

functional score. There is no significant difference in terms of pain, functional outcome, patient satisfaction and complication rate between open and arthroscopic surgery for recalcitrant lateral epicondylitis cases.

However, open surgery takes shorter time, whereas arthroscopic surgery provides earlier return to work and less scar. So, in presence of necessary equipment and adequate skill, arthroscopic surgery can be safely recommended in recalcitrant lateral epicondylitis cases. A larger study with a bigger sample size and longer follow-up is required to confirm the findings of this study.

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REFERENCES

1. Nirschl RP, Pettrone FA. Tennis elbow: The surgical treatment of lateral epicondylitis. J Bone Joint Surg Am. 1979;61:832-9.
2. Nirschl RP, Ashman ES. Elbow tendinopathy: Tennis elbow. Clin Sports Med. 2003;22(4):813-36.
3. De Smedt, de Jong, Van Leemput. Lateral epicondylitis in Tennis: Update on aetiology, biomechanics and treatment. Br J Sports Med. 2007;41:816-9.
4. Monto R. Tennis elbow repair with or without suture anchors: A randomized clinical trial. Techn Shoulder Elbow Surg. 2014;15(3):92-7.
5. Altay T, Gunal I, Ozturk H. Local injection treatment for lateral epicondylitis. Clin Orthop Rel Res. 2002;398:127-30.
6. Sanders TL, Kremers HM, Bryan AJ, Ransom JE. The Epidemiology & Health Care Burden of Tennis Elbow. Am J Sports Med. 2015;43(5):1066-71.
7. Clark T, McRae S, Zhang Y, Dubberley J. Arthroscopic versus Open Lateral Release for the Treatment of Lateral Epicondylitis: A Prospective Randomized Controlled Trial. Arthroscopy. 2018;34(12):3177-84.
8. Wang W, Chen J, Lou J, Shentu J. Comparison of Arthroscopic Debridement and Open Debridement in the Management of Lateral Epicondylitis. Medicine. 2019;98(44):e17668.
9. Riff AJ, Saltzman BM, Cvetanovich G. Open vs Percutaneous vs Arthroscopic Surgical Treatment of Lateral Epicondylitis: An Updated Systematic Review. Am J Orthop. 2018;47(6):43.
10. Moradi A, Pasdar P, Mehrad-Majd H, Ebrahimzadeh MH. Clinical Outcomes of Open versus Arthroscopic

- Surgery for Lateral Epicondylitis, Evidence from a Systematic Review. Arch Bone Joint Surg. 2019;7(2):91-104.
11. Szabo SJ, Savoie FH, Field LD, Ramsey JR. Tendinosis of Extensor Carpi Radialis Brevis: an Evaluation of Three Methods of Operative Treatment. J Shoulder Elbow Surg. 2006;15(6):721-7.
 12. Greco S, Nellans KW, Levine WN. Lateral Epicondylitis: Open versus Arthroscopic. Oper Tech Orthop. 2009;19(4):228-34.
 13. Lai WC, Erickson BJ, Mlynarek RA, Wang D. Chronic Lateral Epicondylitis: Challenges and Solutions. Open Access J Sports Medic. 2018;9:243-51.

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