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Extra-articular arthroscopic release of lateral epicondylitis: a prospective study

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Background: Operative management of lateral epicondylitis can be managed with percutaneous, arthroscopic, or open surgical release. Extraarticular arthroscopic release is a new technique, and no study has compared its outcomes and risk profile.

Methods: A 26-patient cohort was reviewed before and after extraarticular arthroscopic release, which was performed by the senior author. The Mayo Elbow Performance Scores were used as a functional outcome score and obtained via a phone interview. Results were analyzed using a paired t-test with a statistical significance set at $P < .05$.

Results: Of the 26 patients, 10 were being treated under workers compensation. Preoperative Mayo Elbow Performance Score was 47.5, and the postoperative score was 90.2 with a significant difference of 42.7 (P value = .05). The workers compensation group scored 13.3 points lower postoperatively than the remainder of patients, which was shown to also be significant with a P value of .002.

Discussion and Conclusion: The advantage of extraarticular arthroscopic release was better visualization of affected structures, which improved accuracy of debridement, and a small capsulotomy, which decreased the risk of a transient radial nerve palsy. Overall, extraarticular arthroscopic results were found to be good and comparable to the results of other operative techniques with the added advantage of a lower risk profile.

Lateral epicondylitis, also known as tennis elbow, is a degenerative tendinopathy involving the extensor carpi radialis brevis tendon and extensor digitorum communis aponeurosis, which is depicted in Figure 1. The cumulative microtrauma that follows repetitive stress injuries or overuse often exceeds the tissue's ability for self-repair and leads to degeneration due to disruption of tendon fiber and the formation of angiofibroblastic hyperplasia.[12]

Treatment of lateral epicondylitis has a wide spectrum of choices with variable results.

Nonoperative treatment commences with education followed by activity modification, wrist and forearm splints, nonsteroidal anti-inflammatory drugs, physiotherapy, injections in the form of corticosteroid, leukocyte-rich platelet-rich plasma (PRP), or leukocyte-poor PRP injection. In our unit, this was the nonoperative treatment protocol.

Alternative therapies include autologous tenocyte reimplantation and, more recently, extracorporeal shockwave therapy,[5,6,10,11] taping, deep tissue massage, electric stimulation, acupuncture, dry needling, and prolotherapy. Nonoperative treatment can be up to 85% successful at one year.[2] Although nonoperative treatment is indicated up to one year, before surgery, it has been shown that if there is no recovery after 6 months, it is unlikely they will improve with further conservative care, and operative management is recommended for recalcitrant and disabling symptoms.[14]

The most common forms of operative treatment are percutaneous release, arthroscopic debridement, and open debridement. Extraarticular arthroscopic release is a unique technique and first published in 1993 by Kramer[8] and then later in Arthroscopy in

The University of British Columbia Ethics Review Board approved this study (H17-01969).

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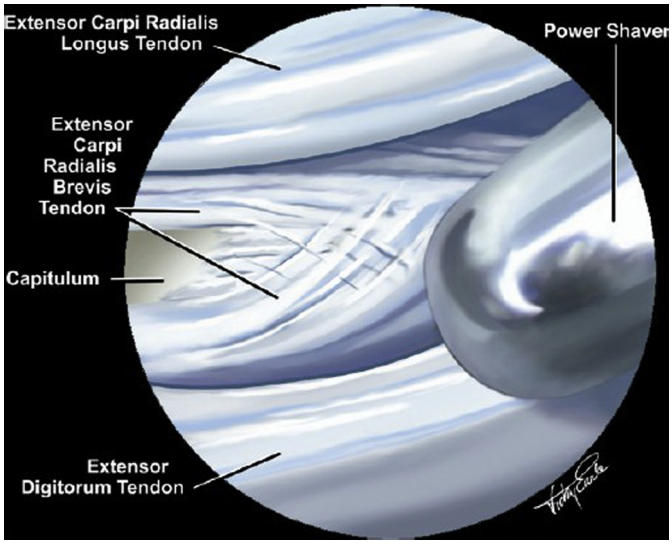

Figure 1 Lateral epicondylitis.

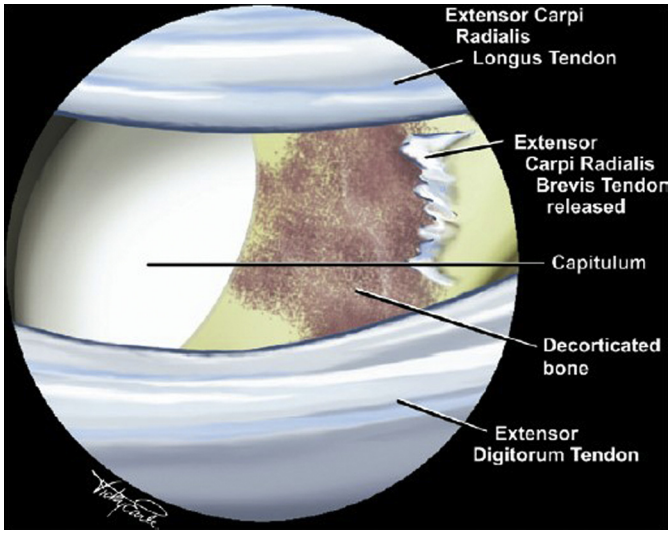

Figure 2 Arthroscopic technique for release of lateral epicondylitis.

1995[7] and as a technical note in the *Journal of Arthroscopy* and related surgery in 2008[3] although the former two articles combined arthroscopic with open treatment of the condition. There is no series in the literature to analyzing the efficacy of extraarticular arthroscopic lateral epicondylar release in terms of outcome or complication rate against known entities such as percutaneous, standard arthroscopic, or open techniques. Accordingly, we present a novel surgical technique and a prospective study to determine whether this technique is safe and effective. The study was approved through the University of British Ethics review board (H17-01969).

Surgical technique

In the arthroscopic extraarticular lateral epicondylar release, the area of maximum tenderness is marked before anesthesia with a permanent marker. Under general anesthesia, the patient is placed in a lateral decubitus position with the arm positioned prone over a mid-humeral support with a tourniquet. After prepping and draping, 15 ml of normal saline is injected into the elbow joint from the posterolateral soft spot to inflate the capsule. A standard proximal-medial portal is used to gain access into the anterior compartment of the elbow, with attention to ensure protection of the antebrachial cutaneous and ulnar nerves. This is created by making a small skin incision and then a blunt trocar to dissect the soft tissue until the anterior humerus is palpated, and the capsule breached. The arthroscope is then inserted, and normal saline runs through the joint via gravity to maintain the working space. Under direct visualization, a proximal lateral portal is created using an inside out needle technique, and intra-articular elbow work is completed as necessary. Then, the arthroscope is moved to the lateral portal with a switching stick, and an accessory proximal lateral portal is created that triangulates the area centered over the premarked lateral epicondylar point of maximal tenderness. A 4-mm shaver is introduced into this accessory proximal lateral portal, and after shaving the bursal tissue, the extensor carpi radialis brevis origin on the humeral lateral condylar ridge in the region of the tender area is visualized and completely debrided as depicted in Figure 2. After the procedure, the portals are sealed with an absorbable suture and steri-strips. This technique is demonstrated in the Video provided with this article.

Materials and methods

The study was undertaken on a cohort of 26 consecutive patients who underwent an arthroscopic extraarticular lateral epicondylar release for recalcitrant epicondylitis under the care of a single senior surgeon (W.D.R.) at the Joint Preservation Center, University of British Columbia. Preoperative and postoperative Mayo Elbow Performance Scores (MEPS) were compared and analyzed. The postoperative notes were reviewed, and, in addition, a phone questionnaire was used to determine any complications. Criteria for inclusion in the study were age greater than 19 years, recalcitrant lateral epicondylitis of greater than 6 months duration after failure of nonoperative treatment, and MRI confirming the clinical diagnosis of lateral epicondylitis. The MRI was to exclude other possible causes of elbow pain and to search for increased signal in the T2 weighted scans around common extensor origin as, in our experience, these patients respond most readily to the novel surgical technique. Exclusion criteria were prior surgery for lateral epicondylitis, negative MRI findings, concomitant pathology in the ipsilateral upper limb, fewer than 6 months of symptoms of lateral epicondylitis, failure to adhere to nonoperative treatment protocol, and inability to undertake a phone interview. Patients were contacted by the arthroscopic reconstructive and joint preservation clinical fellow in the Department of Orthopedics at the University of British Columbia who was not involved in the patients care and who followed the Phone Interview Protocol which includes consenting to undertake the phone interview in addition to using their clinical information for the purposes of the study. The phone interview included a MEPS. The data were compiled in an excel spreadsheet and deidentified. A statistical analysis of the preoperative and postoperative scores was perfomed using a paired t-test with a statistical significance set at $P < .05$.

Results

There were 26 patients in total, 10 of whom had workman's compensation board–related claims. The average age was 48 years (27-57) with an average follow-up duration of 6 years (12 months to 11 years). A summary of these demographics is detailed in Table I.

The mean preoperative MEPS was 47.50, and at final follow-up, the postoperative score was 90.19. Differences in the two groups are represented in Figure 3. Overall, the outcome score was statistically

Table I
Summary of demographics of the patient cohort.

Gender	
Female	15 (51.7%)
Male	11 (42.3%)
Handedness	
Left	1 (3.8%)
Right	25 (96.2%)
Operative side	
Left	13 (50%)
Right	13 (50%)
WorkSafe BC claim	
No	16 (61.5%)
Yes	10 (38.5%)
Returned to work	
No	4 (15.4%)
Yes	22 (84.6%)
Occupational activity	
High	3 (11.5%)
Intermediate	18 (69.2%)
Low	5 (19.2%)

BC, British Columbia.

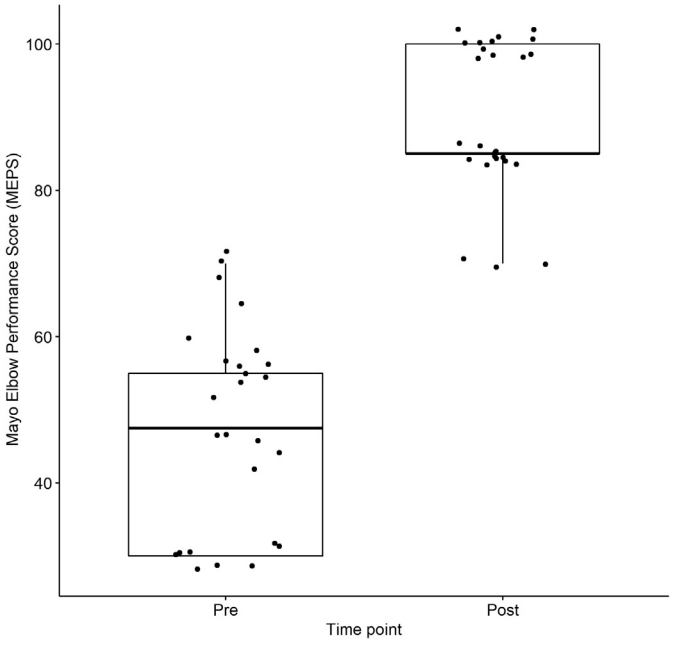

Figure 3 Preoperative and postoperative Mayo Elbow Performance Scores for 26 patients who underwent an arthroscopic lateral epicondylar release.

significant with a *P* value of <.001 as seen in Table II. There were no complications noted through outpatient follow-up or at the final follow-up visit. Workers compensation group had a mean postoperative Mayo score of 82, whereas the noncompensation group had a mean score of 95.3. The individual scores are shown in Figure 4. The difference in score of 13.3 was significant, and the *P* value for this difference was <.001.

Discussion

Our study showed a significant improvement in function, and in addition, there were no complications such as radial nerve palsy, compartment syndrome, or fistulas, which can occur in a standard intraarticular arthroscopic technique as described by Baker et al.[1] The difference in results of the workers' compensation group vs. the rest

Table II
Paired t-test of preoperative and postoperative Mayo Elbow Performance Scores.

Paired samples statistics				
	Mean	N	Std. deviation	Std. error mean
Mayo preop	47.50	26	14.160	2.777
Mayo postop	90.19	26	10.342	2.028

Paired samples test			
	Paired differences		Sig. (2-tailed)
	Mean	Std. deviation	
Mayo preop–Mayo postop	−42.69	18.933	<.001

in this study reflects similar differences in the literature. Most patients were able to return to work, and it stands that a technique with a low-risk profile will have the potential to get most people back into the workforce and minimize the complications of them doing so.

Riff et al[13] found that open debridement of lateral epicondylitis led to a larger proportion of pain-free patients than percutaneous and arthroscopic debridement, with no difference in returning to work and subjective satisfaction. They postulated that in standard arthroscopic techniques, the diseased tissue at the lateral epicondyle is not clearly visualized leading to suboptimal debridement, and in the percutaneous method, the tissue in question is not visualized at all leading to poorer results. We agree with the notion of poor tissue visualization with standard arthroscopic techniques, hence the impetus of the novel extraarticular approach, which allows direct visualization of diseased tissue.

A Cochrane review by Buchbinder et al[4] reported that the percutaneous technique resulted in better function represented by improved median disabilities of the arm, shoulder and hand (DASH) scores and faster return to work than the open surgical technique. However, for the high-performance work-related scores, there was no statistical difference. This and similar articles that compared open surgical release to other alternative therapies such as extracorporeal shockwave therapy, PRP injections, and arthroscopic debridement were systematically reviewed by Pierce et al[11] who found that the arthroscopic and open procedures provided better outcomes than the other methods, but infection rates were higher in the open procedures.

To confound matters, a prospective randomized placebo-controlled clinical trial failed to show any clinical benefit of open surgical debridement of extensor carpi radialis brevis (ECRB) in lateral epicondylitis when compared to placebo surgery,[9] although one of the limitations of this trial was low numbers. Some of the reasons put forward as to why placebo surgery may have been effective include local denervation, stimulation of healing from the surgical incision, and the Hawthorne effect.

Brooks-Hill and Regan[3] described two specific advantages of the extraarticular arthroscopic technique over a standard arthroscopic release of lateral epicondylitis. First, the extraarticular viewing portal allows direct visualization of diseased structures, improving accuracy of debridement compared with an intraarticular viewing portal. The second advantage of the extraarticular viewing portal is that it only requires a small capsulotomy. The small capsulotomy decreases the risk of transient radial nerve palsy and synovial fistula associated with a larger capsulectomy required for the intraarticular technique.

Conclusion

The extraarticular arthroscopic lateral epicondylar release is a reproducible, safe, and effective surgical technique and should form part of the elbow surgeon's armamentarium in the management of recalcitrant lateral epicondylitis.

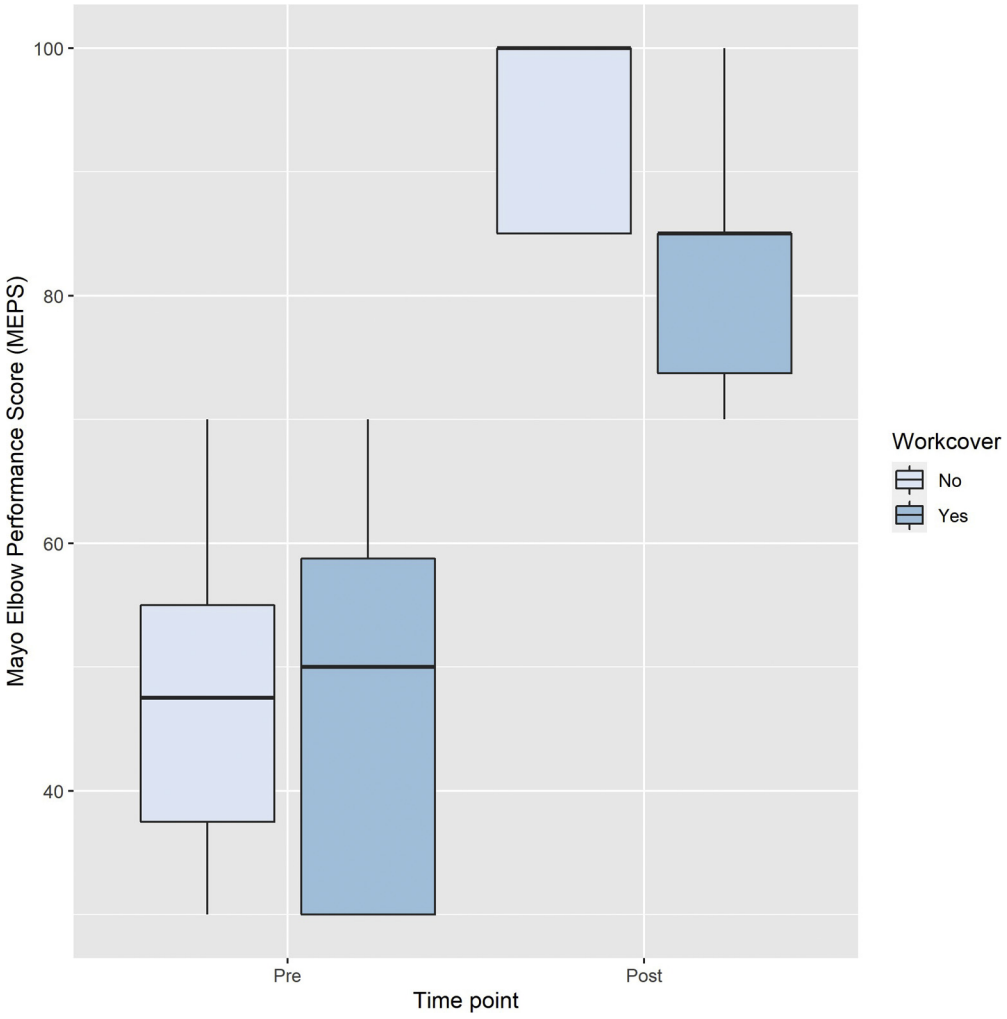

Figure 4 Difference in both preoperative and postoperative Mayo Elbow Performance Score between work compensation and nonwork compensation groups.

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Supplementary data

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