Time to functional recovery after arthroscopic surgery for tennis elbow

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Background: This study evaluated recovery from chronic lateral epicondylitis after arthroscopic treatment.

Methods: Twenty-three consecutive patients (5 men, 18 women) with chronic lateral epicondylitis underwent arthroscopic surgery. Patients were a mean age of 49 years. Prospective outcome data were collected before the operation and at 1, 2, 3, 6, 12 and 24 months after surgery. Outcomes were assessed using a visual analog scale (VAS: 0-100), grip strength percentage (compared with the unaffected side), the Japanese Orthopaedic Association elbow score, and the Disability of the Arm, Shoulder and Hand questionnaire.

Results: A mean VAS score at rest of 26 preoperatively improved to 8 (P = .0026), 6, and 3 at 1, 2, and 3 months after surgery, respectively. A mean VAS score during activity improved from 68 preoperatively to 35 (P < .001), 23, and 19 at 1, 2, and 3 months after surgery, respectively. Both VAS scores gradually decreased up to 24 months after surgery. The mean grip strength improved from 66.1% preoperatively to 88.7% at 2 months after surgery (P < .001). The mean Japanese Orthopaedic Association elbow score improved from 38 points preoperatively to 61 points at 1 month after surgery (P < .001). The mean Disability of the Arm, Shoulder and Hand score improved from 32 points preoperatively to 15 points at 3 months after surgery (P < .001).

Conclusion: Arthroscopic surgery for lateral epicondylitis provides significant improvement in pain and functional recovery up to 3 months after surgery. However, it takes more than 6 months for the VAS score during activity to fall below 10 points.

Level of evidence: Level IV, Case Series, Treatment Study.

Keywords: Arthroscopic surgery; tennis elbow; lateral epicondylitis; VAS; grip strength; functional recovery

Lateral epicondylitis, or tennis elbow, is the most common affliction of the elbow.6,7,10,19 Despite conservative management, approximately 10% of patients may require operative release.8 A variety of surgical treatments have been described (open, percutaneous, and arthroscopic), and all report good but not definitive results.1,5,9,11,13,19,20,23,25,27 Arthroscopic techniques have gained in popularity in recent years.3,4,12,25 In addition to a satisfactory operative result, one benefit of the arthroscopic approach appears to be lower morbidity and earlier return to work and activity. Moreover, arthroscopic surgery allows intra-articular assessment.
Time to return to work after arthroscopic treatment differs among studies. Baker et al.\textsuperscript{22} and Owen et al.\textsuperscript{21} reported that the average time to return to work was 6 days and 2.2 weeks, respectively. Grewal et al.\textsuperscript{12} showed that time taken off work after surgery averaged 19 weeks. Most studies of pain relief and functional recovery after arthroscopic release for lateral epicondylitis involve a minimum follow-up of 2 years,\textsuperscript{4,12,25} and Baker et al.\textsuperscript{25} followed-up patients for up to 14 years. However, none of these studies determined the time at which pain and functional recovery was obtained after surgery.

The purpose of our study was to evaluate pain and functional recovery using a visual analog scale (VAS), grip strength, Disabilities of Arm, Shoulder and Hand (DASH) score, and Japanese Orthopaedic Association (JOA) score for an initial period of 3 months after surgery and continuing for a follow-up of 2 years. Our hypothesis was that arthroscopic release for lateral epicondylitis would require at least 3 months after surgery for pain relief and functional recovery.

Materials and methods

Patients

A single surgeon at our institution (T.W.) performed a consecutive prospective series of 23 arthroscopic surgeries on 23 patients with recalcitrant lateral epicondylitis between February 2008 and April 2010. We undertook a retrospective case-control study of these patients. The prospective data included in this study were obtained as part of the routine care of the patients and were part of their medical record. Because we reviewed the data retrospectively in a deidentified fashion, the Institutional Ethical Committee did not require that the patients provide informed consent.

A clinical diagnosis of lateral epicondylitis was made on the basis of a history of lateral elbow pain that was triggered or exacerbated by wrist extension, with or without specific activity, and point tenderness of the lateral epicondyle. All patients underwent a standard radiographic examination and a preoperative examination by magnetic resonance imaging.

Surgical indications included failure of a minimum of 6 months of conservative treatment such as rest, activity modification, counterforce bracing, nonsteroidal anti-inflammatory medications, and corticosteroid injection. The study excluded patients affected bilaterally, undergoing revision surgery, or with a history of fracture or other elbow disorders. Patients consisted of 5 men and 18 women, with an average age of 49 years (range, 34-67 years). The mean duration of symptoms was 32 months (range, 6-338 months). Affected side and occupation/sports are referred in Table 1. There was no patient of worker’s compensation. No patients showed restriction of elbow range of motion or evident osteoarthritic changes on roentgenograms. Magnetic resonance imaging showed high signal intensity at the extensor carpi radialis brevis (ECRB) tendon origin in all patients.

Operative technique

Surgery was performed with the patient under axillary block\textsuperscript{20} or local anesthesia of the portal sites in combination with general anesthesia.\textsuperscript{24} The patient was placed in the lateral decubitus position with a tourniquet on the affected arm over an arm holder. An arthroscopic pump maintained fluid pressure at 35 mm Hg.

The arthroscope was introduced into the joint through a proximal anteromedial portal for anterior viewing. The surgeon established proximal lateral and anterolateral portals for working instruments, with the portals posterior to the radiocapitellar joint consisting of a posterolateral viewing portal and a soft spot working portal.

Operative treatment consisted of an arthroscopic inspection, debridement of the ECRB tendon origin, and resection of the radiocapitellar synovial plica if interposed in the joint. Initial examination of the anterior compartment of the joint revealed 11 type I lesions, 3 type II lesions, and 9 type III lesions of the ECRB origin, according to the criteria of Baker et al.\textsuperscript{25} The surgical findings of the radiocapitellar synovial plica, according to Mullett et al.,\textsuperscript{18} consisted of 3 type 1 variants, 7 type 2 variants, and 13 type 3 variants (Table 1). The capsule and degenerative ECRB tendon were resected with a 3.5-mm radius shaver, radiofrequency ablator, and punches until the impingement between the capsule and capitellum was cleared.\textsuperscript{22} Tendon debridement was kept to the anterior aspect of the lateral epicondyle to avoid violating the lateral ulnar collateral ligament. In cases in which a synovial plica was interposed in the radiocapitellar joint, it was also debrided. Second, we examined the posterior radiocapitellar joint and debrided the posterior synovial plica until the radial head was fully exposed.

Postoperative care

Active motion was encouraged immediately after surgery. Patients began passive range of motion exercise and grip reinforcement practice at 2 weeks but were restricted to only light work without elbow pain until 4 weeks after surgery. From 4 weeks after surgery, we progressively allowed heavy work and sports to be undertaken.

Outcomes assessment

The authors (G.O. and K.S.) who were not involved in patient care, reviewed the clinical evaluations of all patients performed in the outpatient clinic. Patients visited the clinic at 1, 2, 3, 6, 12, and 24 months after surgery, at which time they assessed their elbow pain at rest and during activity using a VAS scale from 0 (no pain) to 100 (severe pain). Grip strength was also measured at 1, 2, 3, 6 and 12 months after surgery. The patients evaluated their physical condition; and tenderness over the lateral epicondyle, pain with resisted wrist extension, and elbows were rated according to the JOA elbow score for lateral epicondylitis, which consists of the assessment of pain (30 points), function (20 points) and 2 physical findings of lateral epicondylitis (50 points).\textsuperscript{23} The Japanese Society of Surgery of the Hand version of the DASH questionnaire\textsuperscript{15} was also used before the operation and at 3, 6, 12 and 24 months after surgery. We evaluated patient satisfaction with the operation at the last follow-up by asking the following question: Are you satisfied with your operation? Results were classified as very good, good, no change, and worse.

Patients who were professionally active before surgery were classified at the last follow-up as having not changed their profession, changed their profession, retired, or ceased professional activity. We also calculated the time to the resumption of
professional activity. We asked patients about their participation in sports preoperatively, their return to sports after surgery, as well as their feelings regarding differences in the level of sports participation postoperatively compared with the level preoperatively.

Statistical analysis was performed using a paired Student t test, with statistical significance set at P < .01.

Results

No postoperative complications, including nerve injury, infection, instability or heterotopic ossification, were observed.

The mean ± standard deviation VAS score at rest improved significantly from 26 ± 23 preoperatively to 8 ± 14 (P = .0026) as little as 1 month after surgery and reached a plateau thereafter. The VAS score with activity showed a different progression curve: it improved significantly from 68 ± 16 preoperatively to 35 ± 16 at 1 month after surgery and to 23 ± 12 at 2 months after surgery. The VAS score with activity remained at 19 ± 12 at 3 months after operation and continued to improve until 24 months after surgery. It eventually fell below 10 mm between 6 and 12 months after surgery. The mean grip strength improved significantly from 66.1% preoperatively to 88.7% at 2 months after surgery. At 12 months after surgery, the mean grip strength was restored to 98.5% compared with the contralateral side. The mean JOA score improved significantly from 38 points preoperatively to 61 points at 1 month after surgery, and to 72 points at 2 months. The mean DASH score improved significantly from 32 points preoperatively to 15 points at 3 months after surgery (Fig. 1).

Sixteen of the patients engaged in light occupations (eg, housewives or desk workers), and 6 engaged in heavy or repetitive occupations (eg, nurses or removalists). Those engaged in light work were able to go back to work after a mean period of 5.5 ± 2.8 weeks (range, 2-10 weeks), whereas those engaged in heavy work were able to go back to work after a mean period of 8.2 ± 3.3 weeks (range, 3-12 weeks). The difference in time to resumption of employment between the 2 groups was not significant (P = .25). One patient was unable to return to the same work at a warehouse. The 8 patients who played sports, such as baseball, golf, volleyball, and badminton, were able to return to their previous level of participation. The mean time to return was 8.6 weeks (range, 4-16 weeks). The patient satisfaction assessment showed 22 of the 23 patients (95.7%) felt very good or good about the operation, with

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<th>Table I</th>
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D, dominant side; ECRB, extensor carpi radialis brevis; F, female; M, male; N, nondominant side.

* Classification of the ECRB origin according to Baker et al.4

† Classification of the radiocapitellar synovial plica according to Mullett et al.18

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* Classification of the ECRB origin according to Baker et al.4

† Classification of the radiocapitellar synovial plica according to Mullett et al.18

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only 1 patient indicating there had been no change because he could not return to his previous work.

**Discussion**

Our analysis of the time required for pain relief and functional recovery after arthroscopic treatment for lateral epicondylitis showed the mean VAS pain score, grip strength, JOA score, and DASH score improved significantly as early as 3 months after surgery. The average time taken off work or sports after surgery was 8.6 weeks, and 21 of 22 patients (95%) returned to their previous work or activity. However, the mean VAS pain score with activity at 3 months after surgery remained at 19, and it took 6 to 12 months for it to fall below 10. Patients should be informed that the complete relief and stabilization of pain with activity takes longer than does that of pain at rest.

The literature indicates favorable results for arthroscopic surgery for lateral epicondylitis, with 94% to 100% of patients reported to be satisfied with the operative results. Accelerated rehabilitation, together with early return to work and sports activity after arthroscopic surgery, has also been reported. Peart et al reported that patients treated with an arthroscopic procedure returned to work earlier than patients treated with open procedure. Baker et al, Owen et al, Szabo et al, and Lattermann et al reported a mean time to return to work of between 6 days and 3.8 weeks. Grewal et al reported that the average time taken off work after surgery was 19 weeks. Overall, the operative results and time to return to previous activity in this cohort were comparable to those of previous studies.

Regarding relief of pain, the VAS pain score at the final follow-up has previously been reported to be good. Owen et al reported that the average VAS pain score (range, 0-10, with 10 being the worst pain) at rest was 0.58, and that pain during activities of daily living was 1.58 for an average of 24 months after arthroscopic treatment. Baker et al reported the operative results for 30 patients at an average of 130 months. The mean pain score was 0 at rest, 1.0 with activity, and 1.9 during work and sports. However, none of these studies described the process of pain relief after surgery. Nirschl and Pettrone reported that the resection of scar tissue, characterized by disorganized collagen, immature fibroblasts, and vascular elements, facilitates neovascularization and creates a healthy scar. However, they did not mention when this kind of change occurs.

Our data revealed that the mean VAS with activity remained at more than 20, and the mean grip strength remained at less than 90% compared with the contralateral side at 2 months after surgery. Haahr and Andersen reported that poor prognosis at 1 year of follow-up for lateral epicondylitis was related to manual work, high pain score, and the dominant arm. Andersen et al reported that only 31% of employees with pain in the forearm evaluated at a VAS score of more than 30 could return to work.
completely. In our results, the mean DASH score at 3 months after surgery was $15 \pm 8$ points, which is higher than that of the healthy employed adults score reported by Jester et al. $16$

Early return to work may need to carefully managed, even if the arthroscopic treatment is minimally invasive.

We recognize that this study has several limitations. First, there were no control groups, so the study provides only level IV evidence. Second, we did not investigate the influence of the actual situation with regard to reinstatement and the recovery process after surgery. Despite these limitations, this series is the first to report the recovery process after arthroscopic treatment for lateral epicondylitis from the very early postoperative period to the long-term one. This information may aid surgeons in selecting a reasonable period of reinstatement after arthroscopic treatments.

Conclusions

We observed significant improvements in pain and functional recovery within 3 months after arthroscopic surgery for lateral epicondylitis. However, the VAS score during activity only fell below 10 mm more than 6 months after surgery. Therefore, we should pay particular attention to patients who want to return to heavy work as soon as possible.

Disclaimer

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References


