



Extensor tendon and fascia sectioning of extensors at the musculotendinous unit in lateral epicondylitis

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Different surgical techniques exist to treat lateral epicondylitis. In most techniques, release of the common extensor origin is performed adjacent to the humeral epicondyle. The purpose of the present study was to assess the outcome of transverse sectioning of the intermuscular septum and the aponeuroses of the extensor carpi radialis brevis and extensor digitorum communis, 3 to 5 cm distally to the radial epicondyle. Forty-nine elbows were operated on in 44 patients. Subjective results were obtained after a mean follow-up of 33 months. Mean age of patients was 44 years. Mean disabilities of arm, shoulder and hand score was 6, mean visual analogue scale score for pain was 1 and for satisfaction 9. The result was excellent in 26, good in 15 and poor in 8 elbows following Spencer and Herndon. Mean absence from work was 40 days. We conclude that tendon release in the musculotendinous unit can be used to treat lateral epicondylitis.

Keywords : tennis elbow ; lateral epicondylitis ; tenotomy.

humerus, caused by a failure in the mechanism of tendon healing (15). The main tendon involved is the tendon of extensor carpi radialis brevis (ECRB), but the extensor digitorum communis (EDC) insertion also plays a role (6). Usually these muscles have a common tendinous origin (8).

Lateral epicondylitis is more frequent in patients in the fifth decade of life ; in the majority of patients the dominant side is involved (18). In more than 90% of patients with tennis elbow, symptoms disappear with time or conservative treatment is effective (19). When non-operative treatment fails and the condition is disabling, an operation can be performed. In most techniques the common extensor origin is incised adjacent to the lateral epicondyle. A simple open (5), percutaneous (1,12) or arthroscopic release (9,22) of the common extensor origin can be done. During open surgery, procedures can be added including excision or debridement of abnormal looking ECRB tendon, resection of a synovial fringe, incision of the orbicular ligament and

INTRODUCTION

Numerous surgical techniques have been described to treat lateral epicondylitis. This can be explained by the fact that several aetiologies for tennis elbow have been proposed including extensor tendon pathology, nerve compression and intra-articular abnormalities of the elbow joint (18). A commonly accepted theory is that tennis elbow is a tendinosis of muscles inserting at the lateral epicondyle of the

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drilling or decortication of the bone of the lateral epicondyle (2,3,19). Some surgeons have also performed a release of the posterior interosseous nerve (20).

Pain relief has been achieved not only by proximal release of the common tendon of ECRB and EDC, but also by tendon lengthening of the ECRB at the level of the distal forearm (7). In 1953, Spencer and Herndon described a technique in which the deep fascia of the common extensor muscles and the intermuscular septum were divided in a transverse manner 1 cm distal to the lateral epicondyle (24). In the present study, the transverse section was performed more distally, viz. 3 to 5 cm distally from the epicondyle in the musculotendinous unit. Advantages of this technique are its simplicity, the elbow joint is not entered and the incision is not directly over the lateral epicondyle where skin atrophy can be present after repeated corticoid injections. The aim of the present study was to determine the subjective outcomes, complications and time off work with this procedure.

PATIENTS AND METHODS

Forty-nine patients were operated on for lateral epicondylitis in our hospital between 2006 and 2010. Five patients had a bilateral operation. Mean age of the patients was 44 years (range : 32-60 years). Twenty-three elbows were operated on in men and 31 in women. In 5 patients a procedure for lateral and medial epicondylitis was combined. Patients who were previously operated on for tennis elbow on the same arm were excluded from the study.

Surgery was performed after failure of conservative treatment. Diagnosis of lateral epicondylitis was based on clinical examination, plain radiographs and ultrasound. The procedure was performed under general anaesthesia and tourniquet. Patients were placed supine with their arm on a side table. A 3 to 4 cm longitudinal skin incision started 2 to 3 cm distal to the lateral epicondyle. A transverse incision was made in the superficial fascia, the intermuscular septum and the tendons of the ECRB and EDC. Care was taken not to divide muscle fibres. The skin was closed with intradermal or separate sutures after release of the tourniquet and haemostasis. Duration of surgery ranged between 15 and 20 minutes. Postoperatively, patients were treated with a non-compressive bandage. They were encouraged to mobilise the

hand and elbow as soon as tolerated. All operations were performed in the one day clinic.

All patients were operated on by the same surgeon. Results were assessed by the first author who was not involved in the surgery. A questionnaire was sent to the patients with the Disability of Arm, Shoulder and Hand (DASH) score (10) and visual analogue scale (VAS) for pain and satisfaction. VAS scales range between 0 and 10. For pain a score of 0 indicates no pain and 10 unbearable pain. A VAS score for satisfaction of 0 means extremely dissatisfied and 10 extremely satisfied. Patients who did not answer the questionnaire were contacted by telephone.

To be able to compare our results with those presented in the paper of Spencer and Herndon, we categorized patients into three groups. Those with excellent results had complete pain relief. Patients with a good result were better, but they sometimes felt some residual pain ; in patients with poor results, the symptoms were persistent, inadequately relieved or recurrent (24).

The medical files were studied to find information about complications, professional activities and the time patients needed to return to work.

Statistical analysis was done with the Kruskal Wallis test to find a difference in time off work in relation to the type of work and to look for a difference in age between patients with an excellent, good and poor result.

RESULTS

Twenty-five out of 49 patients returned their questionnaires by mail. Patients who had not replied were contacted by telephone. Five patients were lost to follow-up. In two patients DASH and VAS scores were not obtained but they declared that their pain had remained unchanged after the operation. In one of these 2 patients – a 36-year-old woman – the pain was caused by an articular problem. The other patient – a 32-year-old woman – had been unable to resume her work as a labourer in a car factory. In a 47-year-old fork lift driver VAS and DASH scores were not included, because 4 months postoperatively he had been re-operated on the elbow because of persistent pain. A proximal release of the common extensor origin was performed with a good result.

VAS and DASH scores were obtained from 46 elbows of 41 patients. Mean DASH score was 6 (range : 0-41). Mean VAS score for pain was : 1

(range : 0-8) and mean VAS score for satisfaction was 9 (range : 2-10).

Forty-nine elbows of 44 patients (20 men and 29 women) could be categorized according to Spencer and Herndon. Mean age at the time of surgery was 44 years (range : 32-60 years). Mean follow-up time was 33 months (range : 12-66 months). According to the scoring system of Spencer and Herndon, excellent results were obtained in 26 elbows (54%), good in 15 (31%) and poor in 8 (16%). No correlation was noted between age and result quality ($p = 0.34$) : the mean age in excellent results was 45, in good results 43 and 42 in poor results.

Seventy-three percent of elbows were operated on the dominant side. Ten elbows (20%) were operated on in patients who did light work (desk jobs), 16 elbows (33%) in patients who had medium heavy jobs (nurse, crane driver, fork lift driver, postman, policeman, waiter, patient transport, housewife, train driver and shop keeper), 20 elbows (41%) in patients who did heavy labour and 2 elbows in patients who did not work (4%) ; information on the occupation of one patient could not be found. Mean time off work was 40 days (range : 3-153 days). This information was obtained for 39 elbows. Two patients had been unable to resume their occupation at the time of follow-up. They were not included to determine mean time to return to work. Mean time off work for light jobs was 31 days, for medium heavy work 38 and for heavy labour 41 days. The difference was not significant ($p = 0.34$).

Two complications were reported : one patient had a haematoma, and a surgical procedure was required to evacuate it. Another patient had a superficial wound infection, which healed without further treatment. As previously reported, there was one failure in a patient who needed a reoperation and of the 8 cases with a poor result, one was related to an articular problem.

DISCUSSION

Good outcomes have been reported in literature after surgical treatment of tennis elbow with open, percutaneous and arthroscopic techniques. In a review by Karkhanis *et al*, mean success rate for open surgery (80%) was lower than for percutaneous

(90%) or endoscopic methods (96%), however, no real evidence could be found that one technique was superior because of flaws in methodology (11). In a review by Buchbinder *et al*, there was even insufficient evidence to support or refute the effectiveness of surgery for tennis elbow (4).

Lateral epicondylitis is a benign and usually self limiting condition, and a successful result can be obtained with most procedures. Therefore, a non-aggressive surgical technique with minimal risk of complications should be chosen. Since tendinopathy is the most commonly accepted aetiology of tennis elbow, it is not necessary to open the elbow joint when treating tennis elbow. Open release with arthrotomy may lengthen the duration of recovery and may increase the risk for complications. With arthroscopic techniques articular problems can be assessed and a faster return to work has been reported, but special skills and equipment are required (25). It is probably unnecessary to add procedures on the bone. With open surgery, patients had more pain, stiffness and wound bleeding with drilling of the bone than without this procedure (13). Arthroscopic release with decortication caused more pain postoperatively and did not improve results compared with endoscopic treatment without decortication (14). There is also no evidence that release of the posterior interosseous nerve in addition to lengthening of the ECRB tendon improves the result (17).

Garden performed a distal lengthening of the extensor carpi radialis brevis tendon at the wrist to avoid "a direct attack" on the elbow (7). In a retrospective study with 17 patients, 78% excellent and good results were reported with this procedure (16). In a prospective, randomised study comparing the technique of Garden with or without decompression of the posterior interosseous nerve, overall success rate was only 60% after a mean follow-up of 31 months (17). The lower success rate may be explained by the fact that only the ECRB tendon is lengthened and the EDC tendon is left untouched with the Garden procedure.

Several variations in technique exist to perform a transverse section of the deep fascia of the ECRB and EDC. Spencer and Herndon performed a transverse fasciotomy 1 cm distal to the radial epicondyle. They obtained 96% good or excellent results

in 23 patients (24). Posch *et al* reported 86% good and excellent results with the same technique in 35 patients (21). Pannier and Masquelet proposed a more distal double transverse fasciotomy of the deep fascia of the ECRB and EDC. Their approach also permitted release of the posterior interosseous nerve by sectioning the arcade of Fröhse and the fascia of the superficial head of the supinator. Sixteen patients were operated on and good and excellent results were reported in 78% of cases (20). Wang *et al* described fractional lengthening of ECRB and EDC combined with fasciotomy of the superficial head of the supinator. They reported 82% excellent and good results for 21 elbows in 17 patients (27).

In the present study a tendon release of the ECRB and EDC in the musculotendinous unit was performed 3 to 5 cm distally to the lateral epicondyle. Good and excellent results were obtained in 84%. This success rate is similar to most other open procedures reported in the literature (11). Advantages of this technique include a short operation time, a simple procedure; the elbow joint is not opened, tendon lengthening can be achieved without repair, the elbow can be mobilized immediately postoperatively and the skin incision is not directly over the bone of the lateral epicondyle, which is an area with little soft-tissue cover, especially in thin people or in case of atrophy caused by repeat steroid injections.

In the present study, 8 patients had poor results, or a failure rate of 16%. One poor result was related to an articular problem. In another patient a revision procedure was needed. We had two complications (4%), one infection and one haematoma that required an operation. In a review of Karkhanis *et al*, mean failure rate for open procedures was 11% and mean complication rate was 11%. For the percutaneous technique mean failure rate was 9% and mean complication rate 6% and for the endoscopic technique there was a failure rate of 8% and no complications were reported (11).

Factors influencing outcome of open release were investigated in a series of 77 patients. Female gender and young age were weak predictors of poor outcome (23). In the present study results were not worse in patients doing heavy labour. Mean age of patients with poor results (42 years) was lower than

with excellent results (45 years), but the difference was not significant.

In the present study mean time to return to work was almost 7 weeks. There was no significant difference between patients performing light or heavy work. This may indicate that return to work is influenced by other factors such as work compensation. In some studies, mean time to return to work was longer than 7 weeks. The mean time off work was 3 months after double fasciotomy of the ECRB and EDC with release of the interosseous posterior nerve (20). After percutaneous release of the common extensor origin under local anaesthesia, 18% of patients could return to their work at six weeks and 52% returned to their occupation between 6 and 12 weeks (26). Mean time to return to work was only 4 weeks with the Garden procedure (16). In the review of Karkhanis *et al*, mean time to return to work for open procedures was 7 weeks and for the endoscopic technique it was only 10 days (11).

Limitations of the present study are that it is retrospective, that preoperative DASH and VAS scores are not available and that no clinical examination has been performed.

Overall, transverse sectioning of the ECRB and EDC tendons in the musculotendinous unit was effective to treat lateral epicondylitis. Success rate and mean time of work were similar to other open procedures. Main advantage of the present technique was its simplicity. Shorter periods off work have been reported with endoscopic techniques, but this still has to be confirmed by prospective randomised trials.

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