

Tennis elbow—outcome following the Garden procedure: A retrospective study

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ABSTRACT

Purpose. From 1993 to 1999, 17 patients (18 elbows) underwent the Garden procedure for clinically diagnosed tennis elbow. Non-operative treatment was ineffective for these patients.

Methods. The study group consisted of 10 men and 7 women, with a mean age of 49.6 years. Follow-up duration ranged from 18 months to 6 years, with a mean of 37 months. Patients' pain, activity level, and hand grip strength were evaluated postoperatively.

Results. 14 (77.8%) elbows had an excellent or good result, 2 elbows had a fair result, and another 2 elbows had a poor result and required revision surgery. Most patients had immediate relief of elbow pain, returned to work early, and did not notice any weakness of hand grip strength or radial wrist extension. There were no significant complications.

Conclusion. The Garden procedure produced good

results for tennis elbow with minimal morbidity in an unselected group of patients. This retrospective study supports the view that the underlying lesion in tennis elbow is in the origin of extensor carpi radialis brevis.

Key words: tennis elbow; treatment outcome

INTRODUCTION

Controversy exists regarding the pathophysiology of lateral epicondylitis, a common orthopaedic condition. Periostitis, fibrositis, radial nerve entrapment, bursitis, extensor tears, infection, an intra-articular abnormality, and orbicular ligament inflammation have all been suggested as causes. Lateral epicondylitis or 'tennis elbow' is now viewed by many as a distinct entity, identified primarily by the clinical symptoms of epicondylar tenderness, pain on resisted

wrist extension, and the absence of other pathology.^{1,2} Runge³ was the first to describe tennis elbow in the literature in 1873. The term tennis elbow is actually a misnomer because the condition is commonly seen in non-tennis players.

Tennis elbow is usually regarded as a minor ailment and is known to be a self-limiting condition. It is an affliction of the middle-aged and occurs in the productive, working years. Symptoms are usually mild, but occasionally there is significant disability.^{4,5} Conservative treatment is usually successful and the frequency of operative intervention is relatively low.^{4,5} Many differing operative techniques for treatment have been described.

Two studies have supported the view that the underlying lesion is in the origin of the extensor carpi radialis brevis (ECRB).^{2,4} Garden² asserted that the pain of a tennis elbow results from a periosteal tear at the origin of ECRB, and that stress could be readily relieved by a relatively simple operation designed to lengthen the tendon of ECRB. He reported his experience of 50 patients. All had immediate pain relief after this operation, with no extensor weakness and a rapid return of full function. A later study by Carroll and Jorgensen⁶ evaluated the Garden procedure for tennis elbow and reported that the success rate was only 20% in a small series of 16 patients. The current study was undertaken to further evaluate the treatment outcome following the Garden procedure for tennis elbow.

MATERIALS AND METHODS

All patients treated for tennis elbow with the Garden procedure at our institution from January 1993 to January 1999 were considered for this retrospective review. A total of 17 patients (18 elbows) met the inclusion criteria: pain on the lateral side of the elbow, tenderness at the elbow over the ECRB origin, and pain at the lateral epicondyle during resisted dorsiflexion of the wrist with the elbow in full extension. Other causes of elbow pain were excluded by clinical examination.

A total of 10 men and 7 women, aged from 34 to 68 years (mean, 49.6 years), underwent surgery on 11 right elbows (9 dominant side) and 7 left elbows (3 dominant side). All patients had had pain that was severe enough to interfere with activities of daily living and work for more than 12 months, despite non-operative treatment which included analgesics, physiotherapy, elbow supports, and local steroid injections. Duration of symptoms varied from 12 months to 60 months (mean, 19.7 months). Of the 17

patients, 8 described their occupation as involving strenuous manual labour, 5 as involving moderately strenuous work, and 4 as involving light labour.

A senior surgeon performed all the operations, and the procedure was done in the manner described by Garden.² A small incision was made over the dorsal lateral aspect of the forearm just proximal to the muscle bellies of extensor pollicis brevis and abductor pollicis longus. The incision was made to show the flattened tendon of extensor carpi radialis longus, which was retracted to show the ECRB tendon lying adjacent to it. The tendon of the ECRB was divided by a step-cut, and lengthened by approximately 1 cm. The ends were sutured with absorbable sutures. Postoperatively, patients were allowed to use the hand within pain limits, and to return to work and sporting activities as and when they felt able. Patients were reviewed at 2 and 6 weeks postoperatively and discharged when satisfied with the surgical outcome. No physiotherapy, exercise regimen, or splint was given postoperatively.

Patients were reviewed in a separate clinic by a physiotherapist. Review consisted of pain assessment, grip strength evaluation, anthropometric measurement, and activity evaluation. The physiotherapist measured the grip strength of both hands using a Jamar hand dynamometer (Jamar, Camp, UK). Measurements were made with the elbow fully extended and with it flexed to 90 degrees. The mean of the 2 measurements was recorded as the grip strength. The strength of the ECRB was also assessed using spring balance measurement of radial wrist extension. A questionnaire was used to obtain information regarding ability to resume daily activities, occupational activities, and sports.

The overall outcome of treatment was rated using the grading system developed by Verhaar et al.⁷ The result was considered excellent if the pain at the lateral epicondyle had been relieved completely; the patient was satisfied with the result; there was no subjective loss of grip strength; and resisted dorsiflexion of the wrist caused no pain. A good result meant that there was occasional, slight pain at the lateral epicondyle after strenuous activities; the patient was satisfied with the result; there was no loss or a slight subjective loss of grip strength; and resisted dorsiflexion of the wrist caused no pain. The result was considered fair if there was discomfort at the lateral epicondyle after strenuous activities but it was more tolerable than it had been before the operation; the patient was satisfied or moderately satisfied with the result; there was slight or moderate subjective loss of grip strength; and resisted dorsiflexion of the wrist caused slight or moderate pain. A poor rating was given if the

Table
Occurrence of pain in elbows undergoing the Garden procedure for lateral epicondylitis (n=18)

	No. of elbows	
	Before surgery	After surgery
No pain	0	12
Pain on use	18	4 (on heavy manual work; occasionally) 2 (on light work; often)
Pain at rest	14	0
Pain at night	12	0

pain at the lateral epicondyle had not decreased; the patient was dissatisfied with the result; there was severe subjective loss of grip strength; and resisted dorsiflexion of the wrist caused severe pain.

RESULTS

All 17 patients were reviewed in July 2000. The follow-up period ranged from 18 months to 6 years, with a mean of 37 months. In terms of treatment outcome, 8 patients had an excellent result and 5 patients had a good result. One patient had an excellent result in one elbow and fair in the other after bilateral elbow surgery. One patient had a fair result who had pain on grip and felt the hand weak. Two patients had a poor result and needed revision surgery.

Pain

Pain relief was noted in the first 2 postoperative weeks by all patients. At the final follow-up review, 12 elbows were painless, 4 elbows had mild pain occasionally on heavy manual work, and 2 elbows had persistent symptomatic lateral epicondylitis, which worsened with time (Table).

Tenderness

Of the 14 elbows with a good to excellent clinical result, no tenderness was noted on clinical examination, and the Cozen test was negative.

Grip strength

The mean grip strength on the operated side was 29 kg with the elbow in flexion and 28 kg with the elbow in extension. Grip strength for the non-operated side was measured as 31 kg with the elbow in flexion and 30 kg with the elbow in extension. Taking hand

dominance into account, there was no statistically significant difference in grip strength or the strength of wrist extension in radial deviation, compared to the non-operated side, in unilateral cases.

Activity evaluation

All patients returned to their work during the follow-up period. The mean period until return to work was 4 weeks, with 11 (65%) patients returning to work in less than 4 weeks postoperatively. Seven patients who were previously active in sports were also able to return to their sporting activities.

Range of motion

Full and painless range of motion was achieved in both the elbow and wrist joints in all patients.

Complications

One patient had a superficial wound infection, which was treated successfully with a short course of antibiotics. One patient had paraesthesia in the distribution of the superficial branch of the radial nerve on the operated side. Another patient suffered mild wrist pain after heavy work, which resolved completely 3 months after surgery. Two patients complained of mild hand weakness, which was not evident on dynamometric or spring balance measurements.

DISCUSSION

Operative treatment is seldom necessary for tennis elbow, and accordingly, we have operated on only 17 patients using the Garden procedure over a period of 6 years. The advantages of this operation are the simplicity of the procedure itself, the short postoperative recovery period, and minimal subsequent disability. These advantages are particularly important for the working person who has to continue to work despite a painful elbow. This study found encouraging results and a low rate of complications after the Garden procedure.

Verhaar et al.⁷ reported a loss of grip strength in 34% of patients at one year, and 18% of patients at 5 years after lateral release of the common extensor origin, in a prospective long-term follow-up study. Despite lengthening of the ECRB, we did not observe any objective loss of grip strength or strength of wrist extension in radial deviation, compared to the non-operated side. Friden and Lieber⁸ measured ECRB

sarcomere length intra-operatively before and after lengthening of its tendon. They found both a 25% decrease in muscle passive tension and a 25% increase in active muscle force. These findings refute the notion that tendon lengthening necessarily results in muscle weakness, and are in keeping with our good clinical results following the Garden procedure.

Verhaar et al.⁷ also reported that 23% of their patient group had pain on resisted dorsiflexion of the wrist and 40% had tenderness over the lateral epicondyle at 5-year follow-up. Most of the patients required 6 to 12 weeks for adequate, not necessarily complete recovery. Only 18% of patients had returned to their original work at 6 weeks postoperatively. Nirschl and Pettrone⁴ in their series of 82 patients found that the mean period for complete pain relief was 2.6 months (range, 8 days–12 months) after surgical treatment of tennis elbow. In our study, the patients who had good or excellent results had immediate pain relief (within 2 weeks postoperatively) and could return to work early, without any need for immobilisation or physiotherapy.

Treatment outcome in our study appears superior to results reported after complete release of the common extensor tendon,^{5,9} after resection of the orbicular ligament,¹⁰ and by Nirschl and Pettrone⁴ following excision and repair of the pathologic lesion in the origin of ECRB. So far, the literature has not indicated which operative technique for tennis elbow is superior to others, with most studies demonstrating a success rate of more than 80 percent.^{3,5} Given that all operations appear equally effective, a technique that is associated with low morbidity and a short recovery period should be selected.

CONCLUSION

The Garden procedure is a relatively simple procedure, giving good results for patients with chronic tennis elbow, with low morbidity and early recovery. Further, this study adds support to the view that the underlying lesion in tennis elbow is in the origin of ECRB.

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