

Simple lateral release in treatment of tennis elbow¹

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Summary: The records of 340 patients with a clinical diagnosis of tennis elbow were surveyed and the results of conservative treatment assessed. Of 157 patients successfully treated by local steroid injections, 92% achieved their good result after one or two injections. Repeated injections were not helpful. Simple lateral release of the common extensor origin was carried out on 42 elbows in 37 patients. Thirty-seven elbows in 32 patients were personally reviewed. Satisfactory pain relief was achieved in 33 elbows (89%). There were no significant complications.

Introduction

Tennis elbow is a common condition in orthopaedic practice. The pathology is poorly understood and most structures on the lateral side of the elbow have been implicated. Cyriax (1936) listed no less than 26 aetiologies from the literature, but subscribed to what is probably the most widely held theory—that there is an inflammatory reaction in the common extensor origin. Nirschl & Pettrone (1979) and Garden (1961) located the lesion more specifically in the extensor carpi radialis brevis. The orbicular ligament and the synovium were blamed by Bosworth (1955, 1965). Newman & Goodfellow (1975) noted chondromalacia of the radial head in some patients. Roles & Maudsley (1972) proposed that the symptoms might be caused by a radial nerve entrapment. Van Rossum *et al.* (1978) produced evidence to oppose that view, and Heyse-Moore (1984) suggested that decompression of the radial nerve might also be releasing tension on the common extensor origin. Because the pathology has not been clarified, tennis elbow is a clinical syndrome identified primarily by the physical signs of epicondylar tenderness, pain on resisted wrist extension, referred pain when gripping and an absence of any other pathology.

Initial treatment is always conservative, but there remains the problem of deciding when such treatment has failed and, if it has, which of the various operations should be selected. This paper reports the overall experience at the Royal National Orthopaedic Hospital and, in particular, the results of simple lateral release both at that hospital and at Northwick Park.

Methods

Between 1972 and 1982, 340 patients with a clinical diagnosis of tennis elbow were seen at the Royal National Orthopaedic Hospital: 299 (88%) had conservative treatment alone and 41 (12%) some form of operation. In the conservative group there were 155 men and 144 women with an average age of 44.5 years and an average length of history of 9.9 months.

The 41 patients who were treated by operation had a variety of procedures, listed in Table 1. Thirty-one had had a simple lateral release. Because we were particularly interested to assess the results of a single procedure, the others were excluded and to these 31 were added a further 11 elbows which had been treated by the same procedure during the same period at Northwick Park Hospital, making a total of 42 elbows in 37 patients. Thirty-seven elbows in 32 patients were available for review; these comprise the operative group. There were 16 males and 16 females, with an average age of 43.7 years. The length of history prior to operation averaged 2

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Table 1. Operations for tennis elbow at Royal National Orthopaedic Hospital (1972-1982)

Simple release of the common extensor origin	31
Release of the common extensor origin <i>plus</i>	
Excision of part of the orbicular ligament	5
Excision of bursa and synovial fringe	1
Excision of a strip of lateral ligament and capsule	1
Lateral arthrotomy and excision of synovial fringe	1
Excision synovial fringe and shaving radial head	1
Incision of the lateral ligament and excision of part of the orbicular ligament	1

Table 2. Incidence of pain in 37 elbows treated by simple release

	Preoperative	Postoperative
No pain	0	21
Pain on use	37	16
Pain at rest	20	1
Pain at night	25	1

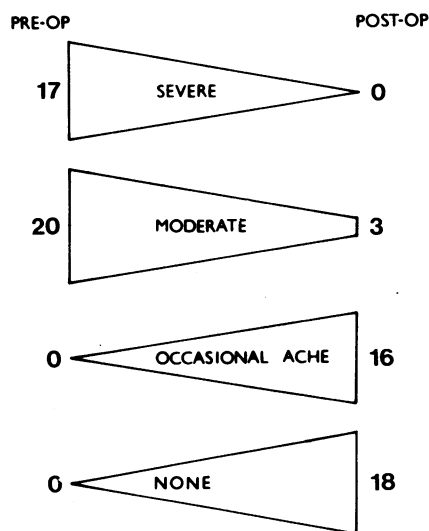


Figure 1. Severity of pain before and after operation for 37 elbows treated by simple lateral release

years. The dominant hand was involved in 27 (84%). All had been treated prior to operation by various conservative methods; these included local steroid injections, physiotherapy, non-steroidal anti-inflammatory analgesics and plaster immobilization.

The operation consisted of division of the common extensor origin adjacent to the lateral epicondyle. The extensor carpi radialis longus was separated from the common extensor origin but was not divided. The remainder of the extensor muscle mass, consisting of extensor carpi radialis brevis, extensor digitorum communis and extensor digiti minimus, was divided close to its origin from the lateral epicondyle. This extensor muscle mass was allowed to retract. The radial collateral ligament and capsule of the elbow joint were exposed but not divided, and no part of the orbicular ligament was excised. The skin and subcutaneous tissues only were sutured. Postoperative care consisted of dressings and a sling until the wound had healed in 30 elbows. Seven elbows were immobilized in plaster for 2-3 weeks.

The patients were seen, examined and X-rayed at an average of 6 years and 2 months after their operation. They were asked about pain relief, their ability to return to work and sport and whether they were satisfied or dissatisfied with the result of their operation. The range of movement of each elbow was recorded. The grip strength of each hand was measured using a Nomeq vigorimeter. Standardized anteroposterior and lateral radiographs of the affected elbow were taken.

Results

Conservative treatment

The symptoms had resolved spontaneously in 35 patients (10%) by the time they presented to the outpatient department; a further 168 patients (49%) were known to be free of symptoms after a period of conservative treatment. Fifty-two patients attended on only one occasion and therefore it is impossible to be certain about the outcome: 14 (4%) had such mild symptoms that they were given advice on how to avoid exacerbating factors; the other 38 (11%) were given a single local injection of steroid and told to come back if their symptoms had not resolved, but none returned. Fourteen patients (4%) defaulted with the result unknown. Residual symptoms, present in 71 patients, were considered sufficient to warrant operation in 41 (12%).

A total of 157 patients were successfully treated with local steroid injections. In this group 112 required one injection, 32 needed two, 9 had three and only 4 patients had more than three injections.

Simple lateral release

Pain: The severity of the pain was assessed in four grades: severe, moderate, occasional and no pain. All elbows were either severely or moderately painful preoperatively and all except 3 were either pain-free or had an occasional ache at follow up (Figure 1). A further attempt was made to assess the severity of the pain by determining whether it was present with use, at rest or at night. When seen for review one elbow caused night and rest pain; 16 were occasionally painful with prolonged use of the arm; and 21 elbows were painless (Table 2).

Range of movement: Preoperatively there were three elbows with fixed flexion deformities of 10°, 15° and 20°, but all other elbows had a full range of movement. At follow up one elbow had a fixed flexion deformity of 10° and one elbow had lost 15° of flexion, but the remainder had a full range of movement.

Return to work: Before operation 12 patients were unable to work because of their symptoms; all except 3 returned to work and 2 of those retired for reasons unrelated to their elbow. The mean time to return to work after operation was 4.3 weeks (range 1 day–12 weeks).

Sport: 13 of the 32 patients played regular sports before the onset of their tennis elbow. None were able to participate in their chosen sport before operation, but at review 9 had returned to playing regularly.

Grip strength: In the unilateral cases the mean grip strength in the operated arm was 12 psi and in the contralateral arm 11.8 psi. There was no statistical difference between these figures. A similar pattern was observed in the bilateral cases, with a slight increase in strength on the right side.

Subjective assessment: 33 elbows (89%) were assessed by the patients as being satisfactory and 4 (11%) as unsatisfactory.

Radiographs: In 12 elbows there was some local sclerosis or small calcific fragments at the lateral epicondyle. In none of these elbows was there evidence of any intra-articular degenerative change. The remaining elbows were normal.

Complication: The only complication of surgery was the development of a hypersensitive scar in one patient.

Discussion

The majority of patients with tennis elbow respond to conservative measures. In this series 12% of patients required operation. This is similar to the 11.5% reported by Coonrad & Hooper (1973), although higher than the 4.2% of Boyd & MacLeod (1973) or the 6.8% of Nirschl & Pettrone (1979). The somewhat higher percentage of patients in this series requiring operation may be explained by the fact that the Royal National Orthopaedic Hospital is a referral centre. Many patients will be successfully treated by conservative means either by their family practitioner or at other hospitals and a higher proportion of resistant cases will be referred to this hospital. This may also be reflected by the rather long length of history (9.9 months) at the time of presentation. The approximately equal sex ratio and the average age of 44.5 years is very similar to that found in previous studies (Nirschl & Pettrone 1979, Bosworth 1955, Coonrad & Hooper 1973, Spencer & Herndon 1973).

Operative treatment is only indicated after failure of adequate conservative measures. This is confirmed by the long period of preoperative symptoms reported by other authors (Nirschl & Pettrone 1979, Baumgard & Schwartz 1982, O'Neil *et al.* 1980, Rosen *et al.* 1980) and by the mean length of history of two years in the operated group in this series. It is interesting that in the 157 patients who responded well to local steroid injection, 144 (92%) achieved their result after one or two injections, whereas those patients who had a lateral release and, by definition, were failures of conservative treatment, had an average 4.7 injections per elbow. Coonrad & Hooper (1973) similarly found that in their conservatively treated patients the mean number

of injections was 2.8 whereas in their operated group it was 6. In other series the average number of injections per elbow in patients who eventually required operation ranged between 3.4 and 4.45 (Nirschl & Pettrone 1979, Baumgard & Schwartz 1982, Posch *et al.* 1978). If a response to hydrocortisone injection is going to occur then it will do so after one or two injections, and repeated injections thereafter are unlikely to be helpful.

The pathological lesion responsible for the clinical syndrome of tennis elbow has not been unequivocally identified. Nirschl has stated that the abnormality is in the origin of the extensor carpi radialis brevis and that the failure of others to demonstrate it can be attributed to its anatomical position underneath the extensor carpi radialis longus, which has to be retracted for proper visualization (Nirschl & Pettrone 1979, Nirschl 1977). Other authors are less certain, and almost every structure on the lateral side of the elbow has been implicated (Bosworth 1965, Newman & Goodfellow 1975, Roles & Maudsley 1972, Boyd & Macleod 1973). There is more agreement about the theory that tennis elbow is caused by overuse: this is supported by our finding that the dominant hand was involved in 84%, a figure which coincides with that of previous reports (Nirschl & Pettrone 1979, O'Neil *et al.* 1980).

In the operative management of resistant tennis elbow, Spencer & Herndon (1953) reported 96% good or excellent results following simple extensor fasciotomy or stripping, but the average length of preoperative symptoms was only 6.1 months and the average period of follow up 13.5 months. Since then two further studies have suggested good results of open lateral release, but in both there was a low proportion of the total number of patients for whom information was actually available (Rosen *et al.* 1980, Posch *et al.* 1978). In this study information was obtained for 88% of elbows and 83% were personally examined. Pain relief was significant and 89% of patients were satisfied with the result, although it often took some time before symptoms settled completely.

When a number of operations are described it is important, if all are equally effective, to select one with a low morbidity. O'Neil *et al.* (1980), in their review of a variety of operations, noted instability of the elbow when a varus stress was applied in 7 patients who had had the proximal third of the orbicular ligament excised. In the present series there were no major complications and no loss of grip strength. Baumgard & Schwartz (1982) have recently described a method of percutaneous lateral release with 91% excellent results and no complications.

Our study demonstrates that open lateral release for resistant tennis elbow produces good results with a low morbidity, and possibly should be employed at an earlier stage than is currently practised.

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References

- Baumgard S H & Schwartz D R (1982) *American Journal of Sports Medicine* **10**, 233–236
Bosworth D M (1955) *Journal of Bone and Joint Surgery* **37A**, 527–533
Bosworth D M (1965) *Journal of Bone and Joint Surgery* **47A**, 1533–1536
Boyd H B & Macleod A C (1973) *Journal of Bone and Joint Surgery* **55A**, 1183–1187
Coonrad R W & Hooper W R (1973) *Journal of Bone and Joint Surgery* **55A**, 1177–1182
Cyriax J H (1936) *Journal of Bone and Joint Surgery* **18**, 921–940
Garden R S (1961) *Journal of Bone and Joint Surgery* **43B**, 100–106
Heyse-Moore G H (1984) *Journal of Hand Surgery* **9B**, 64–66
Newman J H & Goodfellow J (1975) *Journal of Bone and Joint Surgery* **57B**, 115
Nirschl R P (1977) *Primary Care* **4**, 367–382
Nirschl R P & Pettrone F A (1979) *Journal of Bone and Joint Surgery* **61A**, 832–839
O'Neil J, Sarkar K & Unthoff H K (1980) *Acta orthopaedica Belgica* **46**, 189–196
Posch J N, Goldberg V M & Larrey R (1978) *Clinical Orthopaedics* **135**, 179–182
Roles N C & Maudsley R H (1972) *Journal of Bone and Joint Surgery* **54B**, 499–508
Rosen M J, Duffy P F, Miller E H & Kremchele E J (1980) *Ohio State Medical Journal* **76**, 103–109
Spencer G E & Herndon C H (1953) *Journal of Bone and Joint Surgery* **35A**, 421–424
Van Rossum J, Buruma, O J S, Kamphuisen H A C & Onvlee G J (1978) *Journal of Bone and Joint Surgery* **60B**, 197–198