Radial tunnel release

Unpredictable outcome in 37 consecutive cases with a 1–5 year follow-up

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37 consecutive patients with radial tunnel syndrome treated by decompression of the posterior interosseous nerve and application of a free fat transplant were retrospectively evaluated 3.5 (1–5) years postoperatively by an independent observer. Substantial pain relief was reported by 13 patients and 15 patients were satisfied with the outcome. 16 of 35 patients returned to their preoperative employment. There were complications in 12 cases, including two radial nerve pareses. Preoperative and operative findings did not correlate to the outcome. Judging from this study, the symptoms and signs used as diagnostic criteria for radial tunnel syndrome may be unreliable and the results of posterior interosseous nerve decompression unpredictable.

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Compression of the posterior interosseous nerve in the proximal forearm has been suggested as a cause of resistant lateral elbow and forearm pain (Capener 1966, Roles and Maudsley 1972, Hagert et al. 1977, Werner 1979) and has been estimated to be present in 5 percent of cases of the tennis elbow syndrome (Werner 1979). High success rates have been reported following surgical nerve decompression (Roles and Maudsley 1972, Hagert et al. 1977, Lister et al. 1979, Werner 1979, Moss and Switzer 1983). Our results after decompression have sometimes been less favorable and we therefore retrospectively evaluated 37 consecutive radial tunnel releases in patients diagnosed as having a radial tunnel syndrome.

Patients

37 forearms (bilateral in 1 patient) were operated in 19 women and 17 men, aged 43 (22–59) years. The dominant extremity was involved in 26 patients. Of the 35 patients with preoperative employment, 7 patients had light work, 6 had moderate work, and 22 had heavy work. Preoperatively, all patients reported lateral elbow and proximal-radial forearm pain with arm use, 27 reported pain at rest, and 17 had night pain. The mean duration of symptoms was 2.5 (0.5–10) years. A preceding blow to the elbow or proximal forearm was reported by 6 patients. On examination, all cases had maximum tenderness localized over the radial tunnel and 22 had tenderness over the lateral epicondyle. 31 cases felt pain during resisted supination and 12 during resisted middle finger extension. Pain-related weakness of the extensor carpi ulnaris was noted in 22 cases. No muscle paralysis was observed.

All patients had failed closed treatment, including nonsteroidal anti-inflammatory medication, local steroid injections, physical therapy, and splints. 2 patients had previously undergone radial tunnel decompression in the same forearm and 10 patients had undergone release of the common extensor muscle origin.

Methods

The operations were performed by four experienced orthopedic surgeons, one of whom did 24 of the procedures. Preoperative findings were documented according to the diagnostic criteria described by Werner (1979). General or intravenous regional anesthesia or axillary block was used. The posterior interosseous nerve was exposed through a posterior approach (Hagert et al. 1977, Werner 1979) and followed distally, releasing the fibrous edge of the extensor carpi radialis brevis and the proximal margin of the superficial head of the supinator (arcade of Frohse). A free fat transplant was placed over the nerve as described by Werner (1979). The skin was sutured and a soft dressing was applied. An immediate gradual return to activities was begun postoperatively.

Table 1. Previously published series of radial tunnel syndrome

Author	n	Results		Complications	EMG and nerve conduction studies
		Excellent-good	Fair-poor		
4	50	42	8	2 transient EDC pareses, 2 transient numbness	ND
5	13	10	3	ND	ND
6	111	57	54	ND	ND
7	20	19	1	3 hypertrophic scars	Abnormal in 4/6 cases
8	15	14	1	1 transient radial paresis, 1 transient paresthesia, 2 keloid scars	ND
9	35	25	10	None	EMG abnormalities in all cases, decrease of nerve conduction velocity in 25 cases
10	39	29	10	ND	Abnormal in 3/35 cases
11	38	35	3	ND	Abnormal in 8/10 cases
13	10	1	9	ND	Normal in all cases
14	90	73	17	Transient motor weakness in 6/15 reoperations	Slight EMG changes in 8/25 cases, some decrease of motor conduction velocity in 13/25 cases

ND no data. EDC extensor digitorum communis.

All patients were evaluated by an independent examiner by a review of patient charts and questionnaires answered by the patients. Mean follow-up was 3.5 (1–5) years. For statistical analysis Fischer's exact test was used.

Results

Findings at surgery were described as narrowing of the nerve in 18 patients, nerve hyperemia in 6, and a constricting arcade and/or constricting extensor carpi radialis brevis edge in 19. No abnormal findings were found in 6 patients.

Complications related to surgery were recorded in 12 cases. Partial radial paresis involving the extensor digitorum communis occurred in 2 patients. One patient had recovered completely after 8 months, while the second patient showed only partial recovery after 18 months. Transient diminished sensibility in the distribution of the radial nerve was reported in 3 patients. There were 3 postoperative hematomas, one of which had to be surgically evacuated. 4 patients developed hypertrophic scars.

At follow-up, 8 of 37 patients reported complete symptom relief and 5 a marked improvement. 17 cases reported little, if any, improvement, 3 stated that they became worse, and in 4 patients the symptoms recurred after 2–9 months of temporary improvement. In the 13 patients with complete relief or marked improvement, symptom relief was experienced immediately after the operation in 1 patient, within 1 month in 5, within 3 months in 2, within 6 months in 4 and after 6 months in 1 patient. In the 24 patients with substantial residual symptoms, 13 continued to have pain both when using the arm and at rest, 10 had pain with light work, and 1 had pain only with heavy work. The patient who was bilaterally operated on reported complete symptom relief in one arm and persistent symptoms in the other. In the two cases with prior ipsilateral radial tunnel release, marked symptom relief was reported by one and persistent symptoms by the other.

16 patients returned to their preoperative employment. 19 patients had to change to lighter employment or could not return to work due to persistent symptoms from the operated arm.

15 of 37 patients reported that they were satisfied with the results of surgery, 22 were not satisfied.

No correlation was found between symptom relief postoperatively and sex, dominance of the operated extremity, type of employment, history of prior trauma, previous operation for lateral epicondylitis, duration of symptoms, preoperative clinical findings, surgeon or operative findings.

Discussion

Several series of radial tunnel syndrome treated with nerve decompression report a success rate from 10 percent to over 90 percent (Table 1). The compressing structures commonly suggested have been the fibrous proximal margin of the superficial head of the supinator and the tendinous edge of the extensor carpi radialis brevis muscle.

The main clinical features considered as diagnostic criteria of the entrapment are local tenderness over the radial nerve about 5 cm distal to the lateral epicondyle and pain during resisted supination (Hagert et al. 1977, Werner 1979). Pain during resisted middle finger extension has been considered a pathognomonic sign of radial tunnel syndrome (Lister et al. 1979). Werner (1979), however, found the middle finger test not reliable. Pain at night has also been described as a characteristic feature (Hagert et al. 1977). EMG and nerve conduction studies have not been as useful in the diagnosis of radial tunnel syndrome as in other commoner compression neuropathies (Van Rossum et al. 1978, Werner 1979, Verhaar and Spaans 1991). Raimbeau et al. (1990) reported EMG abnormalities in all their 35 patients treated surgically and showed good results in 25 patients. Some authors have found an anesthetic block of the radial nerve to be of diagnostic help (Ritts et al. 1987, Eversmann 1993). Eaton and Lister (1992) believed that the difference in the reported success rates of surgery might reflect an inability to distinguish radial tunnel syndrome from lateral epicondylitis. Heyse-Moore (1984) suggested that surgical division of the fibrous arch of the supinator would relieve tension on the lateral epicondyle, allowing symptom relief independently of posterior interosseous nerve decompression. Ritts et al. (1987) suggested the presence of an interrelated clinicopathologic disease spectrum between radial tunnel syndrome and lateral epicondylitis.

Several surgical approaches to radial tunnel release have been described. Some authors recommend an anterior approach and complete division of the superficial head of the supinator (Eaton and Lister 1992, Eversmann 1993). Werner (1979) advised the placement of a free fat transplant over the decompressed nerve to prevent scar formation. He used this procedure in 25 primary operations and 15 reoperations and suggested that it may prevent recurrence.

In our study, only one third of the patients with a clinical diagnosis of radial tunnel syndrome reported complete or marked symptom relief after surgery. We and other authors believe that the symptoms and signs used as diagnostic criteria for radial tunnel syndrome (Lister et al. 1979, Werner 1979) are not reliable and that the results of nerve decompression are unpredictable.

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