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Experience in integral management of advanced carpal tunnel syndrome in an ambulatory surgical unit

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Abstract

Experience in the integral management of carpal tunnel syndrome over a period of 4 years is presented. All cases were treated at an ambulatory surgical unit. Among this series, special attention is payed to eight cases of severe advanced carpal tunnel syndrome. All cases presented in this study had at the time of evaluation at the ambulatory surgical unit, symptoms of severe pain, thenar atrophy, weakness and decreased sensation. The only treatment received by some patients in this series ($n = 7$), before admission at the ambulatory surgical unit, was conservative therapy, with splinting, anti-inflammatory drugs and corticosteroid infiltrations. In one case, the patient had rejected all therapeutic options and no therapy had been undertaken at the time of first clinical evaluation. Several surgical findings were found in five of the eight cases of severe carpal tunnel syndrome: Basal joint arthritis of the thumb in three patients; A ganglion in another case; A flexor tendon synovitis in another. The diagnostic procedures, the indications for surgery and the postoperative results kin such advanced carpal tunnel syndrome are analyzed and discussed.

Keywords: Severe carpal tunnel syndrome; Clinical findings; Surgical findings; Nerve conduction studies; Outpatient surgery

1. Introduction

Carpal tunnel syndrome is the most common compressive neuropathy of the upper extremity. Nonoperative treatment may relieve symptoms temporarily, but most patients require a surgical decompression [1]. In these cases the use of the integral management procedures in a 1-day regimen surgery, offers benefits both to patients and health care institutions [2].

The causes of carpal tunnel syndrome may be multifactorial. These may include coexisting metabolic disorders, systemic neuropathies, more proximal lesions of the median nerve, local inflammation, and several anatomic peculiarities. It is important to seek an underlying disease, for instance a generalized metabolic disorder, because its treatment could relieve the carpal tunnel syndrome without surgery. Conversely, misdiagnosing an associated condition may yield an unsatisfactory result of a transverse carpal ligament division [3].

Clinical and electromyographic improvement has been demonstrated for the average patient with carpal tunnel syndrome [4,5]. However, these study groups have been heterogeneous with respect to their severity. Once a patient has progressed to severe thenar atrophy, sensory loss, pain unobtainable median sensory-evoked response, and unobtainable or severely prolonged median motor distal latency, the prognosis for surgical decompression has been shown to be uncertain [6,7].

This report describes the results of preoperative and postoperative clinical examinations and nerve-conduction studies in eight patients with severe, advanced carpal tunnel syndrome. Other purpose of this report was to examine the coexistence of other clinical entities such as basal joint osteoarthritis of the thumb. This allows us to provide patients more information about their prognosis after surgical release of a severe compressing neuropathy.

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2. Material and methods

The patients were first evaluated in an outpatient setting, where the surgical and anaesthetic selection was made. Complete oral and written information was given about the particulars of the process. Informed consent was obtained, and the relevant preoperative tests carried out.

During a period of 4 years from January 1994 to December 1997, eight patients underwent carpal tunnel release for advanced carpal tunnel syndrome. The criteria for inclusion in this study were an unobtainable median sensory-evoked response and absent or prolonged median motor distal latency. These patients also had symptoms that included pain, diminished strength, and decreased sensation. There were six women and two men in the group. The average age was 64 years (range, 54–79 years).

The preoperative anaesthetic status was ASA II in seven patients and compensated ASA III in one patient.

The patients were questioned about symptoms of pain, diminished strength, and decreased sensation. These symptoms were graded as none = 0, moderate = 1, or severe = 2. Physical examination before and after surgery included Phalen's test, Tinnel's sign, static two-point discrimination, and assessment of thenar muscle atrophy (Table 1).

A timed Phalen's test was positive if paresthesia was present in the median nerve distribution in less than 60 s. A Tinnel's sign was positive if paresthesia was present in the median nerve distribution with percussion at the wrist. Thenar atrophy was graded as present or absent.

Brachial plexus block with axillary approach was the anaesthetic technique used for all cases.

Surgery was performed under ischaemia of the extremity and magnifying glasses (2.5 ×) were used.

All patients in the study underwent division of the transverse carpal ligament through a standard palmar incision. None of the patients had internal neurolysis. All patients were immobilized with plaster cast for 2 weeks postoperatively. The median follow-up was 15 months from surgery, with a range of 7–24 months.

The surgical findings were basal joint osteoarthritis in three cases, and the reconstructing procedure was thumb arthroplasty, and carpal tunnel release at the same time. One case of tenosynovitis due to rheumatoid arthritis needed flexor tendon tenosynovectomy, and ganglion extirpation was performed in another. In the remaining three cases without clear clinical findings, only a neurolysis procedure was undertaken (Table 2).

Nerve conduction studies were made before and after surgery in all patients. Preoperatively, all patients had an absence of median sensory-evoked response. Median motor distal latency was absent in one patient and prolonged in the rest. Before surgery, the possibility of an opposition transfer was discussed with patients but all of them rejected this procedure.

Table 1
Clinical findings–preoperative evaluation[a]

Patient/sex/age/hand	Evolution (months)	Thenar Atrophy	Pain	Weakness	Decreased sensation	Static two-point discrimination (mm)	Phallen	Tinnel
1/W/58/R	29	+	2	1	1	9	+	−
2/W/66/R	34	+	1	2	2	10	+	+
3/W/70/L	41	+	1	2	2	>15	+	+
4/M/68/L	30	+	1	1	1	10	+	+
5/W/54/R	14	+	2	1	1	8	+	+
6/W/79/L	46	+	1	3	2	>20	+	+
7/W/49/R	18	+	2	1	1	>10	+	+
8/M/69/L	32	+	1	2	2	>15	+	+

[a] Normal values of static two-point discrimination. Positive result if failure to discriminate points more than 6 mm apart [17].

Table 2
Surgery undertaken for carpal tunnel syndrome with intraroperative findings, and clinical follow-up

Patient/sex/age/hand	Surgery	Causes	Follow-up (months)
1/W/58/R	Neurolysis + thumb arthroplasty	Primary thumb osteoarthritis	8
2/W/66/R	Neurolysis + thumb	Primary thumb osteoarthritis	24
3/W/70/L	Neurolysis + tumor excision	Ganglion	18
4/M/68/L	Neurolysis	Not clear	7
5/W/54/R	Neurolysis + thumb arthroplasty	Primary thumb osteoarthritis	10
6/W/79/L	Neurolysis	Not clear	21
7/W/49/R	Neurolysis + flexor tenosinovectomy	Inflammatory systemic disease	15
8/M/69/L	Neurolysis	Not clear	16

Table 3
Clinical findings–postoperative evaluation[a]

Patient/sex/age/hand	Evolution (months)	Thenar atrophy	Pain	Weakness	Decreased sensation	Static two-point discrimination (mm)	Phalen	Tinnel
1/W/58/R	8	−	0	1	0	5	−	−
2/W/66/R	24	+	0	2	1	8	−	−
3/W/70/L	18	+	0	2	1	10	−	−
4/M/68/L	7	−	0	1	1	5	−	−
5/W/54/R	10	−	0	0	1	5	−	−
6/W/79/L	21	+	0	2	2	15	+	−
7/W/49/R	15	−	1	1	1	7	−	−
8/M/69/L	6	+	0	2	1	10	−	−

[a] Normal values of static two-point discrimination. Positive result if failure to discriminate points more than 6 mm apart [17].

There were no serious complications related to surgery, but hospital admission was necessary for two days in one case, because of nausea and vomiting related to anaesthesia.

Finally, patient satisfaction was assessed using the same questionnaire, that is standard in the patient surgical unit.

2.1. Clinical results

All patients improved after surgery. Only one had residual pain after surgery. Six of eight patients reported a decrease in their sense of weakness during daily activities (Table 3).

Five cases had a complete resolution of their numbness, two had a partial resolution, and two patients reported no improvement. All patients had a decrease in at least two of the three symptoms of pain, weakness, or numbness. There were no complete failures of symptomatic improvement.

Preoperatively, the Phalen's test was positive in all cases. After surgery, it remained positive in only one patient. Preoperatively, seven of eight patients had a positive Tinnel's sign at the wrist, which was negative in all patients after surgery.

Static two-point discrimination was 10 mm of greater in six cases, and all cases showed improvement.

Presence or absence of thenar atrophy was chosen as a criterion because of the lack of an objective method to grade partial improvement in the bulk of thenar muscles. Thenar atrophy was present in all cases preoperatively. At the time of follow-up, four patients had no evidence of thenar atrophy. In three cases patients reported that their hands felt stronger after surgery.

2.2. Results of nerve-conduction study

Preoperatively, all patients had unobtainable median nerve sensory distal latencies. One patient had unobtainable median motor distal latencies.

Table 4
Electrodiagnostic study-preoperative evaluation [a,b].

Patient/sex/age/hand	Motor latency (ms)	Sensory latency (ms)
1/W/58/R	9.5	Unobtainable
2/W/66/R	7.5	Unobtainable
3/W/70/L	8.4	Unobtainable
4/M/68/L	12.1	Unobtainable
5/W/54/R	16.4	Unobtainable
6/W/79/L	7.2	Unobtainable
7/W/49/R	5.5	Unobtainable
8/M/69/L	Unobtainable	Unobtainable

[a] Normal values of the distal sensory latency and conduction velocity. Positive result if latency greater than 3.5 mm/s or asymmetry of conduction velocity greater than 0.5 mm/s versus contralateral hand [17].

[b] Normal values of the distal motor latency and conduction velocity. Positive result if latency greater than 4.5 mm/s or asymmetry of conduction velocity greater than 1.0 mm/s [17].

All the others had prolonged median motor distal latencies ranging from 5.5 to 16.4 ms.

Table 5
Electrodiagnostic study—postoperative evaluation[a,b]

Patient/Sex/Age/Hand	Motor latency (ms)	Sensory latency (ms)
1/W/58/R	4.8	Unobtainable
2/W/66/R	56	5.2
3/W/70/L	5.1	4.6
4/M/68/L	6.9	3.5
5/W/54/R	5.2	3.9
6/W/79/L	4.8	3.5
7/W/49/R	3.9	4.4
8/M/69/L	4.8	2.7

[a] Normal values of the distal sensory latency and conduction velocity. Positive result if latency greater than 3.5 mm/s or asymmetry of conduction velocity greater than 0.5 mm/s versus contralateral hand [17].

[b] Normal values of the distal motor latency and conduction velocity. Positive result if latency greater than 4.5 mm/s or asymmetry of conduction velocity greater than 1.0 mm/s [17].

All patients had improvement in median motor distal latency. In all patients postoperatively distal latencies were better than the preoperative values (Tables 4 and 5). All patients except one showed electromyographic improvement in the abductor pollicis brevis muscle.

The only patient (case no 1) who had no improvement in sensory distal latency with carpal tunnel release had symptomatic improvement and was satisfied with the surgical result.

3. Discussion

According to other authors the preferred anaesthetic technique used for this outpatient surgical procedures was brachial plexus block with axillary approach [8,9]. We have applied this technique to all our patients, with a high success rate. Previous studies have reported that advancing age has a detrimental effect on nerve regeneration [10]. The findings in this study suggest but do not prove a correlation. It is also possible that other factors, such as degenerative arthritis of the basal joint or general loss of muscle bulk with advancing age, could contribute to real or apparent thenar atrophy in these cases.

While coexistence of carpal tunnel syndrome and basal joint arthritis of the thumb has been described by multiple authors [11], it has been stressed by only a few. Burton noted that coexistence was common [12]. He warned that unrecognized carpal tunnel syndrome could result in persisting post-operative pain and significant weakness and could even precipitate a reflex sympathetic dystrophy.

Other authors such Melone [13], and Florack [14] also stressed the coexistence of these two processes, but reasons behind their relationship was not clear. It is possible that thenar weakness secondary to carpal tunnel syndrome could play a role in the deterioration of the basal joint in some patients [14].

In our series, three cases out of eight had, at the time of their surgical procedure, basal joint osteoarthritis of the thumb, and reconstructive procedures (arthroplasty) were necessary.

Flexor tendon synovitis is a common finding at the time of carpal tunnel surgery [15]. This synovitis may be a contributing cause of the carpal tunnel syndrome, but it may also represent a reaction of the flexor tendons to a tight carpal tunnel. Only in one case out of eight, a flexor tendon tenosynovectomy was undertaken for an advanced carpal tunnel syndrome with a concomitant inflammatory systemic disease. Routine synovectomy is not recommended as an adjunct to the division of the carpal ligament. It is only appropriate in cases of rheumatoid arthritis [16].

The median motor distal latency improved to a normal range in nearly the half of the hands. The greatest improvement in distal latency was seen in those hands in which it was most prolonged preoperatively.

The sensory response returned in all cases except in one.

The results showed that a high percentage of these patients had improvement in their electrophysiologic parameters and excellent symptomatic relief after decompression of the carpal tunnel. Long-standing symptoms, thenar atrophy, virtual anesthesia, and the absence of demostrable sensory and motor evoked responses are not contraindications for surgery [17].

The evaluation of the entire procedure, diagnostic and therapeutic has demonstrated a high degree of satisfaction in the patient population.

References

[1] Phalen G. The carpal tunnel syndrome: clinical evaluation of 598 hands. Clin Orthop 1972;83:29–42.
[2] Greenburg AG. Ambulatory surgery in the '90s. Ambul Surg 1994;2:136–41.
[3] Szabo RM, Gelberman RH. Peripheral nervecompression: etiology, critical pressure threshold, and clinical assessment. Orthopaedics 1984;7:146–54.
[4] Le Quesne P, Casey E. Recovery of conduction velocity distal to a compressive lesion. J Neurol Neurosurg Psych 1974;37:1346–51.
[5] Schlagenhauff RE, Glasauer FE. Pre- and post-operative electromyographic changes after carpal tunnel release. J Hand Surg 1986;11A:876–80.
[6] Johnson E, Sipski M, Lammetse T. Median and radial sensory latencies to digit I: normal values and usefulness in carpal tunnel syndrome. Arch Phys Med Rehabil 1987;68:140–1.
[7] Nolan WB III, Alkaitis D, Glickel SZ, Snow S. Results of treatment of severe carpal tunnel syndrome. J Hand Surg 1992;17A:1020–3.
[8] Pandit SK, Pandit UA. Regional anaesthesia for outpatient surgery. Ambul Surg 1994;2:125–35.
[9] Bridenbaugh LD. Regional anaesthesia for outpatient surgery—a summary of 12 years experience. Can Anaesth Soc J 1983;30:548–52.
[10] Nathan P, Meadows K, Doyle L. Relationship of age and sex to sensory conduction of the median nerve at the carpal tunnel and association of slowed conduction with symptoms. Muscle Nerve 1988;11:1149–53.
[11] Herndon J. Trapeziometacarpal arthroplasty: a clinical review. Clin Orthop 1987;220:99–105.
[12] Burton R. Complications following surgery on the basal joint of the thumb. Hand Clin 1986;2:265–9.
[13] Melone C, Beavers B, Isani A. The basal joint pain syndrome. Clin Orthop 1987;220:58–67.
[14] Florack TM, Miller RJ, Pellegrini VD, Burton RI, Dunn MG. The prevalence of carpal tunnel syndrome in patients with basal joint arthritis of the thumb. J Hand Surg 1992;17A:624–30.
[15] Neal N, McManners J, Stirling G. Pathology of flexor tendon sheath in the spontaneous carpal tunnel syndrome. J Hand Surg 1987;12B:229–32.
[16] Schuind F, Ventura M, Pasteels J. Idiopathic carpal tunnel syndrome: histologic study of flexor tendon synovium. J Hand Surg 1990;15A:497–503.
[17] Szabo RM, Gelberman RH, Dimick M. Sensibility testing in patients with carpal tunnel syndrome. J Bone Joint Surg 1984;66A:60–8.