Comparison between the clinical and surgical treatment in carpal tunnel syndrome by means of electrophysiological analysis

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Abstract

Introduction: The carpal tunnel syndrome is the most common of the compression syndromes. It is characterized by pain, weakness of fine movements and paresthesias in the first four fingers of the hand. Diagnosis is confirmed by neurological examination and recently the electroneuromiography (ENMG) is useful to define prognosis. Objective: The authors analysed 33 patients, both fist presenting with carpal tunnel syndrome, by means of electrophysiological studies in order to compare the clinical and surgical treatment. Casuistics and method: Twenty five patients (42 hands) were successfully submitted to clinical treatment and 16 patients (18 hands) were submitted to surgical treatment. The clinical treatment consisted in immobilization, pyridoxine administration and eventually antiinflammatory drugs for a three-months stipulated period. The surgical treatment consisted in complete longitudinal section of transverse carpal retinaculum and recovery was analysed electrophysiologically by means of ENMG before and over 3 months after treatment. In the non-surgical group, sensitive velocity increased in most of the patients, however amplitudes had overall no changes. Conclusion: surgical treatment accelerates recovery in all aspects of electrophysiological analysis corresponding to neurological recovery. ENMG should be also advocated in the cases of absence and/or slow recovery.

Key-words

Carpal tunnel syndrome; electrodiagnosis; therapy; nerve recovery; peripheral neuropathy.

Sinopse

Comparação entre tratamentos clínico e cirúrgico da síndrome do túnel do carpo por métodos de análises eletrofisiológicas

Introdução: a síndrome do túnel do carpo é a neuropatia compressiva mais comum. É caracterizada pelo surgimento de dor, fraqueza dos movimentos finos e parestesias dos quatro primeiros dedos da mão. O diagnóstico é confirmado pelo exame neurológico e mais recentemente a utilização da eletroneuromiografia (ENMG) mostra-se útil no prognóstico. Objetivo: Os autores analisaram 66 pacientes com 33 pacientes que apresentavam síndrome do túnel do carpo por meio de estudos eletrofisiológicos, com o intuito de comparar tratamentos clínico e cirúrgico. Material e método: vinte e cinco pacientes (42 mãos) foram submetidos a tratamento clínico com sucesso e 16 pacientes (18 mãos) foram submetidos a tratamento cirúrgico. O tratamento clínico consistiu em imobilização, administração de piridoxina...
e, eventualmente, o uso de drogas antiinflamatórias por período estipulado de três meses. O tratamento cirúrgico consistia da secção longitudinal completa do retináculo transverso do carpo. Os punhos dos pacientes foram analisados eletrofisiologicamente, por meio da eletroneuromiografia (ENMG) antes do início do tratamento e depois de completados três meses da terapêutica. O grupo não cirúrgico obteve aumento da velocidade sensitiva na maioria dos pacientes, entretanto, as amplitudes não tiveram alterações. **Conclusão**: o tratamento cirúrgico acelera a recuperação em todos os aspectos da análise eletrofisiológica, correspondendo, assim, à recuperação neurológica. Também se sugere que a ENMG possa ser utilizada em casos de ausência de recuperação ou recuperação protraída.

**Palavras-chave**
- Síndrome do túnel do carpo; eletrodiagnóstico; terapia; recuperação axonal; neuropatia periférica.

**Introduction**

The carpal tunnel syndrome (CTS) is the most common compressive neuropathy, alone accounting for approximately 90% of all entrapment neuropathies. It is characterized by pain, nocturnal dysesthesias and paresthesias in the first four fingers, both fists, arm pain and weakness of fine movements. With evolution of the disease, tenar atrophy may take place.

The most usual signs are Phalen and Tinel sign, as well as hypoesthesia in the median nerve territory, preserving or not palm sensation.

There are many forms of treatment – open or endoscopic surgery and conservative treatment – and the results are still controversial.

Hudson and other authors advocated surgical treatment by sectioning the carpal retinaculum to make the nerve free of compression and ischemic injury. Many authors also advocate the clinical treatment, less aggressive with good results also.

In order to clarify this point, the authors at the present study analysed a personal series of 33 patients presenting with CTS, by means of pre- and post-management electromyography (ENMG). The patients were divided into two groups – surgical and clinical for the matter of comparison.

**Methods**

**Patients and Examinations**

The diagnosis of CTS was based on clinical history and abnormal neurophysiological tests when examining the sensory and motor function of the median nerve. The neurophysiological values used to support the diagnosis of CTS were: motor distal latency > 3.8 m/s; distal motor amplitude < 5 mV and motor and sensory conduction velocity > 47.0 m/s.

Thirty three patients were divided into two groups: non-surgical group (25 patients – 42 hands) and surgical group (initially 9 patients, later 7 were added after initial clinical treatment – 16 hands).

Patients presenting with diabetes mellitus, hypothyroidism, immunologic disease, rheumatoid arthritis, bone fractures or other neuropathies were excluded from this study.

The patients were submitted to clinical treatment and 18 were submitted to surgical treatment. Clinical treatment consisted in immobilization, pyridoxine administration, and eventually antiinflammatory drugs for three months. We avoided infusion of corticosteroids, because these medications are useful to control the protein synthesis of the inflammatory event in the compressive process.

Surgical treatment consisted of a classical incision over the palmar area and complete longitudinal section of transverse carpal retinaculum under local anesthesia. The patient’s hands were analysed electrophysiologically by means of ENMG before and over 3 months period after the surgical or clinical treatment, in order to compare the grade of recovery by means of measuring the amplitude and sensitive motor conduction velocity.

**Data Analysis**

Wilcoxon nonparametric test for two related samples and t test were applied to compare electrophysiological variables from the first to second ENMG in the clinical and surgical groups and to compare the variables from the electrophysiological status in clinical and surgical groups.

Chi-square test was used to compare the groups and their homogeneity. P<0.05 was considered to be statistically significant.

**Results**

Results were summarized in table 1 and 2. The neurological findings in the non-surgical group were: Phalen’s sign – 38% of cases, Tinel’s sign – 50% of cases, 21% hypoesthesia, 5% amyotrophy. The neurological findings in the surgical group were: Phalen’s sign in 33% of cases, 56% of Tinel’s sign in 56% of cases, 39% hypoesthesia and amyotrophy, 17%.

In the non-surgical group the ENMG findings depicted increase in the sensitive conduction velocity in the second and fourth fingers and recovery of the conduction velocity could be observed in the median nerve through the carpal tunnel, although the amplitude is comparable to the ulnar nerve in which no changes were observed.

ENMG findings in the surgical group demonstrated statistically significant recovery of all parameters mentioned above for the clinical group except for median nerve amplitude.

**Discussion**

The physiological hypotheses for the symptoms and signs of CTS are vascular changes and compression of the nerve. The compressive hypothesis is based in two points: nerve fixation.
and direct compression\textsuperscript{2,12}. In our opinion the clinical treatment could help in cases where the vascular component is the most important one, however regarding the compressive theory it is difficult to imagine how the clinical treatment could ameliorate the points of compression without surgical section.

Clinical treatment is successfully used in patients with mild CTS, however it has frequently failed in the most severe ones\textsuperscript{3,9}.

Surgical treatment is effective in most of the patients, and independently of the clinical severity. Sensitive and motor conduction velocities usually improve more than amplitudes due to the release of the compression points and are not involved with axonal death. The improvement of signs of compression with the surgical treatment is faster than the clinical treatment, as mentioned here and confirmed by others\textsuperscript{3,4,9}.

ENMG should be employed by the time the surgical treatment fails, most of the time due to insufficient section of transversal carpal ligament\textsuperscript{14}.

References

1. D’ARCY CA, McGEE S: Does this patient have carpal tunnel syndrome? JAMA, 283: 3110-7, 2000


8. KEMBLE F: Clinical and electrophysiological improvement from the carpal tunnel syndrome. Electromyography, 8: 27-8, 1968.


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