

Evidence on Physiotherapeutic Treatment for Carpal Tunnel Syndrome



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Abstract

Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy in the upper extremity, with multifactorial characteristics, resulting from compression of the median nerve within the carpal tunnel. The classic symptoms of CTS include numbness, tingling, with or without pain in at least two of the three innervated fingers by the median nerve. It most often affects the dominant hand and affects mainly women, between the fourth and seventh decades of life. CTS treatment is preferably conservative in mild or moderate cases, but surgical decompression of the median nerve may be indicated in persistent cases. The therapeutic resources indicated for conservative treatment are: orthoses, joint mobilization techniques of carpal bones, neural mobilization techniques and electrophysical agents (ultrasound and low intensity laser therapy). Evidence for the use of such resources in this context is moderate, especially for the short- and medium-term effects on controlling the symptoms of individuals with mild to moderate cases. Further clinical studies are needed in the search for better evidence on the efficacy of treatment in this syndrome.

Keywords: Carpal tunnel syndrome; Median nerve; Physiotherapy

Introduction

Carpal tunnel syndrome (CTS) is a focal compressive neuropathy with high incidence, with multifactorial characteristics, resulting from compression of the median nerve within the carpal tunnel. It is the most common entrapment neuropathy of upper limb [1]. The carpal tunnel region is composed of nine flexor tendons and the median nerve, dorsally limited by the transverse carpal ligament, fixed laterally on the tubercle of the scaphoid and trapezius, and medially on the pyramidal, pisiform and hamate. The median nerve at this level innervates the muscles: the abductor pollicis brevis muscle, the superficial head of the flexor pollicis brevis and the opponens pollicis [2].

Etiopathogeny and prevalence

CTS is caused by the expansion of the structures contained therein the carpal canal. Some conditions are related to the onset of this syndrome, such as: edema, inflammation, polyneuropathies, diabetes mellitus, tenosynovitis, pregnancy, hypothyroidism, menopause, hormonal changes and extreme and prolonged wrist awkward postures². Although the available evidence suggests that excessive computer use as a minor risk factor, probably caused by mechanical nerve stress resulting from contact with surrounding tendons, the association between

computer use and carpal tunnel syndrome is controversial. Another risk factor for the development of CTS are smoking, wrist deformity or osteoarthritis, but the evidence proving this association is still insufficient [3].

The onset of CTS may be isolated or associated with diseases such as Motta (trigger finger), De Quervain Syndrome, Raynaud's phenomenon, epicondylitis, cervical spine or shoulder dysfunctions. CTS is described as idiopathic when the cause is unclear, the latter being the most frequent, with edema and thickening of the synovial sheath or decreasing of the dimensions of the canal [4,5].

Clinical condition and diagnosis

CTS is characterized primarily by intermittent and nocturnal focal paresthesia and dysesthesia which can become more and more frequent and occur also during the waking hours. Subsequently, loss of sensation develops along with weakness and muscular atrophy of the tenar region as the disease become chronic, resulting from extensive axonal degeneration. The STC's painful nighttime numbness usually presents relief from shaking hands and this as a typical complaint (Flick's sign). Another common sign is the numbness and tingling sensation in the radial palm of the hand and fingers, as well as pain in the wrist,

which may radiate distally, especially to the thumb and index and middle fingers, or proximally through the upper limb [3,6].

As the condition evolves in chronicity, motor supply of the median nerve is affected, leading to general hand weakness for fine and gross motor tasks and impairment in general manual dexterity. So, CTS is considered at an advanced stage of the disease [3,7]. The diagnosis is suggested by the specific history and physical examination, confirmed by complementary exams. The provocative tests used in the diagnosis of CTS are based on stress positions of the wrist, inducing or exacerbating the symptoms of paresthesia or pain in the median nerve path, either through the classic Phalen test, inverted Phalen test, compression over the carpal canal, or Tinel percussion test [4-6].

For many years, symptoms that occur in the territory of the median nerve of the hand limit the sensory diagnostic criteria in the literature. However, in clinical practice, broader sensory criteria were used, not limiting the symptoms to the first three fingers, but rather including the entire palmar surface. These frequently observed sensory abnormalities might be secondary to a central or peripheral nervous system mechanism (central sensitization or simultaneous ulnar involvement, respectively), or both. Symptoms that are limited to the first three digits may suggest a more severe median nerve involvement due to more severe changes in nerve conduction velocity. Therefore, the distribution of symptoms should be defined as accurately as possible and be strongly considered in deciding the treatment strategy and determining the prognosis [3,8]. Clinical examination in conjunction to electrodiagnostic study are the key to the recognition and characterization of the severity of the patient's involvement with CTS. Despite being one of the most accurate tests, the electrodiagnostic test cannot be considered the gold standard because it presents approximately 18% of cases of false positives and 15% of false negatives in the general population. Therefore, an accurate clinical evaluation is crucial [4,6].

Physical and functional evaluation

For adequate outcome analysis of the functional improvement and the reduction of the symptoms after the treatment of CTS, whether it is conservative or surgical, validated and reliable measurement methods and evaluation techniques are necessary. The evaluation should consist of the following measures: threshold sensibility, grip and pinch strength and dexterity. In addition, one can measure perceived function through self-administered questionnaires and pain scales. Sensory evaluation in compressive syndromes and nerve repairs can be done through many methods and instruments. The two-point discrimination test (D2P) for tactile gnosis and the sensitive threshold tests are the common instruments used for sensory assessment. The muscle strength test in CTS is usually performed by the pulp to pulp pinch dynamometer. The self-report questionnaire specially developed to assess the

degree of hand involvement in CTS is the Boston Carpal Tunnel Syndrome Questionnaire (BCTQ) [2,4,8].

Surgical and conservative treatment

There are several surgical and non-surgical approaches available for the treatment of CTS [3,5,6]. Patient education (eg, reduction of wrist awkward movement and postures and reduction of heavy-duty activities) should be considered the first line of approach and the use of ergonomic tools may be useful in reducing stress on the median nerve. However, there is little evidence on the success of this method. In addition to these interventions, patients should be informed about the surgical and non-surgical strategies for the treatment of CTS [9].

The treatment of CTS is preferably conservative in mild or moderate cases, but it may be surgical, by open or arthroscopic release of the flexor retinaculum canal tunnel, in selected cases. The aim of the surgery is to minimize pressure within the canal by improving neural circulation and decreasing symptoms [2,5,10]. Conservative treatment has a better short-term effect in relieving CTS symptoms if initiated early, but often surgical procedure will be necessary for complete resolution of complaints [2,5,6], although still presents moderate evidence. It is based on the association of the following strategies: use of anti-inflammatory drugs, corticosteroid injection, rehabilitation, ergonomic orientation of postures in the activities, prevention of excessive use of repeated prehensions which can lead to tendon overload and the associative use of static orthoses [11-13]. Some physical therapy resources such as orthoses, carpal mobilization, neural mobilization technique and the use of therapeutic US and LBI are commonly used in the conservative treatment of CTS, with moderate evidence, especially for short- to medium-term effects in the symptomatic control of mild to moderate cases [14-17].

Conclusion

CTS is a common dysfunction in the upper limb, involving compression of the median nerve in the carpal canal. It is a disabling dysfunction, as it alters the functionality of the hand and causes a persistent painful symptomatology, associated with paresthesia in the hand. This entrapment syndrome may have isolated presentation or compromise several segments in the upper limb. Its etiology is multifactorial. Accurate clinical evaluation is critical for the diagnosis of CTS. Sensory threshold plays a complementary role in the prognosis of the nerve compression evolution. Preventive and rehabilitative measures should be recommended to minimize the increase in intracarpal pressure in early stages.

CTS should be treated conservatively in mild and moderate cases. However, surgical decompression may be indicated in persistent cases that have not an adequate remission of symptoms, even after the use of orthoses and the adoption of physiotherapeutic and pharmacological measures. Ergonomic

work environment, pauses between activities and educational actions can contribute to the complaints reduction. Clinical studies are needed in the search for better evidence on the efficacy of treatment of this syndrome.

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