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Carpal tunnel syndrome

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Mini Review

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Background
Carpal tunnel syndrome (CTS) is a symptomatic condition caused by compression of the median nerve, it occurs idiopathically in patients 40 to 60 years of age, its etiology is multifactorial (anatomical changes, general disorders, increased tension, activities repetitive). The symptoms can vary between each patient and can be classified as mild, moderate and severe. The pain can be felt from the thumb, index, middle finger and medial edge of the ring finger, causing a reduction in grip strength and grip function. hand. Compressive symptoms of the median nerve directly affect the quality of life of patients, so it is essential to detect the characteristic clinical symptoms in the early stages of the disease in order to achieve timely treatment.

Keywords: Carpal tunnel syndrome, median nerve compression.

Carpal Tunnel Syndrome (CTS) is a symptomatic condition caused by compression of the median nerve as it courses through the wrist, the result of an anatomy that can be compressive and unfavorable.[1] Medical compression of the median nerve was established around the 20th century as a focal median mononeuropathy of the wrist.[2, 3] In 1924 Galloway first described the surgical release of the carpal tunnel. [4] CTS is one of the most common neuropathies in the upper extremities, characterized by pain in the hand, numbness, and tingling in the anatomical distribution of the median nerve. [5] The symptoms can vary between each patient and can be classified as mild, moderate and severe. The pain can be felt from the thumb, index, middle finger, and medial edge of the ring finger, causing a reduction in grip strength and grip function. hand. It is estimated that 4-5% of the world population suffers from CTS, with people between 40-60 years of age being more susceptible.[6]

The carpal tunnel is a shallow U-shaped bone canal, formed by the carpal bones and the transverse carpal ligament, the carpal tunnel is narrow and inelastic for the median nerve, through which 9 flexor tendons also pass to travel from the forearm to the hand, has an approximate width of 20 to 25mm and the median nerve travels inside the carpal tunnel between the levels of the distal wrist flexion crease and the proximal metaphysis so it has a high risk of being trapped and injured .[7-10] There may be anatomical differences, a bifid median nerve is usually found in 1% to 3.3%.[11] The combination of some mechanical trauma, increased pressure, and chronic ischemic damage to the median nerve within the carpal tunnel has a direct impact on the development of compression pathology. Risk factors for CTS are: obesity, monotonous activity of the wrist, pregnancy, heredity, rheumatic condition, [5, 12] injuries such as fractures or sprains, use of vibrating equipment can cause CTS [13] and the risk factors that increase the probability of surgical treatment are advanced age and a high body mass index.[14]

Pathophysiology

The pathophysiology of CTS results from a combination of mechanical trauma with increased pressure as well as ischemic damage to the median nerve within the carpal tunnel, the increase in pressure in normal values generally varies between 2 mmHg - 10 mmHg, within the carpal tunnel the Change in wrist position can increase fluid pressure, so wrist extension increases up to 10 times its value, while wrist flexion causes up to 8 times its value. [15] For this reason, repetitive wrist movements are a risk factor for developing carpal tunnel syndrome. **(Figure 1)** Demyelination of the nerve develops at the site of maximum compression and extends to the segment where the axons are intact. The continuous compression has the consequence that the blood flow to the endoneural capillary is interrupted, causing alterations in the blood-nerve barrier producing endoneural edema, which leads to venous congestion, ischemia, and local metabolic alterations. [16]

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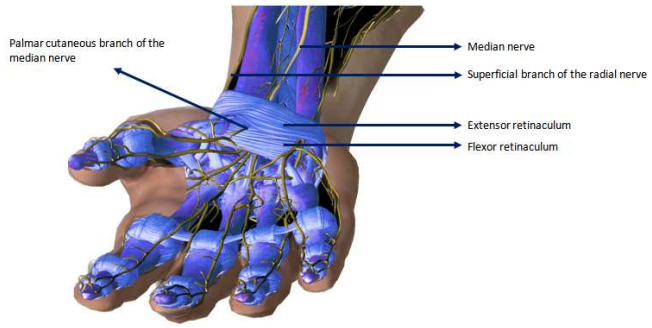

Figure 1. Anatomy of the median nerve and its periphery.

Diagnosis

Making a timely diagnosis is the most important step for early treatment,[7] the clinical symptoms that the patient may present are paresthesia with nocturnal or early tingling in the distal area of the median nerve. Pain is associated with a flexed (Phalen test) or extended (reverse Phalen test) position of the wrist, the cross-sectional area of the carpal tunnel is reduced. In advanced stages there is reduced peripheral sensation and atrophy of the thenar prominence. [17] A clinical history associated with the characteristic signs of CTS should be developed, considering that other conditions can also cause similar symptoms. CTS diagnosis is based on clinical symptoms, additional tests are also used to confirm clinical suspicion and assess severity. It is mainly diagnosed clinically and with ultrasound it is complemented in necessary cases with electro-diagnostic tests to confirm, providing information on the severity of the lesion (demyelination) excluding other diseases such as polyneuropathy,[18] as well as magnetic resonance imaging, which has been an alternative method for evaluating the trajectory of the median nerve.[19] **(Figure 2).**

Treatment

Treatment of CTS consists of immobilization of the extremity for alternate periods, corticosteroid injections and surgery, [20,21] they generally have a positive response to conservative treatment such as physiotherapy, wrist splints, medications, use of alternative work tools, steroids, however there is an 80% chance that the symptoms will return in a period of 12 months, so treatment should consider surgery when the condition produces negative responses to conservative therapies. [13]

There are two types of carpal tunnel release, one with the traditional open approach and endoscopic release.[9] The open carpal tunnel release (CTR) is the standard procedure of choice, there are also alternative techniques with minimal incisions and endoscopic release,[22-25] however, as all surgery is not without risk, those patients in whom new painful symptoms appear

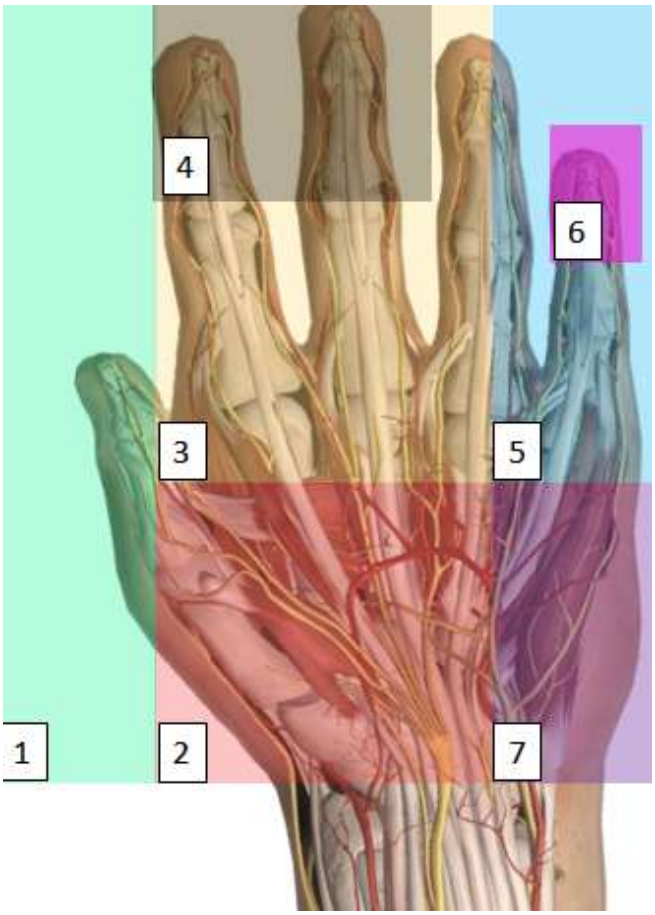

Figure 2. Anatomical innervation by regions of the hand. 1. Superficial radial, 2. Median palmar cutaneous, 3. Median palmar digitalis, 4. Median autonomic innervations, 5. Superficial ulnar branch, 6. Ulnar autonomous innervations, 7. Ulnar palmar cutaneous.

as well as immediate neurological loss after carpal tunnel release can be associated with an acute ischemic injury due to incomplete release and if clinically severe pain is usually associated with an iatrogenic injury, as the palmar cutaneous nerve, palmar cutaneous branch of the ulnar nerve, digital nerves, or the median and ulnar nerves may be injured. [26] Some studies have shown that the rate of complications between carpal tunnel releases by endoscopic approach compared to the open one, occurs less frequently in open treatment, so that the latter continues to be more effective and safer today. [27] The patient may present symptoms related to a new pathology and this may or may not be related to carpal tunnel release, primary compression of the palmar cutaneous branch, and postoperative inflammation after surgery may cause this alternative compression neuropathy. [28]

Conclusions

Compressive symptoms of the median nerve directly affect the quality of life of patients, so it is essential to detect the characteristic clinical symptoms in the early stages of the disease to achieve timely

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treatment. Undoubtedly, surgical approaches with a tendency to minimal invasion are increasing, so complementary and/or novel treatment systems should be studied, which in some cases can be considered eclectic.

Conflicts of interest

The authors declare no conflict of interest.

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