Carpal Tunnel Syndrome

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Key points:

- Carpal Tunnel Syndrome
- Symtoms
- Causes
- Treatment
- Conclusion

Introduction

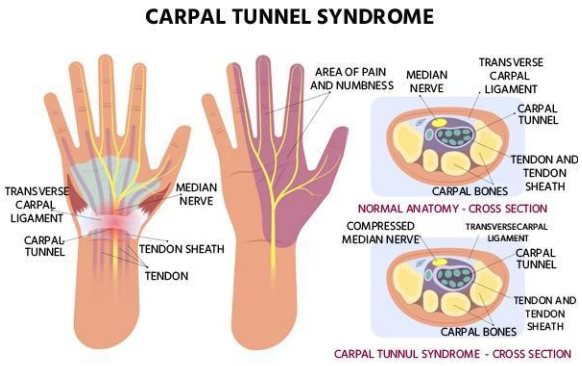


Figure 1- *Carpal Tunnel Syndrome.*[7]

Carpal tunnel syndrome (CTS) is a common disorder of the peripheral nervous system caused by compression of the median nerve as it passes through the carpal tunnel at the wrist. Since the median nerve is the only nerve that passes through the carpal tunnel, compression at this site leads to characteristic sensory and motor symptoms. CTS commonly affects individuals who perform repetitive hand and wrist movements and is also associated with conditions such as diabetes mellitus, obesity, hypothyroidism, pregnancy, rheumatoid arthritis, and wrist trauma. Women are affected more frequently than men, particularly during middle age. Compression of the median nerve causes sensory and motor dysfunction that may progressively impair hand function if left untreated.[1,3–5]

Cause and Symptoms

Patients with CTS typically experience numbness, tingling, or burning sensations in the thumb, index finger, middle finger, and the radial half of the ring finger. Symptoms often worsen at night and may awaken patients from sleep. As the condition progresses, individuals may develop pain radiating to the forearm, reduced grip strength, difficulty performing fine motor activities such as buttoning clothes or holding objects, and weakness or wasting of the thenar muscles in severe cases. Anatomical factors such as a naturally small carpal tunnel, wrist arthritis, or previous wrist dislocation may contribute to CTS. Inflammatory conditions including rheumatoid arthritis and gout may also increase the risk. Repetitive hand use, particularly prolonged forceful gripping or the use of vibrating tools, can further contribute to the development of CTS. In addition, obesity, a high body mass index (BMI), pregnancy, and endocrine disorders such as acromegaly have been identified as important risk factors.[1,3–5]

Possible Diagnosis

The diagnosis of CTS is based on the patient's clinical history, physical examination, and confirmatory investigations. Physical examination includes provocative tests such as Phalen's test, Tinel's sign, and the Durkan compression test, which help

reproduce the patient's symptoms. Nerve conduction studies (NCS) and electromyography (EMG) remain the gold standard for confirming median nerve compression and assessing disease severity. Ultrasound may demonstrate enlargement of the median nerve within the carpal tunnel, while magnetic resonance imaging (MRI) is generally reserved for atypical or complicated cases.[2,6]

Treatment

Treatment depends on the severity and duration of symptoms. Mild to moderate CTS is generally managed conservatively with wrist splinting, especially at night, activity modification, nonsteroidal anti-inflammatory drugs (NSAIDs) for symptomatic relief, corticosteroid injections, hand therapy, and nerve-gliding exercises. Management of associated medical conditions, such as diabetes or obesity, is also important. Surgical treatment, consisting of open or endoscopic carpal tunnel release, is recommended for patients with severe symptoms, thenar muscle weakness or atrophy, or persistent symptoms despite conservative management. The procedure involves dividing the transverse carpal ligament to enlarge the carpal tunnel and relieve pressure on the median nerve. Recovery time varies among individuals, but most patients experience significant improvement in symptoms and hand function following surgery.[2,3]

Conclusion

Carpal tunnel syndrome is a common and potentially disabling condition caused by compression of the median nerve at the wrist. Early recognition, accurate diagnosis, and timely treatment are essential to prevent permanent nerve damage and preserve normal hand function. Although conservative treatment is effective for many patients with mild disease, surgical decompression offers excellent long-term outcomes for individuals with severe or persistent symptoms.[1–3]

References

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