

Evaluation of the Patient with Hand Pain and Numbness: Carpal Tunnel Syndrome

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Article:

Carpal tunnel syndrome (CTS) is one of the most common neuropathies associated with nerve entrapment. It occurs most frequently between the ages of 40 and 60 and affects women three times more often than men.¹ Approximately 80% of patients are older than 40. The most common symptom is pain, but this often is accompanied by numbness, tingling, and sometimes a burning sensation. It is the presence of these accompanying symptoms that often complicates what might be a simple problem in clinical diagnosis and treatment of this condition.

Pathophysiology

The carpal tunnel is composed of the transverse carpal ligament and the carpal bones. The median nerve and tendons in the carpal tunnel are responsible for movement in the hand and fingers. In addition, the median nerve is responsible for sensation in the palmar aspect of the thumb, the index and middle fingers, and the radial aspect of the fourth finger.

In CTS the median nerve specifically is entrapped. Symptoms of entrapment are expressed in the median nerve distribution, including the thenar area of the palm, medial areas of the thumb and fourth digits, and the first and second digits. Also in this distribution are the dorsal distal interphalangeal areas of the thumb and first three digits.

Any condition that contributes to compression of the median nerve by reducing the space in the carpal tunnel may lead to CTS. This may result from physical changes in the ligaments or bones of the carpal tunnel so that they lose their flexibility and thus compress tunnel contents. These changes are usually related to microtrauma of the ligaments, bones, and other components of the musculotendinous elements in the wrist.

Overuse syndromes, degenerative joint disease, and trauma such as Colles fracture are among the conditions that provoke these changes. Reduction of space may also be caused by changes that increase the size of soft tissues in and around the tunnel, such as systemic diseases such as diabetes mellitus, hypothyroidism, and rheumatoid arthritis or changes in the body produced by pregnancy or obesity. It is often swelling in the soft tissues in these conditions that contribute to median nerve compression.

Although no definitive studies identify a direct link between CTS and type of work, there does seem to be a link between repeated flexion or extension of the wrist such as using hand tools that require forceful gripping or that vibrate. Those activities involve repeated compression of the median nerve and may contribute to slow and progressive changes in the structures of the carpal tunnel that contribute to chronic compression of the nerve.²

History

Because CTS symptoms may be associated with a variety of conditions, it is important to do a careful history when evaluating patients presenting with these symptoms, especially when the diagnosis of CTS may be a secondary diagnosis associated with a previously undiagnosed condition.

Although it is important to ask about work or leisure activities, it is more important to ask about specific movements of the wrist and the details of those movements. The goal is to identify repeated wrist flexion or extension. Questions should also be asked about the use of hand tools and whether there is an association with forceful gripping and vibration.

The history should always include a preliminary review of systems related to differential diagnoses or to confirm findings that can be associated with CTS.² These include musculoskeletal conditions above the elbow but with associated symptoms in the hand, as well as systemic conditions. Some conditions to consider include the following:

- Arthritis, particularly of the carpometacarpal joint of the thumb
- Cervical radiculopathy affecting the C6 nerve root (associated with neck pain and numbness in the thumb and index finger without involvement of other fingers)
- Diabetes mellitus with neuropathies
- Median nerve compression higher than the wrist (presents as pain and paresthesias above the wrist)

Examination

The clinical examination should include inspection of the wrist and hand for swelling, redness, nodules, deformity, and muscle atrophy. The thenar eminence should carefully be inspected for flatness or atrophy. The hand and wrist should be carefully palpated for tenderness and pain and for swelling and boggiess. Each finger and joint and the wrist should be carefully palpated. Local circulation should be assessed by capillary refill, and the patency of the radial and ulnar arteries should be assessed through Allen's test. Range of motion and strength of fingers should be assessed individually to evaluate loss of function as a result of atrophy.

The following specific maneuvers should be performed to confirm CTS.

Phalen's Maneuver

The patient flexes both wrists by placing the backs of the hands together for 60 seconds. A positive sign is the report of numbness and tingling in the thumb or first two digits.

Tinel's Sign

Percuss the palmar surface of the wrist with your middle finger or reflex hammer. A positive sign is the report of tingling or sensation like a shock across the palm of the hand into the first two digits.

Carpal Compression

Apply even pressure over the area of the median nerve for 30 to 60 seconds. A positive sign is the occurrence of paresthesias in the hand or first three digits.³

In addition to these maneuvers performed during physical examination, radiographic studies should be ordered for the patient with limited wrist movement. Patients may also be referred for median nerve velocity studies, which may conclusively validate nerve entrapment. Unfortunately, patients with CTS may have normal test results and patients with abnormal results may have no clinical symptoms.³

The clinician's ability to accurately diagnose CTS rests on having a high index of suspicion from the history and on good technique in performing the assessment tests. Although CTS is common, unless the nurse practitioner sees many patients with occupational injury, she or he may not have extensive experience in performing and interpreting these tests. Thus, it may be important for the nurse practitioner to review these techniques periodically to make sure she or he is doing the best examination possible.

References

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