# CARPAL TUNNEL SYNDROME

## I. Background:

Carpal tunnel syndrome is a symptomatic compression neuropathy of the median nerve at the level of the wrist, characterized physiologically by evidence of increased pressure within the carpal tunnel and decreased function of the nerve at that level. Carpal tunnel syndrome can be caused by many different diseases, conditions and events. It is characterized by patients as producing numbness, tingling, hand and arm pain, and/or muscle dysfunction.

Although pressure on the median nerve is clearly the pathophysiologic basis for the symptoms observed clinically, the etiology of the elevated pressure has varied causes, including space occupying lesions, tenosynovitis, tumors, anomalous muscles, constriction of the wrist from external causes (posture, constricting bandages, fractures, arthritis) and systemic causes such as diabetes mellitus, pregnancy, thyroid dysfunction, amyloidosis, obesity, or it can be idiopathic. It can be seen at any age but is characteristically in patients over age 30 with increasing incidence as age increases and is 3-5 times more frequently seen in women than men. In this era of evidence based medicine there is strong evidence that BMI and repetitive hand and wrist motion with a high rate of repetition and associated with high to moderate hand force is associated with carpal tunnel syndrome. There are a number of other factors that are associated with this, but with lesser strength of evidence.[1]

## II. Diagnostic Criteria:

### A. Pertinent Historical and Physical Findings:

Patients typically complain of numbness in the sensory distribution of the median nerve. Burning pain or swelling can be associated with numbness occasionally radiating proximally up the arm to the elbow or shoulder. Nocturnal paresthesias or postural paresthesias (prolonged wrist flexion or extension) can be improved by shaking the wrist, or changing position of the wrist. Weakness, loss of dexterity, dropping items, and hypohidrosis in the median nerve distribution are also common complaints.

Symptoms can be reproduced by provocative maneuvers that increase the pressure in the wrist (Phalen's test, Durkin's compression test), may be evoked with percussion on the nerve at the wrist on the volar side (Tinel's) and may be seen with thenar muscle atrophy, fasciculations, dryness in the median nerve distribution, decreased grip, decreased light touch to two-point discrimination or monofilament sensation.

Evidence based analysis would indicate that any single complaint listed above or physical finding listed above is not strongly associated with ruling in or ruling out carpal tunnel syndrome but may need to be synthesized into the overall evaluation.

[1] J Bone Joint Surgery Am. 2016 Oct 16; 98-A (20: 1750-1754)

### B. Appropriate Diagnostic Tests:

1. Radiographs of the wrist.

2. Electromyography and nerve conduction studies.

3. Response to steroid injection into the area of the carpal tunnel.

4. Hematologic, serologic and endocrine testing if symptoms suggest an underlying disease process.

5. Cervical spine radiographs if symptoms support C-spine origin of the complaints or if a double crush situation is suspected.

6. Chest x-ray if there is concern over possible pressure on the brachial plexus by a lung lesion or mass in the thoracic outlet area.

7. Advanced imaging studies such as MRI are felt to be insensitive to diagnosis of carpal tunnel syndrome unless there is severe flexor tenosynovitis or severe change in signal which is not seen in the majority of patients. Ultrasound evaluation has limited evidence so far to indicate that this is helpful.

## III. Treatment:

### A. Non-operative Treatment:

Non-operative treatment is indicated when there are mild symptoms, possibility of pregnancy, if constricting bindings or positional abnormalities are causative or other modifiable use parameters are present. These treatment options include neutral wrist splinting especially at nighttime, steroid injections, activity modification, treatment of underlying systemic disease and/or the removal of constricting bindings or bandages. The efficacy of non-steroidal anti-inflammatory drugs is in question.

Physical therapy may have a limited role. Hand and wrist tendon gliding exercises, grip strengthening exercises and modification of activities of daily living and/or job tasks can cause temporary improvement in symptoms.

These non-operative treatment modalities can generally be tried for a time-limited period of up to 6 weeks.

### B. Operative Treatment:

Surgical intervention is indicated when there has been a failure to respond to the non-operative treatments. It is also indicated if there is presence of thenar atrophy or weakness or significant dysesthesia, progressive symptoms, or indication of a space occupying lesion in the carpal canal. A history of having a favorable response to steroid

injections or use of a wrist splint during the non-operative treatment phase is good evidence that surgical indication may be helpful.

The surgical release of the transverse carpal ligament is the generally recommended treatment option and may be performed on an outpatient basis under local or regional block.

### C. Rehabilitation:

In the postoperative period there is the immediate healing phase where hand elevation and gentle exercise of the fingers, elbow and shoulder are encouraged.

In general, post-operative immobilization is not required and gradual progression of use as symptoms allow over the next 3-6 weeks is the standard course.

Following surgical intervention there is generally 3-6 weeks of limited use with a gradual progression of normal use for ADLs. Returning to work is quite dependent upon the requirements of the job.

## IV. Evidence Based Recommendations:

Evidence-based guidelines on management for carpal tunnel syndrome have been endorsed by the American Society for Surgery of the Hand, the American College of Radiology, the American College of Surgeons and the American Society of Plastic Surgeons. This document can be found at www.AAOS.org\guidelines. It is important to note that this chronicles the strength of current evidence for support of using or not using various modalities and criteria for both diagnosis and treatment. It is important to realize that this is a changing situation and in many cases there is not substantial evidence to either rule in or rule out the use of a specific criterion.

PROTOCOL HISTORY:

Passed: 9/01/1992

Amended: 6/06/2006

Amended: 1/10/2017