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a core concepts musculoskeletal health group newsletter

Carpal Tunnel Syndrome: Non-operative Management

Disorders from the repetitive or cumulative trauma in the wrist and hand may lead to significant loss of hand function and lost work time. The causes of such injuries are related to repeated movements over an extended period of time. The resulting inflammation can affect muscle, tendon, synovial sheaths, and nerves. One of such a repetitive stress syndrome is carpal tunnel syndrome.

The carpal tunnel is a confined space between the carpal bones dorsally and the flexor retinaculum volarly. The extrinsic finger flexor tendons and median nerve course through the tunnel. Carpal tunnel syndrome (CTS) is described by sensory loss and motor weakness that occur when the median nerve is compromised in the carpal tunnel. A reduction in the space within the carpal tunnel can compress and restrict the mobility of the median nerve, causing a compression injury and neurological symptoms distal to the wrist.

Classical Presentation

The patient presents with a complaint of pain, tingling or numbness in the palmar surface of the thumb and first two and a half fingers, with the symptoms described as being worse at night. The patient typically complains of poor precision gripping or problems with sustained or repetitive wrist motion (i.e. assembly line work, typing,

fine tool manipulation). Clinical tests such as Tinel's sign and Phalen's test are positive. Other common impairments include:

- Increasing pain in the hand with repetitive use
- Weakness/atrophy in the thenar muscles and the first two lumbricals
- Tightness in the adductor pollicis and extrinsic extensors of the thumb and digits 2 and 3
- Sensory loss in the median nerve distribution
- Possible decreased joint mobility in the wrist and MCP joints of the thumb and digits 2 and 3

Cause

There are a few causation factors, such as swelling of the wrist joint from trauma to the carpals (i.e. fall or impact on the wrist) and fracture of the carpals. Synovial thickness and scarring in the tendon sheaths (tendinosis), irritation, inflammation, and swelling (tendinitis) as a result of repetitive wrist flexion, extension, or gripping activities may reduce the space in the tunnel. As such, these patients are likely to provide a history of direct external pressure on the tunnel or a history of prolonged wrist in full flexion and extension, which include awkward wrist postures (i.e. keyboard and mouse use), compressive forces from sustained equipment use, and vibration against carpal tunnel. Other

factors contributing to CTS include, pregnancy (due to hormonal changes and water retention), or other causes of fluid retention such as rheumatoid arthritis, osteoarthritis and connective tissue disorders which can potentially reduce the space in the tunnel, causing median nerve compression.

Non-operative Management

Depending on the severity of CTS, patients would be managed either conservatively or operatively. Conservative management of mild forms of CTS, include physiotherapy, which usually yield good results especially if the injury is recent and is due to awkward wrist postures and repetitive motions of the wrist in the workplace. Physiotherapy intervention is guided by the objective assessment and directed to the causative factors with rehabilitation lasting typically about 6 weeks to 4 months. Considerations include:

1. **Splinting**- Splint wrist in neutral to minimise pressure in the tunnel and to provide rest from the aggravating activity
2. **Joint mobilisation** - If there is restricted joint mobility, mobilise carpals for increased carpal tunnel space.
3. **Bio-mechanical analysis**- identify faulty wrist or upper extremity motions. Adapt the environment if possible to reduce the need for faulty motion. Strengthen and increase endurance in stabilising muscles.

4. Tendon gliding and median nerve mobilisation exercises -

A study by Rozmaryn et al (1998) has shown a significant improvement in symptoms in patients treated conservatively with the tendon and median nerve gliding exercises. Only 43% of the patients in the experimental group who had the nerve mobilisation exercises underwent subsequent surgical release of the carpal tunnel, compared to 71% in the control group.

i. Tendon gliding exercise

Teach patient tendon gliding exercises to develop mobility in the extrinsic tendons. Such exercises should be performed gently to prevent increased swelling. One of such flexor tendon gliding exercise consists of 5 finger positions. Start off from neutral (straight hand) to hook fist position, then proceed to a full fist, followed by a straight fist and then thumb flexion. (see figure 1)

ii. Median Nerve Mobilisation

Start off with Picture 1 (see figure 2) and progress to each successive position until the median nerve symptoms just begin to be provoked (i.e. tingling, but not to the extent of numbness). Stop at this position, as it is the maximum that the mobilisation will go. Sustain position for 5-30 seconds without making the symptoms worse. Alternate between this position and the preceding one. When the patient can be moved into the last position without symptoms, he or she can progress to the next mobilisation position and repeat the routine. This routine should be done 3-4 times daily as long the symptoms are not exacerbated.

5. Patient education- Teach the patient to monitor his or her hand for recurrence of symptoms and the aggravating factors. Once the patient understands the mechanism of injury, he or she

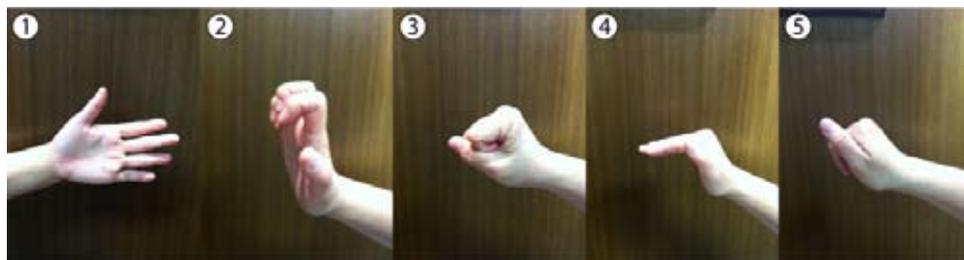


Figure 1 - Tendon Gliding Exercise: 1.Straight Hand 2.Claw Fist (hook) 3.Full Fist 4.Table Top 5.Straight Fist



Figure 2 - Median Nerve Mobilisation: 1.Wrist neutral with fingers and thumb flexed. 2. Wrist neutral with fingers and thumb extended 3. Wrist and fingers extended, thumb neutral 4. Wrist, fingers, and thumb extended 5.Wrist, fingers, thumb extended and forearm supinated 6.Wrist, fingers, thumb extended, forearm supinated and thumb stretched into extension.

would then modify activities to decrease nerve injury. Usually sustained wrist flexion, ulnar deviation, and repetitive wrist flexion and extension combined with gripping and pinching are the provoking movements.

6. Strengthening and endurance exercises-

Initially, only gentle muscle setting exercises are the only resistive exercises done. It is important that these exercises do not provoke symptoms. Subsequently, dynamic strengthening and endurance exercises with isometrics will be added without increasing the symptoms.

Overall, the physiotherapy programme endeavours to educate the patient and increase his or her awareness of 'high-risk' wrist postures especially while working and to stabilise the wrist through means of strengthening, thus

minimising the re-occurrence of CTS in future.

References

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