REPORTS ON THE RHEUMATIC DISEASES SERIES 5

Hands On

Practical advice on management of rheumatic disease

CARPAL TUNNEL SYNDROME

Jonathan Barnardo, MB, BS, MRCGP, DipPCR
General Practitioner, Guildford

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What is carpal tunnel syndrome?

The **carpal tunnel** is the space at the base of the wrist bounded on three sides by the carpal bones and covered by the flexor retinaculum. It is approximately as wide as the thumb and has its proximal border deep to the distal wrist skin crease.

The **median nerve**, which passes through the carpal tunnel, passes under the palmaris longus tendon and supplies sensation to the palmar aspect of the radial 3½ digits and the distal half of the dorsal aspect of the same digits. It also provides motor innervation to the muscles of the thenar eminence, notably the abductor pollicis brevis and the opponens pollicis.

Carpal tunnel syndrome (CTS) is caused by elevated pressure in the carpal tunnel resulting in ischaemia of the median nerve and consequent impaired nerve conduction, paraesthesiae and pain.

How may CTS present?

The classical presentation is of pins and needles and/or numbness or burning sensations in the distribution of the median nerve, initially at night, and then during the day. Weakness, particularly of thumb grip, a history of dropping things, and clumsiness of fine finger function may follow. There is wide variation in the area of distribution of the median nerve, but the little finger is usually excluded: the palm is usually supplied by a superficial branch of the median nerve that leaves the main nerve proximal to the carpal tunnel. The prevalence of CTS in the population is about 3% in women and 2% in men, with a peak prevalence in women >55yrs[1] – the usual age range of CTS is 40–60 years. Patients often report shaking their hand to alleviate the symptoms. The presence of this 'flick sign' was found to have a sensitivity and specificity of >90% in one study.[2]

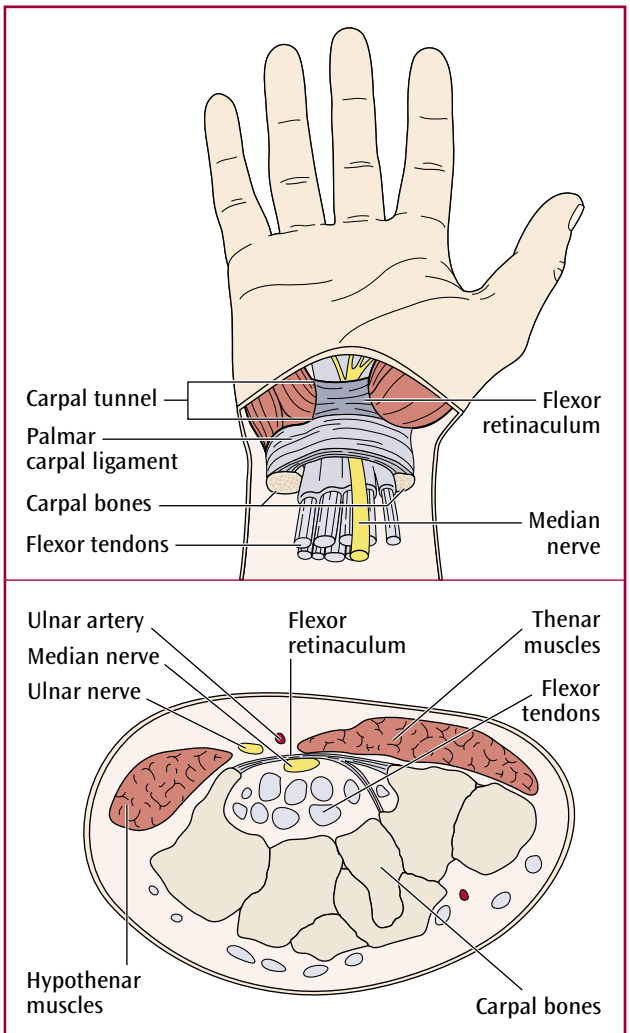

FIGURE 1. The anatomy of the carpal tunnel

Differential diagnosis

The differential diagnosis for symptoms such as those described above should include:

- other nerve entrapment syndromes such as ulnar nerve compression and C6/7 radiculopathy

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- tendon disorders
- demyelinating disease
- diabetic or other neuropathy – remember that diabetes is the commonest cause of mononeuropathy in UK patients but also that CTS is common in diabetes.

Associations

Most cases of CTS are idiopathic with no apparent association, but presentation of CTS-type symptoms in someone outside the usual age range or with bilateral symptoms may prompt further investigation. I now have a low threshold for at least checking a random blood sugar and thyroid levels in new cases.

CTS occurs more frequently in people with the following conditions:

- hypothyroidism
- rheumatoid disease
- diabetes mellitus
- pregnancy
- previous Colles' fracture
- amyloidosis
- acromegaly
- use of hand-held vibrating tools

NB: There is a positive family history in first-degree relatives in 1 in 4 patients.

Diagnostic tests and signs

Importantly CTS can be confidently diagnosed on history alone. Physical signs may be absent and diagnostic tests such as Phalen's and Tinel's are of confirmatory value only – neither test is more than 80% sensitive or specific.

Phalen's test

- Flex the wrist for 60 seconds and note occurrence of pain or paraesthesiae in the median nerve distribution.
- Phalen's test is positive in up to 75% of electromyography (EMG) proven cases but 20% false positives are found in controls.

Tinel's sign

- Tap lightly over the median nerve at the wrist.
- Positive test symptoms are distal lancinating paraesthesiae in the median nerve distribution.

EMG testing

- Shows delay in the latency of the motor unit action potential for the abductor pollicis brevis.
- False negative rates for neurophysiological examination of the median nerve have been estimated in several trials to be between 7 and 13%.[3]
- EMG testing is the standard diagnostic test of choice, but if a questionnaire is employed (see below) EMG testing can be reserved for atypical cases or to rule out more diffuse neuropathy, as in diabetics, when the response to treatment may be reduced.

Scored questionnaire versus EMG testing

A scored questionnaire can replace nerve conduction studies in the initial assessment of patients presenting with CTS.

The questionnaire is based on the work of Levine et al[4] and has been validated in secondary care for the diagnosis of CTS by Kamath and Stothard.[3] The results gave a sensitivity of 85% for the scored questionnaire compared to 92% for nerve conduction studies. Importantly the positive predictive value was 90% for the questionnaire and 92% for the nerve conduction studies. Symptom relief was taken as the 'gold standard' for true carpal tunnel syndrome.

Clinical questionnaire for the diagnosis of CTS*

INSTRUCTIONS:
Circle YES or NO and the score either + or –

- Has pain in the wrist woken you at night?
  YES 1 NO 0
- Has tingling and numbness in your hand woken you during the night?
  YES 1 NO 0
- Has tingling and numbness in your hand been more pronounced first thing in the morning?
  YES 1 NO 0
- Do you have/perform any trick movements to make the tingling, numbness go from your hands?
  YES 1 NO 0
- Do you have tingling and numbness in your little finger at any time?
  YES 0 NO 3
- Has tingling and numbness presented when you were reading a newspaper, steering a car or knitting?
  YES 1 NO 0
- Do you have any neck pain?
  YES –1 NO 0
- Has the tingling and numbness in your hand been severe during pregnancy?
  YES 1 NO –1 N/A 0
- Has wearing a splint on your wrist helped the tingling and numbness?
  YES 2 NO 0 N/A 0

TOTAL: .....

A score of 3 or more has been submitted to analysis in comparison with nerve conduction studies.
A score of 5 or more is recommended for use of the test as a diagnostic screening tool to replace nerve conduction studies.

* Reproduced from Appendix A from J Hand Surg [Br] 29(1):95-6 Kamath and Stothard, 'Erratum to: A clinical questionnaire for the diagnosis of carpal tunnel syndrome'.

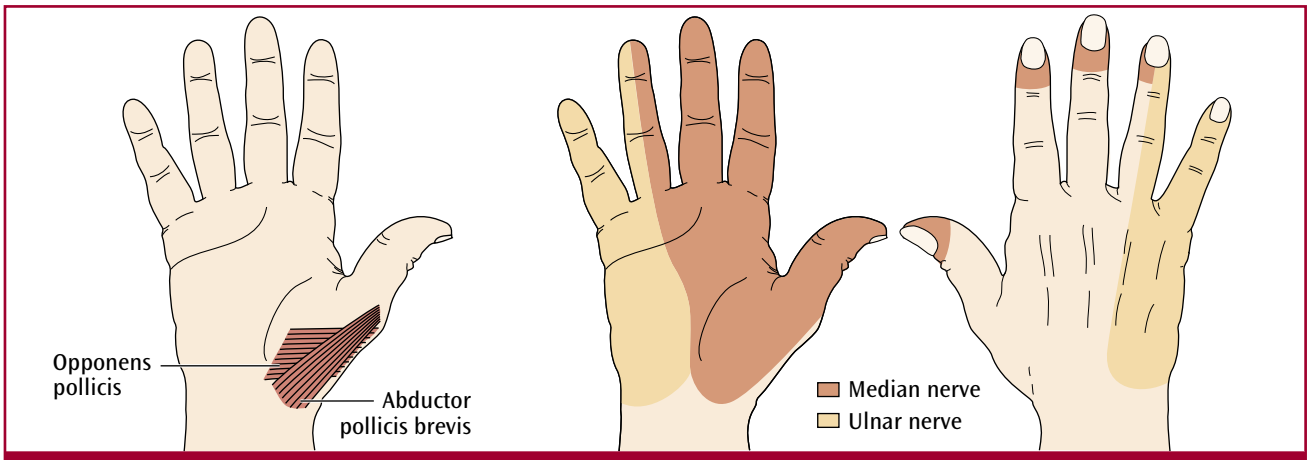

FIGURE 2. Aspects of median nerve function

Treatment options

Randomised controlled trials (RCTs) have shown no benefit with NSAIDs or diuretics over placebo. In the short term (4 weeks), oral steroids are better than placebo.[5] There are no long-term studies. Local steroid injections are better than oral prednisolone at 8–12 weeks. There are no studies on the use of intramuscular steroids. There are no RCTs assessing long-term outcomes of repeated injection compared to surgical decompression.

Modification of activities

This should apply to all patients and is particularly important for patients with elements of repetitive strain injury (RSI) or work-related upper limb disorder (WRULD). Sometimes advice from a community or employment occupational therapist should be sought. Some patients with WRULD have been shown to have reduced median nerve mobility on MRI scan ('tethering') but to be without CTS on nerve conduction testing.

Night splinting

Night splinting in a neutral position has been shown to be helpful to a greater or lesser extent in about 80% of cases. It has also been demonstrated that it reduces sensory latency, presumably by maintaining the carpal tunnel in a position that minimises pressure and ischaemia of the median nerve for enough time each night to allow more normal function. Velcro splints are inexpensive and many patients choose this option as a medium-term/intermittent treatment option. Patients who are very apprehensive about injections or surgery may wish to try splints.

Local corticosteroid injection

Patients who remain symptomatic after more conservative measures may be considered for injection of the carpal tunnel with steroid. An RCT of patients at a district general hospital (DGH) neurology clinic demonstrated improvement at 1 month in 20% of the placebo group and 77% of the intervention group. This single injection was still effective at 1 year in 50% of patients in the intervention group.[6] The associated risks of infection or nerve damage with a single injection of 1 ml hydrocortistab via an orange or blue needle are thought to be low but have not been formally studied. It is my practice not to infiltrate with lignocaine/steroid mixture, in order to avoid any unpleasant numbness of the hand after injection. Studies suggest that the risk of recurrence of symptoms, despite the relatively conservative treatments, is higher for patients with constant day and night symptoms or muscle atrophy (89%) than for those with intermittent sensory symptoms and no motor signs (60%).

Surgery

Surgery is the treatment option for anyone who has failed the above treatments. It may also be considered as a first- or second-line treatment for anyone presenting late in the disease process on the basis that they are unlikely to gain long-term benefit from a steroid injection if they have loss of sensibility of their finger tips and thenar muscle atrophy (see above and 'Comment' below).

Further reading

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COMMENT

Mr C Ramanathan
Consultant Plastic Surgeon
James Cook University Hospital, Middlesbrough

Most patients referred to a plastic surgeon/hand surgeon may have already received one or more of the combinations mentioned in this article under 'Treatment options'. Surgical release should be driven by patient preference and should be seriously considered where there are severe signs and symptoms of axonal loss. These include:

- *constant numbness*
- *symptoms for >1 year*
- *loss of sensibility of finger tips*
- *thenar muscle atrophy.*

Different surgical techniques

- *Traditional open procedure*
- *Endoscopic release using one or two portals (said to carry a higher risk of transient median nerve damage)*
- *Mini open release of the flexor retinaculum.*

Principles of traditional open procedure

- *Can be performed under local anaesthesia with tourniquet control*
- *Release of the flexor retinaculum*
- *Examination of contents to identify and treat any cause:*
  - *synovial tendon thickening, e.g. in RA*
  - *constriction/fibrosis in the nerve*
  - *local tumours, e.g. ganglion*
- *Haemostasis and skin closure only.*

Post-operative management

- *Bandage and elevation in a sling for 1–2 days.*
- *First week – use hand normally for essential activities only.*
- *Keep wound clean and dry until sutures removed.*
- *No heavy lifting for 2 weeks to assist wound healing.*
- *Most patients experience almost immediate pain relief, return of sensibility of the fingers, and return to normal sleep pattern.*
- *'Pillar pain' – pain over the thenar and hypothenar eminences with use: this is almost certainly because the origin of the muscles is, in part, from the flexor retinaculum. This mostly settles down within 2–3 months.*
- *75% of grip strength returns in 2–3 months, 100% in 6 months. Some patients (10–20%) may never regain full strength.*
- *In a small proportion of patients the scar may be a problem, being sensitive/painful/hypertrophic or keloid. All patients are advised to massage the scar regularly after suture removal to try to prevent these problems.*

Research

There is a need for an RCT comparing long-term outcomes of surgery against a course of local steroid injections.

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