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Carpal and Cubital Tunnel Syndromes

Dr Richard Mayne

GP Registrar and Academic Research Trainee (ST3), Struell Surgery, Downpatrick and Queen's University Belfast.

Email: rmayne02@qub.ac.uk

Twitter Handle: @themovingmedic

Dr Neil Heron

GP and Consultant in Sport and Exercise Medicine, Centre for Public Health, School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast.

Twitter Handle: @neilSportDoc

Introduction

Tingling, pain and numbness in the hand can be a major cause of morbidity for many people. Adequate hand and wrist function are required for a huge variety of daily tasks, therefore disorders of the hand and wrist can have significant detrimental effects on the quality of life of affected individuals. With any upper limb issue, it is important to consider hand dominance, occupation and pastimes of the affected person. This article focuses on the optimal diagnosis and management of carpal and cubital tunnel syndromes from a primary care perspective.

Clinical Case Scenario

Archana, a 52-year-old ward clerk in the local hospital, is seeking advice regarding intermittent tingling and numbness in her right hand over the past two months. Initially it occurred at night time, occasionally waking her from her sleep. It is now also happening during the day at times, such as when she is holding heavy files of patient notes in work. She is right-handed, with a recent diagnosis of type two diabetes mellitus and a body mass index of 31.2.

Main Section

Carpal Tunnel Syndrome

Epidemiology

Carpal tunnel syndrome is the most common peripheral nerve entrapment, with an annual incidence of approximately one person per thousand each year (Latinovic et al. 2006, Bowden et al. 2010). It is more

common in females, middle age, pregnancy, diabetes, obesity, hypothyroidism and autoimmune conditions such as rheumatoid arthritis (Bowden et al. 2010). There is expected to be an increasing incidence of carpal tunnel syndrome over future decades due to increasing levels of diabetes and obesity, combined with an ageing population (Palial et al. 2019).

Anatomy

In carpal tunnel syndrome, the median nerve is compressed within the carpal tunnel, beneath the transverse carpal ligament (also known as the flexor retinaculum) at the heel of the hand (Fig. 1). The median nerve originates from the medial and lateral cords of the brachial plexus, containing fibres from C5-T1 nerve roots. The median nerve innervates the palmar surface of the thumb, index and middle fingers and the radial half of the ring finger (Fig. 2). It also innervates the abductor pollicis brevis, opponens pollicis and lumbrical muscles of the middle and index fingers, which comprise the thenar eminence.

Presentation, Examination Findings and Diagnosis

The typical presentation is of tingling in the middle and index fingers and thumb, which is often worse at night. Patients often report shaking the hand to try to relieve symptoms. Symptoms can often be provoked by palmar flexion, such as holding a newspaper or steering wheel. Assessment of symptom severity can be aided by using a validated scoring questionnaire. Some questionnaires are too lengthy to be used feasibly in the primary care setting, however the Kamath and Stothard questionnaire (2003, see box 1) is short, simple and validated for its' diagnostic accuracy (Edwards and Frampton 2014, Sangram et al. 2019).

On examination, Tinel's (tapping repeatedly over the carpal tunnel) and Phalen's (palmar flexing the wrists, Fig. 3) tests can often provoke symptoms of tingling within 60 seconds, however they may be negative in early and mild cases. In severe cases there can be loss of manual dexterity, with weakness and wasting of the thenar muscles.

Differential diagnoses include cervical radiculopathy, cubital tunnel syndrome, diabetic neuropathy, thoracic outlet syndrome and neurological conditions such as multiple sclerosis.

Management

In conjunction with clinical examination findings, the Kamath and Stothard questionnaire can be used to guide management in the primary care setting. A score of less than three means carpal tunnel syndrome is unlikely, and an alternative diagnosis should be considered. A score of three or four means carpal tunnel syndrome is possible, and primary care treatments and referral for nerve conduction studies are indicated. A score of five or more, with consistent examination findings, means carpal tunnel syndrome is very likely. Primary care treatments are advised initially, with further management dependent on response to treatment. Depending on local referral criteria, if initial primary care treatment is unsuccessful, severe cases can be referred directly to hand clinic without the need for nerve conduction studies. Refer urgently, without delay, if there is evidence of established numbness, loss of dexterity or muscle wasting. Unnecessary referral for nerve conduction studies can result in greater expense and a delay in definitive treatment (Sangram et al. 2019). Nerve conduction studies should therefore be reserved for when there is diagnostic uncertainty, however they may still be required depending on local referral policy (Ryan et al. 2017).

In the primary care setting, patients can be advised that wearing a wrist splint can be helpful, particularly at night. In a randomised control trial of wrist splinting compared to no intervention, there were significant improvements in clinical symptoms in the intervention group, compared to the control group after eight weeks of follow-up (Hall et al. 2013). Wrist splints prevent palmar flexion, which often occurs when people are asleep.

Referral for physiotherapy can also be considered. A recent randomised control trial comparing physiotherapy with carpal tunnel release surgery showed similar outcomes among participants in both groups after four years of follow-up (Fernández-de-Las-Peñas et al. 2020). This trial also demonstrated physiotherapy to be significantly more cost-effective than carpal-tunnel release surgery (Fernández-de-Las-Peñas et al. 2019). It must be noted, however, that this approach requires patients to be well motivated in order to perform exercises at home, as well as having the availability of physiotherapists skilled in performing desensitization manoeuvres of the central nervous system. Nonetheless, given these promising findings, the uptake of physiotherapy in the management of carpal tunnel syndrome may become more widespread in the years ahead.

If appropriately trained, a steroid injection into the carpal tunnel can also be effective (Saunders and Longworth, 2018), although this often only provides temporary relief (see box 2 and Fig. 4). Two randomized controlled trials reported significant symptom relief for patients with carpal tunnel syndrome as a result of local corticosteroid injection, compared to placebo injection, after two and four weeks follow-up, with a relative risk of successful response of 2.58 (95% CI 1.72 to 3.87) (Armstrong et al. 2004, Dammers et al. 1999). Up to half of patients receiving local corticosteroid injection can have ongoing response up to one year post injection (Dammers et al. 1999.) There is a lack of evidence for other treatment modalities such as oral medication, acupuncture or therapeutic ultrasound.

Definitive management of carpal tunnel syndrome has traditionally been carpal tunnel release surgery (Verdugo et al. 2008). This is the most frequently performed hand operation in the United Kingdom, with approximately 53,000 procedures carried out every year (Palial et al. 2019). The procedure is typically performed under local anaesthetic as a day-case procedure. Although traditionally performed in hospital, it has been safely performed in the Primary Care setting over recent years (Palial et al. 2019). Carpal tunnel release surgery generally cures night-time tingling immediately. In some cases, reduced dexterity and numbness may not recover, especially in older patients. Following surgery, patients are typically advised to wear a sling for one to two days. They should use their hand for essential activities only for one week, and avoid heavy lifting for two weeks. They are also advised not to drive during the first one to two weeks.

Cubital Tunnel Syndrome

Epidemiology

Cubital tunnel syndrome is the second most common entrapment neuropathy of the upper limb (Latinovic et al., 2006). It is approximately 13 times less common than carpal tunnel syndrome (Latinovic et al. 2006, Assmus et al., 2015). Male gender, diabetes and obesity are risk factors (Assmus et al., 2015, Cutts, 2007).

Anatomy

Cubital tunnel syndrome usually involves compression and irritation of the ulnar nerve behind the medial epicondyle of the elbow. Rarely, the ulnar nerve can also get trapped at Guyon's canal in the wrist, as it passes through it to reach the palm of the hand. The ulnar nerve arises from the medial cord of the brachial plexus, containing fibres from C8 and T1 nerve roots. The ulnar nerve innervates the palmar and dorsal skin of the little finger and the ulnar half of the ring finger (Fig 2). It also innervates the flexor pollicis brevis and adductor pollicis muscles of the thumb and the hypothenar, interossei and lumbrical muscles of the little and ring fingers.

Presentation and Examination Findings

Patients typically present with tingling in the little and ring fingers. Symptoms can often be provoked by flexing or leaning on the elbow. In severe cases there can be loss of grip-strength and wasting of the hypothenar eminence. Tinel's percussion test is often positive behind the medial epicondyle, however this should be compared with the other side, as a positive Tinel's test at the elbow can often be a normal finding. Symptoms may also be provoked by holding the elbow in flexion. Differential diagnoses are similar to those of carpal tunnel syndrome.

Management

Injections or splints are not indicated in ulnar nerve compression. The patient should instead be advised to avoid provocative activities, such as prolonged elbow flexion. Persistent cases can be referred to an upper limb surgeon. Urgent referral is indicated with established numbness or muscle wasting in the ulnar nerve distribution. The ulnar nerve can be surgically released by performing a small incision behind the elbow, a relatively straightforward procedure with a short postoperative recovery period.

Key Points

- Carpal tunnel syndrome is a common condition, affecting approximately one patient per thousand each year.
- Cubital tunnel syndrome is less common than carpal tunnel syndrome, affecting approximately one patient per ten thousand each year.
- The diagnosis of carpal and cubital tunnel syndromes can often be made clinically, based on history, examination findings and response to treatments.
- Optimal management of carpal tunnel syndrome depends on severity, which can be assessed using validated scoring questionnaires and clinical examination.
- Nerve conduction studies are normally only required when there is diagnostic uncertainty regarding suspected carpal tunnel syndrome, depending on local referral guidelines.
- Initial management of carpal and cubital tunnel syndromes can be undertaken in primary care, with referral to secondary care for further management when indicated.

Box 1. Modified Kamath and Stothard Questionnaire			
Question	Response (circle)		Score
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 or numbness in your hand been more pronounced first thing in the morning?	Yes = 1	No = 0	
Have you been able to perform any trick movements that help ease the tingling or numbness in your hands*?	Yes = 1	No = 0	
Do you have tingling and numbness in your little finger at any time?	Yes = 1	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 score:			
<p>Suggested Management:</p> <p>Score <3: Carpal tunnel syndrome unlikely. Consider alternative diagnosis.</p> <p>Score 3-4: Carpal tunnel syndrome possible. Initiate primary care treatment and refer for nerve conduction studies.</p> <p>Score ≥5: Carpal tunnel syndrome likely. Initiate primary care treatment and refer to hand clinic if primary care treatment is unsuccessful, depending on local referral guidelines. Refer urgently if there is evidence of established numbness, loss of dexterity or muscle wasting.</p> <p>*wording changed slightly in this article to make original question clearer.</p>			

Box 2. Carpal Tunnel Injection Technique
<p>Injection Site</p> <p>The median nerve lies immediately under the palmaris longus tendon at the mid-point of the wrist, and medial to the flexor carpi radialis tendon. As not everyone has a palmaris longus tendon, ask the</p>

patient to press tip of their thumb onto tip of their little finger. The crease at mid-point of the palm points to where the median nerve should run.

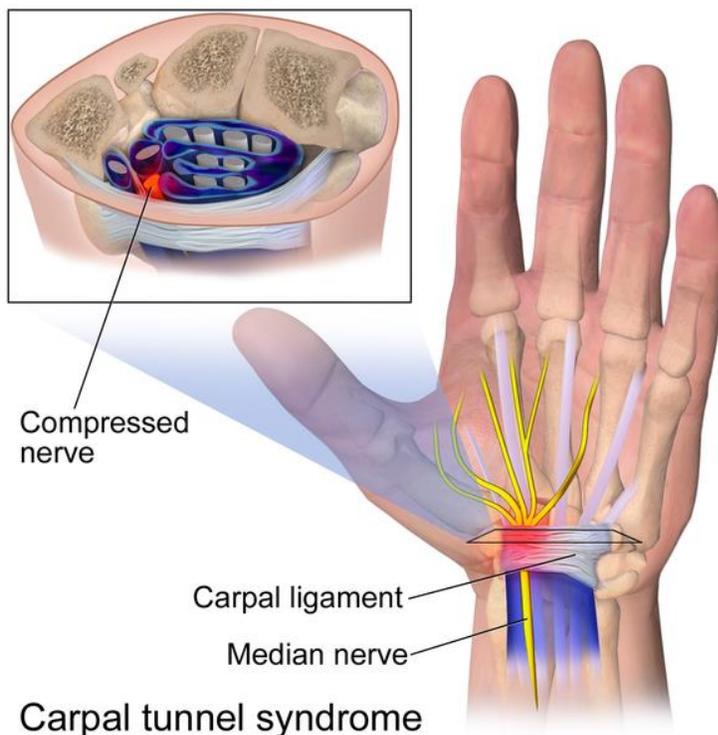
Injection Technique

- Ensure injection is appropriate, there are no contraindications, and informed consent has been obtained prior to procedure.
- The injection is typically 0.5mg of kenalog 40mg/ml solution, using a blue needle. Local anaesthetic is not normally used because the main symptom is paraesthesia, not pain, and it is best to avoid increasing pressure within the carpal tunnel.
- Have the patient place their hand palm up, resting on a flat, sterile surface.
- Identify the point midway along proximal wrist crease, between flexor carpi radialis and median nerve.
- Insert the needle at this point, then angle it 45°. Slide the needle distally until the end of the needle lies under the mid-point of the transverse carpal ligament.
- Inject solution as a bolus (Fig. 4).

Post-Injection Care

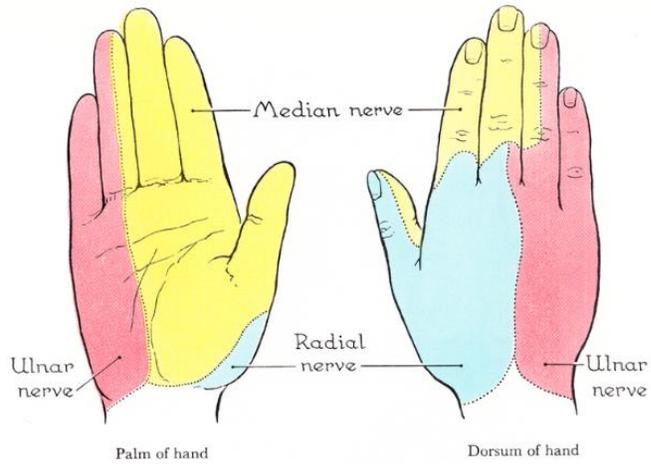
Advise the patient to rest the hand as much as possible for 1 week, before resuming normal activities. A night splint helps in the early stages to avoid the patient sleeping with the wrists held in flexion.

Figure 1. Median nerve compression in the carpal tunnel



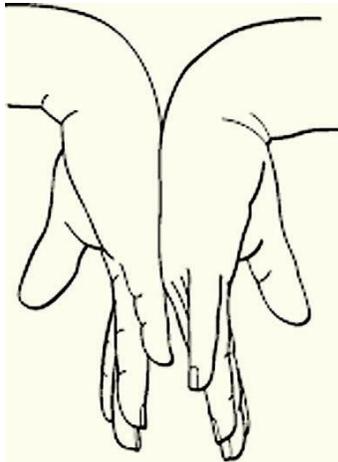
Blausen.com staff (2014). Medical gallery of Blausen Medical 2014. *WikiJournal of Medicine* 1(2). DOI: 10.15347/wjm/2014.010

Figure 2. Innervation of the hand



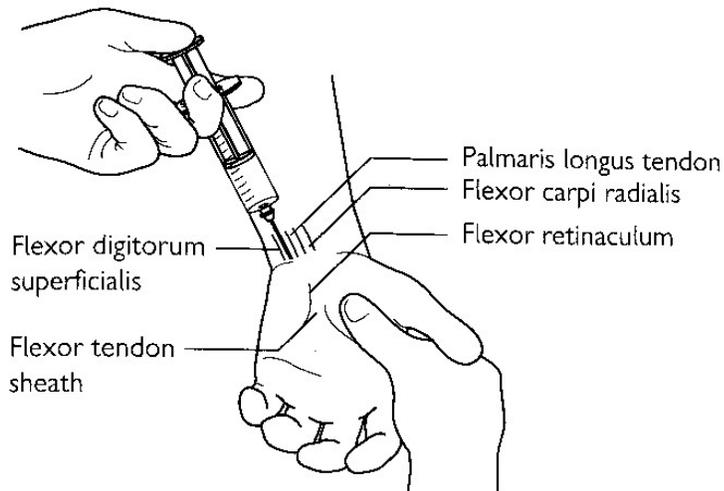
Grant, JCB (1962). *An atlas of anatomy, by regions, 5th edition*. Baltimore: Williams & Wilkins.

Figure 3. Phalen's Test



Davies R, Everitt H and Simon C. (2006) *Musculoskeletal Problems*. Oxford: Oxford University Press

Figure 4. Carpal tunnel injection



Simon C, Everitt H, van Dorp F, et al. (2014) *Oxford Handbook of General Practice, 4th Edition*. Oxford: Oxford University Press.

References and further information

Armstrong T, Devor W, Borschel L, et al. (2004) Intracarpal steroid injection is safe and effective for short-term management of carpal tunnel syndrome. *Muscle Nerve*. 29(1): 82-88. DOI: 10.1002/mus.10512.

Assmus H, Antoniadis G and Bischoff C. (2015) Carpal and cubital tunnel and other, rarer nerve compression syndromes. *Deutsches Arzteblatt international*. 112(1-2): 14-25. DOI: 10.3238/arztebl.2015.0014

Bowden G, McNally M, Thomas S, et al. (2010) *Oxford Handbook of Orthopaedics and Trauma*. Oxford: Oxford University Press.

Cutts S. (2007) Cubital tunnel syndrome. *Postgraduate medical journal*. 83(975): 28–31. DOI: 10.1136/pgmj.2006.047456

Dammers JW, Veering MM and Vermeulen M. (1999) Injection with methylprednisolone proximal to the carpal tunnel: randomised double blind trial. *BMJ*. 319(7214): 884-886. DOI: 10.1136/bmj.319.7214.884.

Edwards C and Frampton, I. (2014) Predicting the Outcome of Nerve Conduction Studies in Patients with Suspected Carpal Tunnel Syndrome: Using an Existing Carpal Tunnel Assessment Tool. *Open Journal of Therapy and Rehabilitation*. 2: 57-62. DOI: 10.4236/ojtr.2014.22010.

Hall B, Lee HC, Fitzgerald H, et al. (2013) Investigating the effectiveness of full-time wrist splinting and education in the treatment of carpal tunnel syndrome: a randomized controlled trial. *American journal of occupational therapy*. 67(4): 448-459. DOI: 10.5014/ajot.2013.006031

Fernández-de-Las-Peñas C, Ortega-Santiago R, Díaz HF, et al. (2019) Cost-Effectiveness Evaluation of Manual Physical Therapy Versus Surgery for Carpal Tunnel Syndrome: Evidence From a Randomized Clinical Trial. *Journal of Orthopaedic and Sports Physical Therapy*. 49(2): 55-63. DOI: 10.2519/jospt.2019.8483

Fernández-de-Las-Peñas C, Arias-Burúa JL, Cleland JA, et al. (2020) Manual Therapy Versus Surgery for Carpal Tunnel Syndrome: 4-Year Follow-Up From a Randomized Controlled Trial. *Phys Ther*. 100(11): 1987-1996. DOI: 10.1093/ptj/pzaa150

Kamath V and Stothard J. (2003) A Clinical Questionnaire for the Diagnosis of Carpal Tunnel Syndrome. *Journal of Hand Surgery*. 28(5): 455–459. DOI: 10.1016/S0266-7681(03)00151-7

Latinovic R, Gulliford MC and Hughes RA. (2006) Incidence of common compressive neuropathies in primary care. *Journal of Neurology, Neurosurgery and Psychiatry*. 77(2): 263-265. DOI: 10.1136/jnnp.2005.066696

Paliyal V, Kheiran A and Siddiqui S. (2019) Carpal tunnel decompression in primary care: what is the infection risk and is it safe and effective? *Annals of the Royal College of Surgeons of England*. 101(5): 353-356. DOI: 10.1308/racsann.2019.0036

Ryan D, Shaw A, Graham S, et al. (2017). Variation in CCG policies for the treatment of carpal tunnel syndrome. *The Bulletin of the Royal College of Surgeons of England*. 99(1): 28-31. DOI: 10.1308/rcsbull.2017.28

Sangram BS, Mayne AIW and Jariwala AC. (2019) Can we accurately predict nerve conduction study outcome using a carpal tunnel syndrome questionnaire? *The Surgeon*. 17(3): 156-159. DOI: 10.1016/j.surge.2019.02.001

Saunders S and Longworth S. (2018) *Injection Techniques in Musculoskeletal Medicine, 5th Edition*. London: Elsevier.

Simon C, Everitt H, van Dorp F, et al. (2014) *Oxford Handbook of General Practice, 4th Edition*. Oxford: Oxford University Press.

Verdugo RJ, Salinas RA, Castillo JL, et al. (2008) Surgical versus non-surgical treatment for carpal tunnel syndrome. *Cochrane Database Syst Rev*. 2008(4): CD001552. DOI: 10.1002/14651858.CD001552.pub2.