BSSH Evidence for Surgical Treatment 1

Carpal Tunnel Syndrome (CTS)

This guide on Carpal tunnel syndrome is based on evidence and current research and is intended to inform and guide tertiary referral.

Definition

Carpal Tunnel Syndrome (CTS) is caused by irritation or compression of the median nerve at the wrist. There is a community prevalence of between 1.3 and 4.9% (Atroshi, 1999; Bongers, 2007) but this figure may be higher – 7-16% (Ferry, 1998). CTS is commonest in people between the ages of 45 - 65 and commoner in women than men (3:1) (Bongers, 2007).
CTS presents with a variable clinical spectrum of signs and symptoms which may include:

- Paraesthesia - pins and needles or tingling in the thumb, index and middle fingers (median nerve territory), often nocturnal with night waking
- Hypoaesthesia or numbness in these fingers (median nerve territory) which can be constant in late or **severe** CTS
- Pain in the hand, palm and sometimes forearm
- Clumsiness and "dropping things"
- Weakness of pinch and grip
- Wasting of thenar muscles in late or **severe** CTS

Diagnosis is clinical and based on the typical patient profile, signs and symptoms and the use of provocative tests: **Tinel**, or tap, percussion test of the median nerve at the proximal wrist crease and the **Phalen** forced wrist flexion test. Together these provocative tests have a high sensitivity and specificity (Szabo, 1999).

Go to the top

Severity of CTS

- **Mild**
  - intermittent paraesthesia :
    - nocturnal
    - position of hand
    - pregnancy
    - hypothyroidism

- **Moderate**
  - constant paraesthesia
    - interference with activities of daily living
    - constant night waking
  - reversible numbness and/or pain (perhaps by clenching and unclenching of fist or hand shaking)
- **Severe**
  - constant numbness or pain,
  - wasting of thumb muscles and/or
  - weakness of thumb muscles

Go to the top

Evaulation

The Boston questionnaire (Levine, 1993) is a self-administered but validated tool which measures severity of CTS, effect of this on hand function and outcomes of various therapeutic interventions for CTS. This is a valuable tool in assessing different treatments for CTS.

Go to the top

Electro-physiological studies

Confirmation of the diagnosis of CTS with **electro-physiological testing** (nerve conduction studies and/or electro-myography) is both specific and sensitive – of the order of 95% (Chang, 2008). These studies are, however, usually reserved for equivocal diagnoses and are not required routinely.

Situations where these tests may be indicated include:

- atypical or bilateral symptoms and/or suggestive of neck involvement or "double crush" syndrome (Hurst, 1985)
- exclude peripheral neuropathy
- persistent symptoms after surgery
- medico-legal or occupational indication
- diagnostic confusion

Go to the top

Consevative treatment

- It is possible that untreated CTS will resolve or significantly improve in anything between 34% (Futami 1997 – quoted in O'Connor 2003) and 49% (Padua 2001) of cases.
- As a significant proportion of all CTS cases may improve without treatment, interventions based on sound evidence obtained by Level I or II trials should form the basis of treatment protocols. (USPSTF 2003; JHS[A] 33A, Jan 2008; page A18).
  - Most published trials suffer from error due to non-homogenous patient population starting points.
- **Conservative treatment** with local steroid injection (Dammers 1999, Marshall 2007), nocturnal neutral wrist splint, oral steroids, hand therapy (median

nerve gliding exercise, carpal bone mobilisation, ultrasound) and yoga may all provide temporary relief (O'Connor 2003). None of these has been shown to provide relief for greater than 2 months compared to controls.

- Of these, local **steroid injection** would appear to offer the most predictable effect (Weiss 1994, Graham 2004, Dammers 2006) although Marshall 2007 (Cochrane review) states the evidence for benefit ***beyond one month is not clear***. In the Verdugo Cochrane review (2003) one study (Ly-Pen 2005), which was not formally reviewed, would appear to show benefit of steroid injection at up to 1 year. Steroid injection is less likely to be effective in those with severe symptoms, older patients, diabetics and those with symptoms lasting for over 1 year (Burke 2005). There is no evidence for giving more than one injection and the main risk is injury to the nerve.
- ***Pregnancy and hypothyroidism*** remain the most obvious indications for steroid injection (Gelberman 1980, Burke 2005). Relief from a single injection is often so prompt, however, that a single injection may be used for either diagnosis or to help ease the painful tingling until surgery is available.
- There is poor evidence to suggest that **work-place modification** (ergonomic adjustments) or physiotherapy help in the management of work-related carpal tunnel syndrome (Verhagen, 2006). This is because most trials have wide heterogeneity of patients and treatments.

Go to the top

Surgery

- **Surgical division** of the transverse carpal ligament, either by conventional open release, or by endoscopic release, results in resolution of symptoms (Gerritsen, 2002; Verdugo, 2003; Scholten, 2004; Leit, 2004; Scholten, 2007; Hui , 2005).
- This improvement is durable, reliable and relatively risk-free (Boeckstyns 1999; Scholten, 2007) when performed by appropriately trained surgeons.
- Carpal Tunnel Release (CTR) is thus indicated for:
  - failed conservative treatment
  - severe symptoms at presentation
  - various "disease" states (Leit, 2004) may alter the natural history of CTS and CTR should be considered differently, perhaps earlier:
    - diabetes,
    - rheumatoid arthritis,
    - older people
    - CTS and cervical spondylosis often occur together and may exacerbate one another: "double crush" (Hurst, 1985)

Go to the top

British Society for Surgery of the Hand recommendations for Treatment

- **Mild / Moderate** (Primary care treatment)
  - Exclude pregnancy, hypothyroidism, and diabetes clinically and/or by investigation:
    - Nocturnal, neutral wrist splint
    - Consider activity / work-place modification (if clear association apparent) and referral to hand therapy service (Storey, 2007)
    - Consider steroid injection proximal to wrist crease if trained injector available (Tavares, 1996).

- **Severe** (Tertiary treatment)
  - Indication:
    - failed non operative treatment
      - (unchanged or increasing severity of symptoms > 3 months),
    - severe signs/ symptoms, elderly, diabetics.

  - Open / endoscopic carpal tunnel release

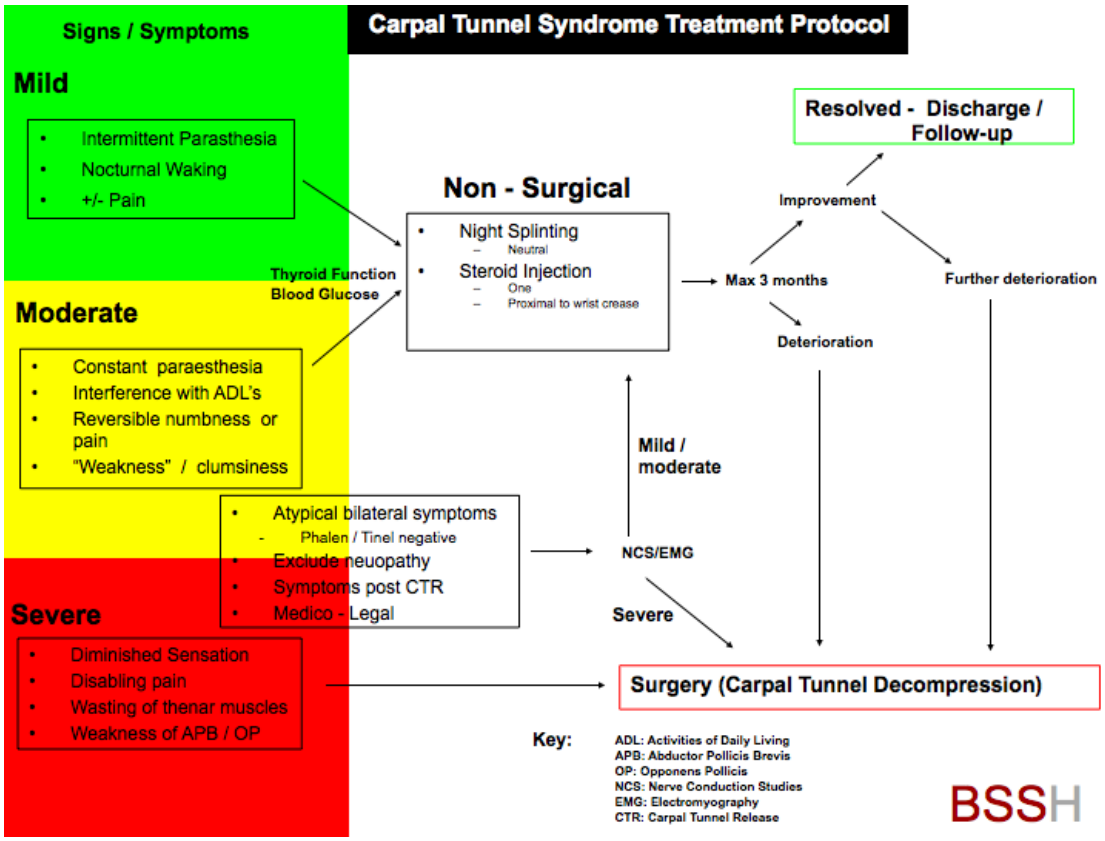
Treatments without evidence:

No effect is demonstrated for the following treatments which are **Not Recommended**:

- Diuretics (O'Connor, 2003)
- NSAID's (O'Connor, 2003)
- Vitamin B6 (O'Connor, 2003)
- Work-related Carpal Tunnel Syndrome – no clear association between work activities and development of "de novo" Carpal Tunnel Syndrome (Verhagen, 2006).

Go to the top

Treatment plan: diagram



Further guidelines from the American Academy of Orthopaedic Surgeons may be seen at: http://www.aaos.org/research/guidelines/CTS_guideline.pdf and http://www.aaos.org/research/guidelines/CTSTreatmentGuideline.pdf}

Go to the top

Research Opportunities

- Proper community-based study of untreated Carpal Tunnel Syndrome
- Proper community-based study of Carpal Tunnel Syndrome in the workplace with homogenous patient group(s) and interventions
- What steroid injection, how much, duration of relief in matched controls
- Proper randomised, controlled trial of splinting vs steroid vs surgery at 3, 6, 12 months in matched patients

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Go to the top

Go to