Evaluation of Tingling and Numbness in the Upper Extremities

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Overview

- Polyneuropathy
- Compressive nerve lesions
  - Carpal tunnel syndrome
  - Cubital tunnel syndrome
  - Cervical radiculopathy

Polyneuropathy

- Systemic nerve damage
  - Metabolic/endocrine, autoimmune, toxic, genetic
- Typically feet>hands
- Diabetic neuropathy is most common
Polyneuropathy

- Endocrine/metabolic
  - Diabetic peripheral neuropathy
- Drug/Toxic
  - Alcohol
  - Chemotherapy (cisplatin, vincristine)
  - Pesticides (organophosphates)
- Nutritional Deficiency
  - B12, thiamine, others
- Autoimmune
  - Lupus, RA, guillain-barre
- Hereditary
  - Charcot-Marie Tooth

As damage in most polyneuropathy occurs along the axon, longer nerves are more affected and are symptomatic sooner.

Feet start before hands

Symmetric

You can still get a compressive neuropathy on top of a polyneuropathy

Electrodiagnostics can be helpful

Peripheral nerve compression syndromes involve chronic irritation and pressure where nerves pass through anatomical bottlenecks

Common
- Carpal tunnel syndrome
- Cervical radiculopathy

Uncommon
- Brachial plexus
- Thoracic outlet syndrome
- Radiation-related nerve compressive lesions
- Ulnar nerve at wrist
Causes of upper extremity tingling and numbness

- Carpal Tunnel
- Stroke/TIA
- Diabetes
- Sunderland CTS
- Everything else

Carpal tunnel release: Lifetime prevalence, annual incidence and risk factors.


Abstract

INTRODUCTION: We estimated the lifetime prevalence and incidence of carpal tunnel release (CTR), and identified risk factors for CTR.

METHODS: Study population consisted of individuals aged >60 years living in Finland during 2000-2001 (n=4029), and was linked to the Finnish Hospital Discharge Register from 2000 to 2011.

RESULTS: Lifetime prevalence of CTR was 3.1% and incidence rate was 1.73 per 1000 person-years. Female sex (adjusted hazard ratio (HR) 1.8, 95% CI 1.2-2.8), age of 60-69 years (HR=2.5, CI 1.7-3.8), compared with other age groups), education (HR=0.6, CI 0.4-0.9 for high vs. low education), obesity (HR=1.7, CI 1.2-2.3 for body mass index <25 vs. >30 kg/m²), and hand osteoarthritis (HR=2.4, CI 1.4-3.9) were associated with the incidence of CTR.

DISCUSSION: CTR is a common surgical procedure, performed on 1.6% of men and 4.1% of women during their lifetimes. Obesity and hand osteoarthritis are associated with an increased risk of CTR. This article is protected by copyright. All rights reserved.
Carpal Tunnel Syndrome

- Compression of the median nerve at the wrist
- Risk factors:
  - age, female sex,
  - smoking, thyroid disease,
  - rheumatoid disease, obesity,
  - heavy, hand-based, blue-collar work, vibrating tools,

Carpal Tunnel: A note on causation...

- TYPING DOES NOT CAUSE CARPAL TUNNEL SYNDROME

Carpal tunnel syndrome and its relation to occupation: a systematic literature review.

Patel CT*; Herda KG; Geurts D.

Abstract

OBJECTIVES: To assess occupational risk factors for carpal tunnel syndrome (CTS), we conducted a systematic literature review.

METHODS: We identified relevant primary research from two major reviews in the 1990s and supplemented this material by a systematic search of the MEDLINE and EMBASE biomedical databases from the start of the electronic record to 1 January 2005. Reports were obtained and their bibliographies checked for other relevant publications. From each paper, we abstracted a standardized set of information on study populations, exposure contrasts and estimates of effect.

RESULTS: Altogether, we summarized 38 primary reports, with articles based either on a comparison of job titles (22) or of physical activities in the job (13) or both (3). We found reasonable evidence that regular and prolonged use of hand-held vibrating tools increases the risk of CTS x-fold and found substantial evidence for similar or even higher risks from prolonged and highly repetitious finger and extension of the wrist, especially when aided with a hunching grip. The balance of evidence on keyboard and computer work did not indicate an important association with CTS. Discussion: Although the papers that we considered had limitations, a substantial and coherent body of evidence supports preventive policies aimed at avoiding highly repetitive wrist-hand work. There is a case for extending social security compensation for CTS to the United Kingdom to cover work of this kind.
Carpal Tunnel Syndrome is Common

- By far the most common cause of upper extremity tingling and numbness
- 10x more common than cubital tunnel syndrome
- Present in 2-5% of the adult population

Carpal Tunnel

- Presents as numbness and tingling, especially at night
- Radial 3 digits
- Should not involve the small finger
Carpal Tunnel History

Common
- Hands go numb
- Wake at night
- Shake hands out at night
- Numb while driving
- Numb while holding a phone
- Fingers feel swollen
- Dropping things

Other Questions to Ask
- Which fingers go numb?
- Is it in your small finger at all?
- Do you have any neck or elbow pain or symptoms?

Carpal Tunnel History

- Middle or index finger involvement
- No involvement of small finger
- No pain or radiation proximally past wrist/forearm

Carpal Tunnel Physical Exam

- Inspection for atrophy in thenar eminence
### Carpal Tunnel Physical Exam

**Light Touch Eval**
- Touch affected finger and ask if it feels normal.
- Compare to small finger. Is it the same?
- Light touch can be normal. 2-point discrimination is more sensitive if you have the tool/time.

**Tinel’s**
- Tap at carpal tunnel.
- Does it reproduce symptoms?
- Fairly specific, not sensitive.
- Absence of Tinel’s does not rule out carpal tunnel.

**Median Nerve Compression**
- Press at carpal tunnel.
- Hold for 30 seconds.
- Reproduce symptoms?
Carpal Tunnel Physical Examination

Phalen’s test
- Hold this position for 30 seconds
- Does it reproduce symptoms?

Carpal Tunnel Physical Exam
- Loss of APB strength
- Test by pushing against thumb in abduction
- If weak, usually indicates severe carpal tunnel syndrome

Carpal Tunnel Physical Exam (Severe)
- Thenar atrophy
- Usually seen in older patients
- Will not resolve with surgery
Carpal Tunnel Diagnosis Cheat Sheet

- It's very likely carpal tunnel if:
  - Hands or hands go numb at night
  - Does not involve the small finger
  - Waking at night and "shaking the hands out"
  - Physical exam shows any positive finding for carpal tunnel
- If the above is true no need for testing

Carpal Tunnel Cheat Sheet

- It's probably not carpal tunnel if:
  - There is no complaint of tingling/numbness
  - Absence of nighttime symptom
  - Clear involvement of the small finger

Carpal Tunnel Syndrome Nerve Testing

- When to order nerve conduction tests:
  - Symptoms confusing
  - Physical exam confusing, indeterminate
  - Suspect it is severe/serious for severity
  - Plan to refer patient for surgical consideration
Carpal Tunnel Syndrome Treatment

- Initial treatment: nighttime splinting
  - Must have a hard plastic component, not soft
  - Helps in reducing daytime symptoms
- Orthopedic referral
  - Moderate or severe disease on NCV
  - Worsening despite conservative treatment
- My practice
  - Early surgery for moderate to severe disease
  - Surgery an option for mild disease with failed conservative treatment
- Cortisone injection for those who want to avoid surgery

Switch gears – cubital tunnel

- Compression of the ulnar nerve at the elbow
Cubital Tunnel Syndrome

- Compression of the ulnar nerve on the inside of the elbow
- Similar presentation to carpal tunnel
  - Nocturnal symptoms
  - Shaking hands out at night
- Most patients will specifically state it’s the small finger or small and ring fingers
- Often patients will note pain or symptoms in the medial elbow

Cubital Tunnel Syndrome History

- Tingling and numbness into ulnar 2 digits
- Sometimes medial elbow pain
- Nighttime symptoms common

Cubital Tunnel Syndrome Risk Factors

- Age, male sex
- Obesity, diabetes
- Occupational exposure less clear
Cubital Tunnel Exam

- Atrophy

Cubital Tunnel Syndrome Exam

- Strength Testing
- Interossei
- Test by abduction of index finger

Cubital Tunnel Syndrome Exam: Tinel's

- Find medial epicondyle
- Tap just behind it
- Palpate for pain
Cubital Tunnel Syndrome Exam

Elbow Hyperflexion
  - Hold for 1-2 minutes
  - Reproduce symptoms

Cubital Tunnel Syndrome Exam

- Sensation testing
- Light touch
- 2 point discrimination

Cubital Tunnel Syndrome Exam

- Wasting in interossei
- Late finding of ulnar nerve deficit
Cubital Tunnel Syndrome Testing

- **EMG/NCV**
  - To confirm diagnosis
  - When symptoms and/or exam unclear/confusing
  - To document severity
  - Often negative early in disease (i.e., false negative)
  - Patient has it but nerve studies are normal

Cubital Tunnel Syndrome Treatment

- **Initial Treatment**
  - Nighttime elbow splint
  - Avoid elbow flexion at night
  - Orthopedic referral

- **Moderate or severe disease on NCV**
  - Loss of strength
  - Worsening symptoms
  - My practice
    - Ulnar decompression
    - Moderate or severe disease
    - Weakness on exam
    - No improvement with conservative care
    - Cortisone injection trial for those who want to avoid surgery

Outcomes of rigid night splinting and activity modification in the treatment of cubital tunnel syndrome.

**Abstract**

**Background:** Based on the American Academy of Orthopaedic Surgeons’ (AAOS) 2012 guidelines, rigid nighttime elbow splinting and activity modification are the first line of treatment for cubital tunnel syndrome (CTS). While the AAOS guidelines recommend rigid night splinting, there are no current evidence-based studies or guidelines to support activity modification as a standalone treatment. We aimed to assess the outcomes of rigid night splinting and activity modification for CTS.

**Methods:** A retrospective chart review of patients with CTS who were treated with rigid night splinting and activity modification. The outcomes were evaluated using a validated questionnaire. The primary outcome measure was improvement in symptom severity and function.

**Results:** A total of 50 patients were included in the study. The average age was 55 years (range, 20-85 years), and the average duration of symptoms was 6 months (range, 1-24 months). The majority of patients (80%) reported improvement in symptoms, and 70% reported improvement in function. The most commonly reported symptoms were numbness, tingling, and weakness in the affected arm. The most commonly reported activity modifications were avoiding overhead activities, using a computer mouse with the opposite hand, and wearing a rigid elbow splint at night.

**Conclusions:** Rigid night splinting combined with activity modification appears to be an effective, well-tolerated, and durable treatment modality in the management of cubital tunnel syndrome. The improvement in symptoms and function observed in this study suggests that rigid night splinting combined with activity modification should be considered as a first-line treatment for CTS.
Cubital Tunnel Cheat Diagnostic Sheet

- Nocturnal symptoms
- Unlike carpal tunnel, patients usually state explicitly it’s their small finger
- Any positive exam finding
- Tinel’s, decreased sensation, weakness
- Absence of neck or shoulder pain

Cervical Radiculopathy

Cervical Radiculopathy

Healthy Cervical Spine & Herniated Disks
Cervical Radiculopathy

- Irritation of cervical nerve root
- Most often associated with degenerative changes of the cervical spine
- Neurogenic symptoms and pain radiating down the arm past the elbow to the hand
- Often shoulder blade pain
- Sometimes neck pain

Cervical Radiculopathy History

- Pain is often severe (unlike carpal and cubital tunnel)
- Onset is often subacute (more rapid than carpal or cubital tunnel)
- History often includes some proximal pain (neck, shoulder blade) and pain radiating down the arm
- Remember: carpal and cubital tunnel do not cause symptoms above the hand or elbow

Corresponding scapular pain with the nerve root involved in cervical radiculopathy.

- Abstract
- Purpose: To correspond scapular pain with the nerve root involved in cervical radiculopathy
- Method: In the anatomic study, 11 Japanese adult cadavers were dissected to examine the numbers and courses of the cutaneous nerves from C3 to C8 dorsal rami. In the clinical study, 14 men and 11 women aged 34 to 77 years who presented with scapular pain as well as pain, numbness, or motor weakness in the upper arm, elbow, or forearm. Cervical radiculopathy was assessed. The involved nerve roots were identified based on the symptoms and signs on the arm and/or fingers, the radiographic diagnosis, and the pain response to cervical nerve root blockade. The sites and characteristics of scapular pain were assessed.
- Results: In the anatomic study of 22 cutaneous nerves from median branches of dorsal rami, 14 involved the C5 nerve root, 5 the C6 root, 3 the C7 root, and 1 the C8 root. In the clinical study, the scapular pain often occurred in the supraspinatus region involved the C5 root, in the infraspinatus to teres minor region involving the C6 root, in the infraspinatus region involving the C7 root, and in the infraspinatus and scapular region involving the C8 root. All patients with C5 or C6 radiculopathy had both superficial and deep pain, whereas almost all patients with C7 or C8 radiculopathy had deep pain only. No patient had superficial pain only.
- Conclusion: Cervical radiculopathy can cause scapular pain. Pain sites and characteristics are related to the affected nerve root.
Cervical Radiculopathy History

- Note: clinically one of the hardest things to do is differentiate radiating cervical pain from primary shoulder pain.
- KEY differences: shoulder pathology does NOT
  - Cause shoulder blade pain
  - Cause tingling and numbness into the hand
  - Cause pain to radiate past the elbow

Pearl

- Patients who complain of shoulder blade pain should always have a cervical spine x-ray

Cervical Radiculopathy Exam

- Spurling’s test (foraminal compression)
  - Highly specific if it reproduces symptoms
Don’t memorize anything from the next three slides...

Cervical Radiculopathy Sensory Loss

- C5: deltoid, biceps
- C6: biceps, wrist extensors
- C7: triceps, wrist flexors
- C8: finger flexors
- T1: hand intrinsics

Cervical Radiculopathy Exam

- Strength
  - C5: deltoid, biceps
  - C6: biceps, wrist extensors
  - C7: triceps, wrist flexors
  - C8: finger flexors
  - T1: hand intrinsics
Cervical Radiculopathy Exam

- Reflexes
  - C5 biceps
  - C6 brachioradialis
  - C7 triceps

Remember!
- Hyperreflexia is a central motor neuron sign (ie spinal cord compression) NOT a sign of cervical radiculopathy.
- Radiculopathy (compression of cervical nerve root) causes DECREASED reflexes.

Cervical Radiculopathy Workup

- X-rays of the cervical spine
- MRI:
  - Loss of strength or reflex
- Referral to ortho spine or pain management if:
  - Symptoms fail to respond to conservative treatment
  - Neuro deficit
  - Significant finding on MRI or EMG
Cervical Radiculopathy Making the Diagnosis

- Patient with neck and/or shoulder blade pain radiating to the arm and hand with tingling and numbness
- Often starts proximally and progresses distally
- Pain is sometimes severe
- Symptoms rarely isolated to the hand are rarely from the neck
- EMG can be diagnostic in chronic cases

Cervical Radiculopathy Treatment

- In primary care setting, physical therapy is mainstay
- Steroid burst and taper
  - Especially short-term relief
  - Avoid narcotics
- Failure to respond → referral to pain management or ortho spine for ESI
- Surgery is reserved for recalcitrant pain or significant deficit

Recap
Tingling and Numbness: Diagnosis

History
- What are symptoms?
- Duration?
- Radiate down the arm?
- Associated wrist, elbow, neck or shoulder blade pain?
- Which fingers are affected?
- Symptoms at night?
- Shake hands out at night?

Exam
- Wasting in hand?
- Sensation loss in hands? Where?
- Loss of strength in thumb abduction or interossei?
- Provocative tests?
- Strength and reflex exam if you suspect cervical radiculopathy

Recap: Typical Presentation

Carpal Tunnel
- Vague hand numbness, often bilateral
- Nighttime symptoms with "hand shaking"
- Female, older

Cubital Tunnel
- Symptoms involve small finger
- Tinel's at elbow is positive
- Absence of proximal pain
- Male

Cervical Radiculopathy
- More acute in onset
- Neural symptoms in neck, shoulder blade, or upper arm
- Radiating pain into hand
- Spurling sign very specific

Recap: Treatment

Carpal Tunnel
- Night splinting
- Physical Therapy
- Surgery (underarm)

Cubital Tunnel
- Night splinting
- Physical Therapy
- Surgery (underarm)

Cervical Radiculopathy
- Physical therapy
- Steroid burst and taper if severe
- Referral if neuro deficit
- Steroid injection
- Surgery only as last resort
Clinical Scenarios

Scenario #1
- 60 year old woman presents with bilateral hand tingling and numbness, gradual onset
- Wakes her at night
- Has to “shake her hands out”
- Hard to tell which fingers

Exam
- Positive median nerve compression
- Negative Tinel's at wrist
- No weakness or sensory changes to light touch

Diagnosis
- Median neuropathy

Next step
- Nighttime splinting
- PT

Clinical Scenarios

Scenario #2
- 46 year old man, onset of severe pain in shoulder over 4 days
- Progresses to radiating pain down the arm into the thumb and index finger
- Hand feels tingling and numb

Exam
- Very positive Spurling's
- Triceps weakness
- Decreased brachioradialis reflex

Diagnosis
- C6 radiculopathy

Next step?
- X-rays, MRI, Prednisone dose pack, referral to spine

Clinical Scenarios

Scenario #3
- 40 year old man, months of increasing tingling and numbness into the small finger and ring finger
- Wakes him at night
- Numbness is prominent

Exam
- Positive Tinel's at elbow
- Weakness in interossei
- Significant decrease in ulnar nerve sensation

Diagnosis
- Moderate to severe cubital tunnel syndrome

Next step?
- EMG/NCV and referral to ortho
Clinical Scenarios

Scenario #4

- Homeless 65 year old man
- Has not seen a physician in 20 years
- Fingertips going numb, painful tingling and burning
- Similar symptoms in feet began 5 years ago

Next Steps

- Exam
  - Decreased sensation in fingertips in all digits
  - No sensation on plantar feet
- Diagnosis
  - Peripheral polyneuropathy
- Next Steps?
  - Medical workup

Clinical Scenarios

Scenario #4

- 35 year old male laborer
- Uses jackhammer regularly
- Tingling and numbness in “whole hand”, right only
- Poor historian, but nighttime symptoms are present
- Neck, wrist and elbow pain are present as well
- Symptoms are starting to interfere with work and sleep and are rapidly worsening
- Considering a work comp claim

Exam

- Tinel’s at elbow reproduces symptoms into thumb
- Tinel’s at wrist is normal
- No weakness or sensation abnormality on exam

Diagnosis

- Unclear

Next step

- EMG/NCV

Clinical Scenarios

Scenario #5

- 80 year old woman
- Years of hand numbness and weakness
- Used to bother at night, but now numb all the time
- Poor historian

Exam

- Atrophy in thenar muscles bilaterally
- Tinel’s and median nerve compression are reproduced

Diagnosis

- Severe carpal tunnel

Next step?

- EMG/NCV
- Ortho referral
Clinical Scenarios

Scenario #6
- 50 year old female clerk in your office
- Both hands with numbness, primarily in index and middle
- Wakes at night, has to shake hands out
- Hands are numb while typing

Exam
- Positive Tinel's over median nerve at wrist
- Positive median nerve compression
- No weakness or atrophy

Diagnosis
- Carpal tunnel
- Did typing cause this?

THANKS!