Carpal Tunnel Syndrome: Is It Work Related?

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Carpal Tunnel Syndrome is pressure induced dysfunction of the median nerve in the carpal tunnel of the wrist.
SYMPTOMS

• The symptoms of CTS are those caused by dysfunction of the sensory and motor components of the median nerve.
• Sensory symptoms include decreased sensation (numbness), tingling and pain.
• Motor weakness or atrophy of thenar muscles to thumb
DIAGNOSIS

• Lack of agreement on “gold standard”
• History & Clinical Exam rely on subjective input (thenar atrophy only exception)
  • Durkin, Phalen, Tinel’s, Hand sx. Diagram
• Electrodiagnostic Studies
  • Most objective
  • Have limitations
  • Should be used in conjunction with H&P
    • Confirmatory
Epidemiology

• Up to 10% of the general population will suffer from a compressive neuropathy
  • CTS most common
• Long standing changes may not reverse due to vascular insult and fibrosis
• Multiple risk factors identified
Risk Factors

- Obesity
- Hypothyroidism
- Diabetes
- Pregnancy
- Renal disease
- Inflam. arthritis
- Acromegaly

- Mucopolysaccharidosis
- Female Gender
- Genetic predisposition
- Age (> 50 years of age)
- Smoking
- Occupational exposure
Epidemiology

- 4\textsuperscript{th}-5\textsuperscript{th} decade (82%)
- Female:Male 3:1
- Correlates most with increased Body mass index (BMI)
- \(~50\%\) have bilateral CTS
- \(~400,000-500,000\) CTR per year
  - economic cost \(~\$2\) billion
  - worker’s comp cost 5X non-workers
Pathophysiology: Multifactorial

- Systemic disease creates “at risk” environment
  - Diabetes, hypothyroidism, smoking
  - Microvascular disease
- Symptoms develop when pressure exceeds nerve threshold
  - normal pressure 2.5mm Hg; ↓epineural blood flow/edema seen at 20-30mm Hg
Aggravators of Symptoms

• Symptoms increase with activities that increase pressure on median nerve within the carpal tunnel
  • Driving a car
  • Vigorous grasping
  • Operating heavy/vibrating equipment
  • Sleeping (wrist posture)
CTS Recognized as a “Multifactorial Disease”

may frequently be work-related... when such diseases affect the worker they may be partially caused by adverse working conditions; they may be aggravated, accelerated or exacerbated by workplace exposures; and they may impair working capacity. (*WHO* 1985).

(in contra-distinction to an “Occupational” Disease - direct cause and effect)
US Department of Health and Human Services

Has recently characterized carpal tunnel syndrome as a "worker-related upper extremity disorder," defining "worker-related" as "a disorder that affects workers, not as a disorder necessarily caused by work" (Chapell 2003).
Scope of Problem

• CTS accounts for more lost time than any other work-related problem (*US Bureau of Labor Statistics*)
  • Highest median lost days (27 days off vs. 20 days for a fracture – in 2000)
  • Still represents small percentage of w/c claims filed
Etiology: “Acute” CTS

- Rapid sustained increase pressure in CT
- Requires urgent surgical intervention
- Precipitating Factors
  - Wrist Trauma (Fractures)
  - High Pressure Injection Injury
  - Hemorrhage
“Chronic” CTS

4 Categories

• Idiopathic (unknown etiology)
  • Most cases of CTS
• Anatomic
• Systemic
• Exertional/Ergonomic
CAUSATION

SYSTEMIC
- Obesity
- Diabetes
- Renal Disease
- Rheumatoid
- Collagen-Vasc. & thyroid disease
- Pregnancy
- Smoking
- Aerobic Deconditioning

ANATOMIC
- Osteoarthritis
- Masses/Neoplasms
- Hematoma
- Small Wrist dimensions
- Fractures/Carpal Disloc.
- Injection Injury
- Burns

ERGONOMIC
- Awkward Posture
- High Repetition
- High Force
- Vibration
- Cold Environment
Exertional CTS

- CTS has been linked to repeated impact on the palm and Vibratory Tools
  - Vibration exposure associated with demyelination and fibrosis (Lundborg 1997)
- Link shown between heavy repetitive work in cold environment and CTS (Falkiner and Meyers 2002)
  - Boners (butchers)
  - Frozen food workers
Exertional CTS

• Extremes of wrist flexion/extension shown experimentally to increase pressures in the CT (Gelberman 1981)

• Finger flexion also shown to increases CT pressure (lumbrical muscles drawn proximally – Kier et al 1999)

• A direct relationship between repetitive (low force) work activity and CTS has never been objectively demonstrated
CAUSATION

• Routine occupational activities may unmask rather than cause CTS
  • Symptoms will be aggravated when pressure in CT increased
• Decision for work relatedness often more legal(administrative) than medical
Keyboard Use

• 2004 NIOSH Report
  • 50% claims for CTS filed by computer users
• Most common occupations listed by patients with CTS – homemaker, unemployed, retired
• No scientific evidence that prolonged keyboard can cause CTS (Anderson et al JAMA 2003)
Keyboard Use

• Carpal tunnel syndrome and keyboard use at work: a population-based study (Atroshi et al 2007)
  • Intensive keyboard use was associated with lower risk of CTS (unexpected)
  • A possible explanation could be voluntary restriction of use if users have CTS
  • Prospective studies needed
CONCLUSIONS

• Concept of Work-Related CTS is becoming more fixed (Cultural Concept)
• Reinforced by lay media and Internet
• Linking computer use to CTS is widespread yet remains speculative
• CTS primarily structural, genetic, & biological condition
  • occupational factors’ role more debatable
CONCLUSIONS

• CTS is a condition that affects workers but work may or may not be a significant contributing cause
  • Assigning causation can be inexact
• Whatever the cause if poorly managed CTS can have negative effect an one’s ability to work
Thank You!

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