CARPAL TUNNEL SYNDROME

By: Donald Barthel
Bradford & Barthel, LLP

Bradford & Barthel, LLP

@bradfordbarthel

bradfordbarthelllp

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CARPAL TUNNEL…

Is it *really* aoe/coe?

Examples of False Assumptions

- Carpal tunnel syndrome is usually occupationally related.
- Degenerative disk disease is due to cumulative trauma.
- Common medical diseases (e.g. hypertension, heart disease, “GERD”, …) are related to an injury.
- Why in athletic pursuits do we encourage activity and then in workers’ compensation arena blame activity?

ASSH Position Statement on Cumulative Trauma Disorder and Repetitive Strain Injury

- The American Society for Surgery of the Hand is concerned that patients with upper extremity pain are being assigned specific diagnoses on the basis of subjective complaints without objective physical findings. There is also a tendency to assign a causal relationship to work for this pain when there is a lack of epidemiological evidence. As part of our normal process of providing the best care for our patients, it is important that the diagnosis be accurate and the assignment of causation be correct.
- The American Society for Surgery of the Hand feels that the diagnoses of "cumulative trauma disorder" (CTD) and "repetitive strain injury" (RSI) are not appropriate and may actually lead the patient to believe that he or she has a condition that is something more than the ordinary aches and pains of life.

http://www.assh.org/Public/HandConditions/Pages/CumulativeTraumaDisorder.aspx

FACT

CTS is 2nd only to backs as most common injury in lost-time cases

FACT

CTS claimants tend to be...

OLDER
PAID MORE

Meaning CTS is even more expensive!

FACT

CTS surgery drives up average costs from

$1,500

to

$12,000

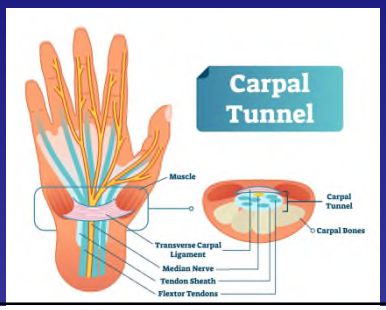
FACT

"[Doctors are] not getting histories and exams to get a proper diagnosis and they're not getting tests performed properly."

Dr. Teryl Nuckols, Health Services Researcher (RAND) (11/1/11, "Rand Study Author Hopes to Improve Treatment of Carpal Tunnel", Workcompcentral)

CARPAL TUNNEL SYNDROME (CTS)

- **Definition**: "A complex of symptoms resulting from compression of the Median Nerve in the carpal tunnel, with pain and burning or tingling paresthesias in the fingers and hand, sometimes extending to the elbow." – *Dorland's Medical Dictionary, 27th Edition*
- Most common upper extremity nerve entrapment syndrome.



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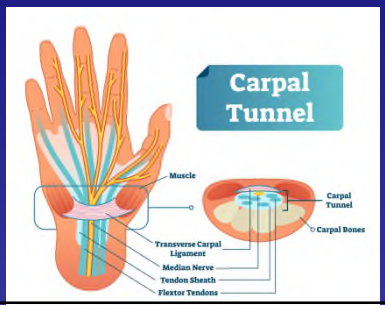
Hand Nerves

radial

ulnar

median



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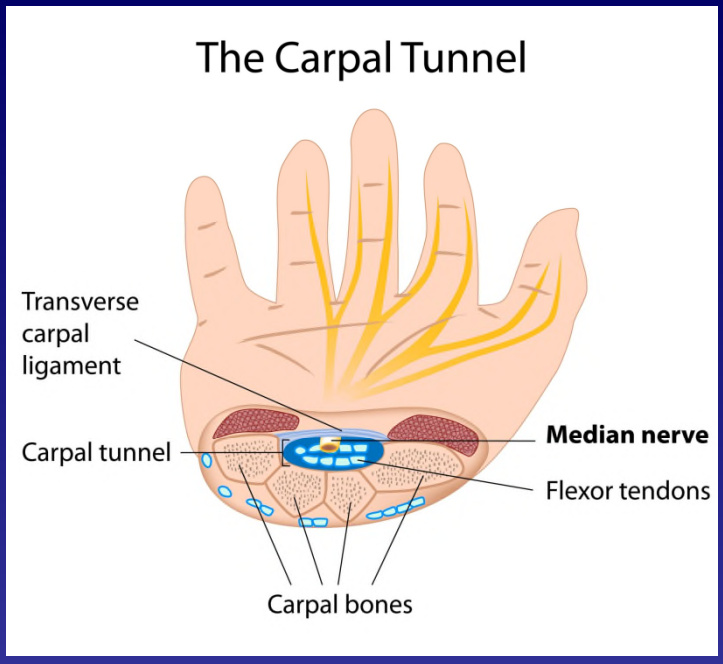
What's a "carpal tunnel"?

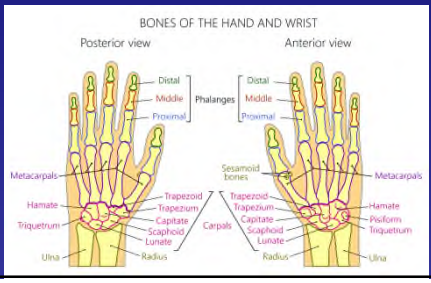
It really does look like a tunnel!

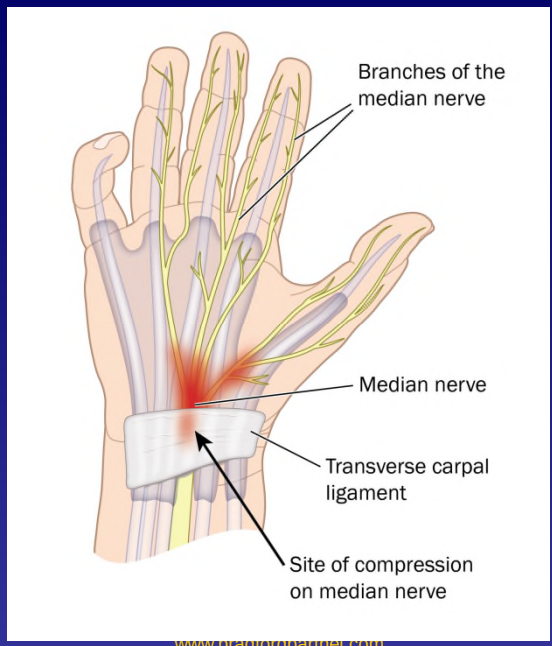


The “tunnel” includes

- U-shaped cluster of 8 bones at the base of the palm
- A ligament (“transverse carpal ligament”) arching across the bones

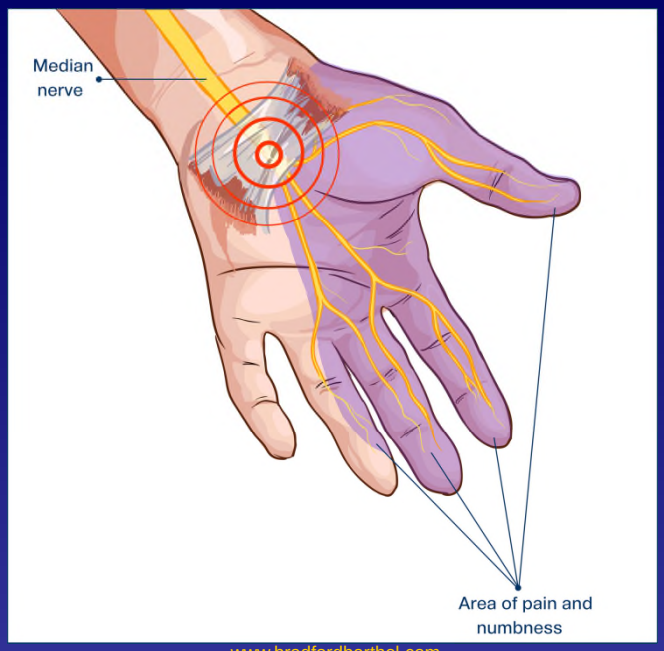
  -creates the tunnel’s “roof”





The median nerve goes through the “tunnel”, controlling sensations in the:

- Palm side of the thumb
- Index finger
- Middle finger
- Half of the ring finger



So what causes this condition?

- Pressure on the median nerve!
- Caused by anything reducing space in carpal tunnel.

Anything?

Yes…

- ANYTHING…from bone spurs to swelling of the tendons (tough tissue connecting muscles in the carpal tunnel)

Conditions that may cause:

- repetitive, forceful grasping with the hands
  - Industrial? (Maybe, Maybe not)
- repetitive bending of the wrist
  - Industrial? (Maybe, Maybe not)

Conditions that may cause:

- hormonal changes
  - Industrial? (Better not be!)

Conditions that may cause:

- arthritis
  - Industrial? (Unlikely!)
  - Forty-six million Americans currently living with arthritis
  - Nation's leading cause of disability
  - Increases caused by aging of the population (predominantly baby boomers)*

*Centers for Disease Control

Conditions that may cause:

- diabetes
  - Industrial? (Unlikely!)
- thyroid imbalance
  - Industrial? (Unlikely!)
- broken or dislocated bones in the wrist that cause swelling
  - Industrial? (Maybe, Maybe not)

Conditions that may cause:

- Tunnel Size
  - Industrial? (No way!)

Though the size of your wrist appears irrelevant, having a smaller carpal tunnel makes you more prone to CTS!

Conditions that may cause:

- Heredity
  - Industrial? (No way!)

Genes account for about half of cases!

Studies show a <u>much higher risk</u> in women who have an identical twin with the disorder compared with those with a nonidentical twin.*

*www.health.harvard.edu

Conditions that may cause:

- Metabolic Diseases
  - Industrial? (Unlikely!)

Examples:

diabetes

thyroid disease

Conditions that may cause:

- Autoimmune Diseases
  - Industrial? (Unlikely!)

Examples:

Rheumatoid arthritis

Lupus

Connective Tissue Disorders

Conditions that may cause:

- pregnancy
  - Industrial? (If so, AOE/COE issues are the LEAST of somebody's problems)

20% to 60% of pregnant women develop CTS

Symptoms usually disappear after birth (though can linger for a year!)

Conditions that may cause:

- Hormonal changes (other than pregnancy)
  - Industrial? (Unlikely!)

Example:

ovary removal (surgical menopause) increases CTS risk

www.bradfo

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Conditions that may cause:

- Body Weight
  - Industrial? (Unlikely!)

Being overweight/obese may <u>double</u> the risk of CTS

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It's as American as...

Apple Pie (and McDonalds!)

Between 1976–1980
and 2003–2004,
the prevalence of obesity
increased from15.0% to...
32.9%!!!

Source: CDC, http://www.cdc.gov/nccdphp/dnpa/obesity

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Cause of Carpal Tunnel Syndrome

Primary Factors (supported by current science)

- Genetics
- Age
- Obesity
- Gender
- Smoking

"…medical literature suggests most cases previously labeled as occupationally related were neither caused nor aggravated by work." (*Guides Newsletter*, May – June 2009)

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"Contrary to popularly held belief, no strong scientific evidence links computer use to carpal tunnel syndrome."*

Who says that?
The defense bar?
No!
The insurance industry?
No!

What radical, employee-hating outfits make such preposterous claims?

*THE MAYO CLINIC!!!!

*HARVARD PRESS!!!!

ALSO…

Up to two-thirds of people with presumed "occupational" CTS were found to have other medical conditions capable of causing CTS!!!!

And another thing….

A study of 5,600 workers found workplace computer use does not pose a risk of CTS.*

*Journal of the American Medical Association (2003)

One more thought…

A recent study found that "heavy computer users" (up to seven hours/day) did NOT face an increased risk of CTS!!!!*

*See Neurology (2001) **

That's the Official Journal of the American Academy of Neurology (AAN)

A cure…?

CT cases decreased (nationally) by:

21% in 2006[1]

[1]Bureau of Labor Statistics

Prof. & Bus. Service Employees:

2005 to 2006, CTS cases

Decreased by…

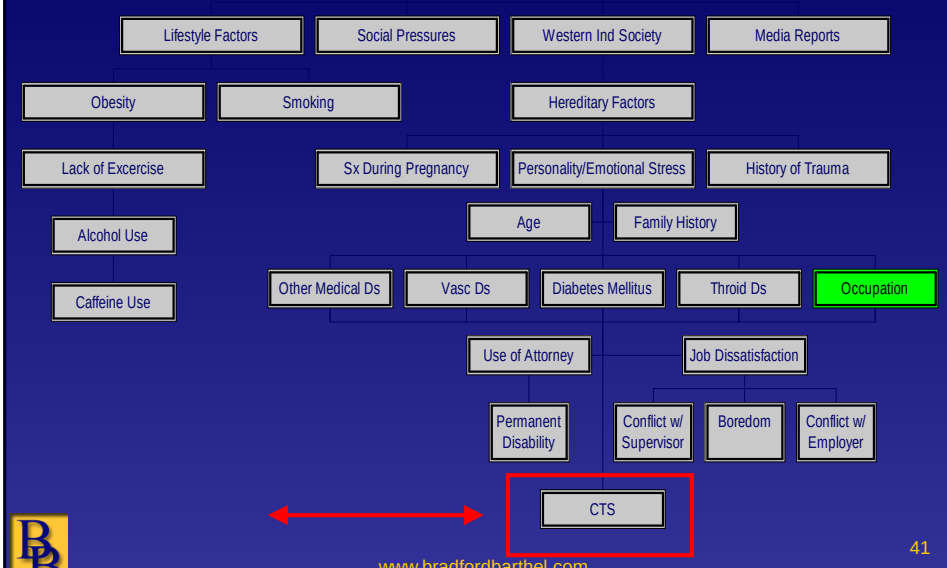
HALF!!!![1]

[1] Bureau of Labor Statistics

CTS "Risk Factors"

Age	Tobacco	+/-Weight lift	Trigger digit
Female	Caffeine	Amyloid	Lateral. epi
Obese	Alcohol	Prior CTS	Mult. myeloma
Diabetes	Renal failure	corticosteroid use	Polyneuropathy
Hypothyroid (?hyper)	Hepatitis C	Raynaud's	Dieting
Wrist arthritis (OA)	Acromegaly	Systemic Sclerosis	Varicose Veins
Rheumatoid arthritis	Knitting/crochet	Breast size	Perimenopausal
Gout	Toxic oil syndrome	Polymylagia rheumatica	Hysterectomy
Systemic lupus	Fractures	Transthyretin mutation	Thumb CMC OA
High demand	Trauma	Liver transplant	Kidney transpl
Short stature	Cushing's synd.	Family history	Leprosy
Hypertension	Cushing's dz	Lyme disease	'Tendinitis'
BCPs	AV Fistulae	Fibromyalgia	Ganglia
Pregnancy	Estrogen/HRT	↓ vitamin C	Ulnar neurop.
Genetics	Wheelchair use	↓ vitamin B_6	Anatomic abn

Web of Causation for CTS



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"Computer use deleted as carpal tunnel syndrome cause." [1]

"Clearly, if keyboarding activities were a significant risk for carpal tunnel, we should have seen, over the last 10 to 15 years, an explosion of cases. If keyboarding were a risk, it cannot be a strong factor."

Dr. Kurt Hegmann, Director
Rocky Mountain Center for Occ. & Environ. Health
Quoted 3/9/08, in AP article: "Feared Workplace ailment drops sharply – but why?"

[1] Harvard University press release (2005)

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STRONG AOE/COE CONNECTIONS

- heavy and repetitive assembly line work
- work involving prolonged, heavy gripping
- use of vibrating tools*

***(www.mayoclinic.org/.../index.html, 2/2/07)**

APPROPRIATE TESTING FOR CTS?

APPROPRIATE TESTING FOR CTS?

- Physical exam
- Routine lab tests (x-rays, blood tests)

*diabetes?

*athritis?

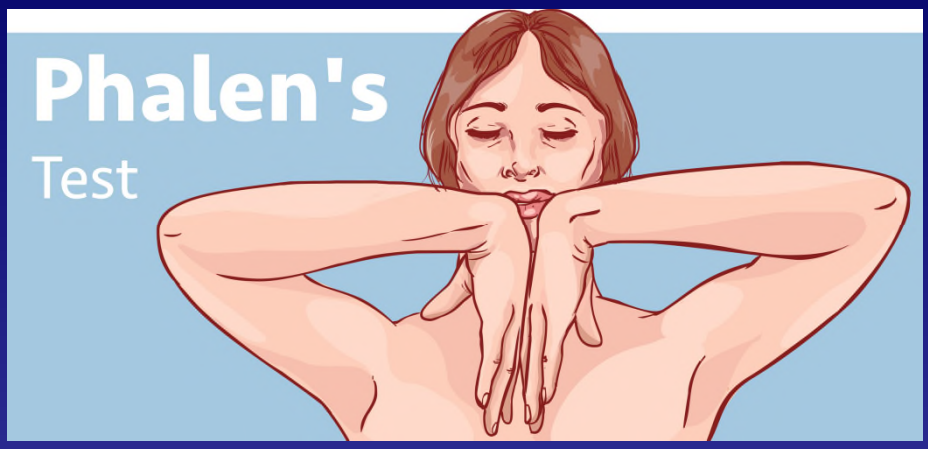
*fractures?

APPROPRIATE TESTING FOR CTS?

- Tinel Test:
  - *doctor taps/presses median nerve
  - *positive if causes tingling or "shocklike" sensation in fingers

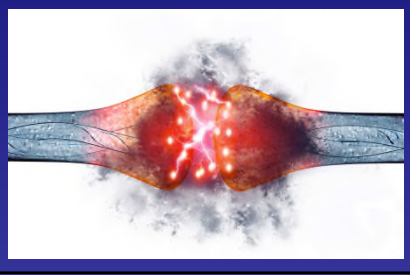
APPROPRIATE TESTING FOR CTS?

- Phalen (aka “wrist flexion”) Test:
  - *involves holding the elbows straight and flexing the hand & wrists
  - *positive if fingers tingle/feel numb after one minute



APPROPRIATE TESTING FOR CTS?

- Nerve Conduction Velocity (NCV) Test:
  - *administers weak electric shocks via small electrodes on hands/wrists
  - *electrodes measure how quickly nerves transmit impulses



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APPROPRIATE TESTING FOR CTS?

- Electromyography (EMG):
  - *clinician inserts needle into muscle to measure electrical activity
  - *this reveals severity of median nerve damage

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CTS Treatment

- Non-surgical
  - Splinting
  - Medical management of systemic disease
  - If Vitamin B_6 deficient, pyridoxine
  - Corticosteroid injection into carpal tunnel
- Surgical
  - Endoscopic
  - Open
- Treatment should decrease or resolve impairment and disability.

CTS Treatment Options?

- BRACING:
  - Need to rest affected hand at least two weeks
  - Helpful in early CTS stages (esp. when primary complaint is numbness/pain at night)

CTS Treatment Options?

- MEDICATIONS:
  - No evidence that most meds will help, including:
    - *NSAIDS (aspirin, ibuprofen, naproxen)
    - *COX-2 medications (ex. Celebrex)

Corticosteriod pills should not be used more than 1-2 weeks

CTS Treatment Options?

- CORTICOSTERIOD INJECTIONS:
  - Effective for symptom relief (esp. in younger patients with short history of complaints)
  - Long-term benefits?
- Mixed
- Studies show, for most, pain returns within 2 to 4 months
- May ease symptoms more effectively than surgery in first three months, but both are "equally effective" after one year

CTS Treatment Options? (cont'd)

- SURGERY:
  - Goal: create more space in the tunnel
  - Method: releasing the traverse carpal ligament
  - Options: "open" vs "endoscopic"

Open Procedure

2 in. incision in hand/wrist to enlargen carpal tunnel

Pros: Allows surgeon to see wrist anatomy clearly
Decreases risk of injury to other nerves

Cons: Scar more tender
Recovery longer than endoscopic

Endoscopic Surgery

One or two smaller (1/2 in) incisions in wrist & palm

Camera attached to tube (endoscope) is inserted to view cutting of carpal ligament

Pros: Smaller incision = less scarring + speeds recovery

Cons: Higher risk of complications
Ex. Damaging median/ulnar nerve

SUCCESS RATES*

Very high for *both* types of surgery

How high?

"80% to 90% of people report relief of daytime and nighttime symptoms after six weeks."*

*www.health.harvard.edu

This means—of course—that you'll see success in the

VAST MAJORITY

of your workers' compensation CTS claims!

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The AMA *Guides*

&

RATING CTS

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CTS Case Assessment Standards

- Determine if diagnosis is accurate
  - Was the diagnosis supported by appropriate electrodiagnostic studies?
- Assess whether at maximal medical improvement.
  - Whether adequate time for resolution of impairment?
- Adequate medical documentation
  - Are there medical records and adequate history in regards to past medical history and other risk factors (medical disease, obesity, tobacco usage)?

CTS Case Assessment Standards

- Assess reliability of functional status.
  - Are the subjective complaints of interference in activities of daily living accurate?
- Assess reliability of physical examination findings
  - Was the physical examination consistent with standards defined in the *Guides*?
- Determine etiology of carpal tunnel syndrome (apportionment).
- Apply *Guides* process and criteria, as specified in appropriate edition of the AMA *Guides.*

Impairment Assessment

1762 carpal tunnel cases analyzed

Error rate 69% with Fifth Edition and 62% with Sixth Edition

16.5d Entrapment/Compression Neuropathy (5th ed, 491-495)

- "Objectively verifiable diagnosis"
- "Not only on believable symptoms but, more important, on the presence of *positive clinical findings and loss of function"*
- "Diagnosis should be documented by electromyographic studies as well as sensory and motor conduction studies"

Carpal Tunnel Syndrome

- Normal sensibility, opposition strength, nerve conduction studies = 0
- Normal sensibility/strength
  "abnormal sensory and/or motor latencies
  or…EMG testing
  = no greater than 5% UE (3% WPI)
- Positive clinical finding of median nerve dysfunction *and* electrical conduction delay(s).

CTS Impairment Options

- 0%
- "not to exceed 5%" = 0-5% UE
- Valuation based on sensory and/or motor deficits

Carpal Tunnel Syndrome (5th ed, 495)

If after an optimal recovery time following surgery, continues to be symptomatic:

1. Positive clinical findings of median nerve dysfunction and electrical conduction delay: the impairment due to residual CTS is rated according to the sensory and/or motor deficits

Table 16-15 (5th ed, 492)

Maximum Upper Extremity Impairments

Table 16-15 Maximum Upper Extremity Impairment Due to Unilateral Sensory or Motor Deficits or to *Combined* 100% Deficits of the Major Peripheral Nerves

	Maximum % Upper Extremity Impairment Due to:		
Nerve	**Sensory Deficit or Pain** *	**Motor Deficit†**	***Combined* Motor and Sensory Deficits**
Pectorals (medial and lateral)	0	5	5
Axillary	5	35	38
Dorsal scapular	0	5	5
Long thoracic	0	15	15
Medial antebrachial cutaneous	5	0	5
Medial brachial cutaneous	5	0	5
Median (above midforearm)	39	44	66
Median (anterior interosseous branch)	0	15	15
Median (below midforearm)	39	10	45
Radial palmar digital of thumb	7	0	7
Ulnar palmar digital of thumb	11	0	11
Radial palmar digital of index finger	5	0	5
Ulnar palmar digital of index finger	4	0	4
Radial palmar digital of middle finger	5	0	5
Ulnar palmar digital of middle finger	4	0	4
Radial palmar digital of ring finger	3	0	3
Musculocutaneous	5	25	29
Radial (above arm with loss of triceps)	5	42	45
Radial (below with sparing of triceps)	5	35	38
Subscapular (upper and lower)	0	5	5
Suprascapular	5	16	20
Thoracodorsal	0	10	10
Ulnar (above midforearm)	7	46	50
Ulnar (below midforearm)	7	35	40
Ulnar palmar digital of ring finger	2	0	2
Radial palmar digital of little finger	2	0	2
Ulnar palmar digital of little finger	3	0	3

* See Table 16-11a to grade sensory deficits in pain

† See Table 16-11a to grade motor deficits.

* From Swanson AB, de Groot Swanson G. Evaluation of permanent impairment in the hand and upper extremity: In: Drage JC, ed. Guides to the Evaluation of Permanent Impairment. Fourth ed. Chicago, Ill: American Medical Association; 1993.

Table 16-15 (5th ed, 492)

Median (below midforearm)	39	10
Radial palmar digital of thumb	7	0
Ulnar palmar digital of thumb	11	0
Radial palmar digital of index finger	5	0
Ulnar palmar digital of index finger	4	0
Radial palmar digital of middle finger	5	0
Ulnar palmar digital of middle finger	4	0
Radial palmar digital of ring finger	3	0

Tip: Identify specific portion of median nerve involved, do not automatically rate for loss of entire median nerve. If all digits involved, the differential diagnosis is symptom magnification, peripheral neuropathy, or multiple entrapments.

Table 16-10 (5th ed, 482)

Determining Impairment of the Upper Extremity Due to Sensory Deficits of Pain

Grade	Description of Sensory Deficit or Pain	% Sensory Deficit
5	No loss of sensibility, abnormal sensation, or pain	0
4	Distorted superficial tactile sensibility (diminished light touch), with or without minimal abnormal sensations or pain, that is forgotten during activity	1-25
3	Distorted superficial tactile sensibility (diminished light touch and two-point discrimination), with some abnormal sensations or slight pain, that interferes with some activities	26-60
2	Decreased superficial cutaneous pain and tactile sensibility (decreased protective sensibility), with abnormal	61-80
1		
0	Absent sensibility, abnormal sensations, or severe pain that prevents all activity	100

Tip: Most post carpal tunnel release are Grade 5 or 4, less commonly 3. Be careful of Grade 2, 1 and 0 – more likely than not to be erroneous – based on subjective reports.

Sensory Assessment

- Examinee self-reports often unreliable.
- Based on objective sensory findings, as explicitly defined in *Guides* including two point discrimination and sensibility testing.

The Guides Newsletter

Expert advice, practical information, and current trends on impairment evaluation

September/October 2009

In this issue

Examinee Reported History

Lower Extremity Workbook Exercises: Q and A

Book Review: Guides to the Evaluation of Disease and Injury Causation

Calendar of Events

In upcoming issues

Complex Regional Pain Syndrome Update

Rating by Analogy: Abusing the Guides Fifth Edition Reflections

Comparison of Two Jurisdictions: California vs Hawaii

Observations on the Sixth Edition: Improvement in Impairment Assessment

The Guides, Sixth has been reprinted!

The Guides to the Evaluation of Permanent Impairment, Sixth Edition, has been reprinted to incorporate updates to the original edition—all found in the Clarifications and Corrections document released in 2008. The reprinted books have been shipping since June 1, 2009. But please e-mail guides@ama-assn.org with any questions or concerns.

AMA AMERICAN MEDICAL ASSOCIATION

Examinee-Reported History Is Not a Credible Basis for Clinical or Administrative Decision Making

by Robert J. Barth, PhD

Clinicians often rely on the history that is reported by examinees. For example, an examinee might report that he or she did not have back pain prior to lifting an object at work, and since lifting that object, he or she has had chronic disabling back pain. Clinicians often rely on such history for several types of clinical decision making. For example, such reports factor into conclusions in regard to whether there has been an injury (e.g., "the examinee sets the pain started when he lifted the object; therefore, there must have been an injury that occurred at that moment"). Determining work-relatedness is another example of clinical decision making that might be influenced by such reports (e.g., "the examinee says that his pain started at work; therefore, the pain complaint is work-related"). Impairment evaluations are also vulnerable to being influenced by the examinee's self-reported history, especially under the Sixth Edition of the Guides, where examinee-completed functional rating scales are a component of the process for developing an impairment rating.

It is not only clinicians who allow examinee self-report to influence their decision making. Claims administrators (adjusters, judges, commissioners, arbitrators, etc) also rely on such claimant reported histories for administrative decision making. They rely on such history directly on the basis of the reports from examinees, and indirectly in the form of any clinical conclusions that are based largely on the examinee-reported history.

Unfortunately, the premise that examinee reports are accurate has repeatedly failed scientific testing. As a detailed below, scientific tests have demonstrated that such histories are highly vulnerable to inaccuracies, specifically including inaccuracies that will mislead clinicians in their diagnostic, causation, and impairment evaluation work, and that will mislead administrators in their decision making. The unreliability of examinee reports is especially pronounced when the examinee has filed a medical-legal claim. Consequently, reports from examinees are simply not a credible basis for clinical, forensic, or administrative decision making.

This article reviews relevant scientific findings and provides recommendations for making determinations on a manner that is more credible than basing conclusions on an examinee's reports. Such recommendations are offered for practicing clinicians, for claims administrators, and also for consideration in regard to future editions of the Guides. Specifically, given the Guides' emphasis on scientific credibility, future editions should emphasize that clinical and forensic conclusions cannot be based on reports

Motor Grading Table 16-11

(5th ed, 484)

Grade	Description of Muscle Function	% Motor Deficit
5	Complete active range of motion against gravity with full resistance	0
4	Complete active range of motion against gravity with some resistance	1- 25
3	Complete active range of motion against gravity only, without resistance	26- 50
0	No evidence of contractility	100

Tip: Unless the nerve is severed, extremely rare to have more than a Grade 4 deficit, i.e. for median nerve involvement more than 25% x 10% UEI = 2.5% UEI.

"[G]rade 4 covers a wide range of weakness from minimal detectable weakness to severe weakness in which the muscles are functional through a full range with only very slight resistance."

p. 484, AMA Guides

Median nerve destroyed (ooops!)

- Sensory = Grade 0 = 100% deficit (Table 16-10a, p. 482)
- Motor = Grade 0 = 100% deficit (Table 16-11a, p. 484)

Max. value? (Table 16-15, p. 492)

Sensory = 39%

Motor = 10%

100% x 39% = 39% UE (sensory)

100% x 10% = 10% UE (motor)

Combine and convert

39% C 10% = 45% UE

45% UE = 27% WPI

CTS Impairment Options

- 0%
- 0-5% UE = 3% WPI
- Up to 45% UE = 27% WPI

CTS Errors with Fifth Edition Ratings

1. Diagnosis of carpal tunnel syndrome not confirmed by reliable electrodiagnostic testing performed by a skilled physician.
2. Unreliable functional reports.
3. Unreliable sensory or motor evaluation resulting in incorrect assessment of nerve involvement and grading.
4. Reliance on software to perform the rating. (GIGO)
5. Including factors not permitted in *Guides* resulting in "double dipping"
   - Range of motion ("the motion impairment values…are not applied to this section")
   - Grip strength ("In compression neuropathies, additional impairment values are not given for decreased grip strength. . . the *Guides* does not assign a large role to such measurements.")
6. Faulty assessment of causation and apportionment.

RED FLAGS

- Watch out for additional values based on
  - Decreased pinch strength
  - Decreased grip strength
  - Motor deficits of specific nerve structure(s)
  - Sensory deficits due to digital nerve lesions

"In compression neuropathies, additional impairments…not given for decreased grip strength." p. 494

"The maximum value for each grade is not applied in automatically"

page 482, AMA Guides

Applies in California, too!

EXAMPLE

Facts

- L UE injury
- Status post-carpal tunnel release – 14 months
- MMI
- Diminished light touch
- Fair to good 2-pt discrimination (8 mm)
- Pain is “forgotten during activity”
- Complete active ROM with “some resistance”
- Sensory = Grade 4
- Motor = Grade 4

Table 16-15, p. 492

Table 16-15 Maximum Upper Extremity Impairment Due to Unilateral Sensory or Motor Deficits or to *Combined* 100% Deficits of the Major Peripheral Nerves

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Medial antebrachial cutaneous	5	0	5
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Ulnar palmar digital of middle finger	4	0	4
Radial palmar digital of ring finger	3	0	3
Musculocutaneous	5	25	29
Radial (upper arm with loss of triceps)	5	42	45
Radial (elbow with sparing of triceps)	5	35	38
Subscapulars (upper and lower)	0	5	5
Suprascapular	5	16	20
Thoracodorsal	0	10	10
Ulnar (above midforearm)	7	46	50
Ulnar (below midforearm)	7	35	40
Ulnar palmar digital of ring finger	2	0	2
Radial palmar digital of little finger	2	0	2
Ulnar palmar digital of little finger	3	0	3

Impairment?

Sensory?

Grade 4 = 1-25% = 10%

(see Table 16-10a, p. 482)

10% (deficit) x ? (max. sensory value)

10% (deficit) x 39% UE (max. sensory value) = 3.9% = 4% UE

Impairment (cont'd)

Motor?

Grade 4 = 1-25% = 20%

(see Table 16-11a, p. 484)

20% (deficit) x ? (max. motor value)

20% (deficit) x 10% UE (max. motor value) = 2% UE

Combine and Convert

Sensory Impairment = 4% UE
Motor Impairment = 2% UE

4% C 2% = 6% UE

6% UE = 4% WPI

Thought for the day…

- "…medical literature suggests most cases previously labeled as occupationally related were neither caused nor aggravated by work." *(Guides Newsletter*, May – June 2009)
- Average observed Fifth Edition rating is 8.8% WPI, however average corrected is 3.4% WPI.
- Apportionment must always be evaluated (by facts in the case and scientific evidence).

Operating on a hand Will Not Cure a "Bad Job" or a Wounded Spirit

…or G-R-E-E-D