WORK-RELATED ARM PAIN AND CTS

BENIGN, MOSTLY HARMLESS, AND SELF-LIMITED. BUT THEY COST A FORTUNE

Steven G. Atcheson, M.D.
Medical Director
SpecialtyHealth, Inc.
“It is incident to physicians, I am afraid, beyond all other men, to mistake subsequence for consequence.”

*Samuel Johnson (1734)*

NOWHERE IS THIS ILLUSTRATED MORE CLEARLY THAN WITH ARM PAIN AND THE CARPAL TUNNEL SYNDROME
MUSCULOSKELETAL DISORDERS (MSDs)

- Defined by BLS: Injuries or illnesses affecting muscles, nerves, tendons, discs, other connective tissue not caused by direct trauma to the body, but from activities such as bending, twisting, repetition, etc.
- Includes carpal tunnel syndrome, sprains, strains, tears, soreness and pain.
MSD’s: A **VERY COSTLY PROBLEM**

**SOFT TISSUE COMPLAINTS (BLS 2006)**

- **SPRAINS/STRAINS 40% OF ALL INJURIES/ILLNESSES**
- **PAIN/SORENESS ALONE 9% OF ALL CTS/TENDONITIS**
- **ONLY 1.5 % OF TOTAL**
- **CTS CASES W/LOST WORK TIME HAD MEDIAN 27 DAYS OFF WORK, SAME AS FRACTURES, AND MORE THAN AMPUTATIONS**

OVER 300,000 SEPARATE MSD’s RESULTING IN LOST TIME ARE REPORTED EVERY YEAR
THE STORY OF SUSAN M

- Symptom onset age 50
- Office/clerical work for 30 years
- Develops pain at base of both thumbs with use, worse with some work activities
- Assumed it was due to her job but did nothing about it other than take OTC meds

Is musculoskeletal pain normal?
OUR DAILY ACHES AND PAINS

IF YOU LIVE LONG ENOUGH, YOU WILL NOT SHED YOUR MORTAL COIL WITHOUT AT LEAST ONE BOUT OF SIGNIFICANT BACK, NECK AND LIMB PAIN, AND HAVE NO IDEA HOW OR WHY IT HAPPENED
# Symptoms in the Community

<table>
<thead>
<tr>
<th>Affliction</th>
<th>Prevalence</th>
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<tbody>
<tr>
<td>Joint Pain</td>
<td>37%</td>
</tr>
<tr>
<td>Back Pain</td>
<td>32%</td>
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<tr>
<td>Arm/Leg Pain</td>
<td>24%</td>
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Lifetime prevalence in 13,538 people in 4 communities.

Pain was “excessive” and caused “a lot of problems.”

*Archives of Internal Medicine* 1993;153:2474-80
# Symptoms in the Community

<table>
<thead>
<tr>
<th>Location</th>
<th>Annual Incidence</th>
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<tr>
<td>Shoulder</td>
<td>10%</td>
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<tr>
<td>Elbow</td>
<td>15%</td>
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<tr>
<td>Wrist</td>
<td>25%</td>
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This is pain occurring without any definite trauma, memorable and lasting a week or more.

Only a small portion of these people will seek any medical help, and even fewer will file a workers’ comp claim.
IS IT A REAL INJURY, OR DO YOU JUST HURT?

- AN *ILLNESS* IS AN UNHEALTHY CONDITION OF THE MIND OR BODY, AND MAY NOT BE DUE TO A *DISEASE*
- HAVING AN ILLNESS DOES NOT IMPLY THE PRESENCE OF *INJURY, HARM, OR DAMAGE*
- A REAL *INJURY* RESULTS FROM REAL *DISEASE*
REAL DISEASE
THE BODY’S RESPONSE TO ENVIRONMENTAL OR GENETIC FACTORS
TRAUMA MALNUTRITION TOXINS METABOLIC ERRORS INFECTION
DISEASE IMPLIES TISSUE PATHOLOGY CAUSING MALFUNCTION, WITH A POTENTIAL FOR DAMAGE
REAL TRAUMA

- TRAUMA CAUSES INJURY: A WOUND
- TRUE INJURIES RESULT IN DAMAGE, WHICH IMPLIES LOSS - TEMPORARY OR NOT
- TRAUMA IMPLIES THE APPLICATION OF EXTERNAL FORCE OR VIOLENCE
SUSAN’S HANDS GET NUMB

- 3 YEARS LATER, AT AGE 53
- HER THUMBS ARE STILL HURTING WITH USE (THIS IS NOT NORMAL!)
- DEVELOPS NOCTURNAL HAND NUMBNESS AND TINGLING
- NUMBNESS IS NOT PRESENT WITH WORK AT FIRST, AND SYMPTOMS ARE RELIEVED WITH ACTIVITY

WHAT ABOUT NUMB HANDS?
DOES SHE HAVE CARPAL TUNNEL SYNDROME (CTS)?
NUMB HANDS ARE COMMON

SURVEYS OF LARGE NUMBERS OF PEOPLE HAVE SHOWN THE PREVALENCE OF “TYPICAL” SYMPTOMS SUGGESTIVE OF CTS TO BE 14% - 20%

SO JUST WHAT IS CARPAL TUNNEL SYNDROME?
CTS IS A COMPRESSION OR ENTRAPMENT NEUROPATHY

ANY CONDITION THAT INCREASES PRESSURE ON THE MEDIAN NERVE AS IT PASSES THROUGH THE NARROW CARPAL TUNNEL CAN CAUSE THE TYPICAL NUMBNESS, TINGLING, OR PINS-AND-NEEDLES SENSATIONS IN THE FINGERS SERVED BY THE MEDIAN NERVE

EDEMA, THICKENED SOFT TISSUES, BONE SPURS, HEMORRHAGE, TUMORS OF ANY TYPE
NERVE SUPPLY TO THE HAND

- Median nerve
- Radial nerve
- Ulnar nerve
DIAGNOSING CTS

AT A MINIMUM:

■ ABNORMAL SENSATION LOCALIZED TO THE MEDIAN NERVE DISTRIBUTION OF THE HAND, **PLUS**

■ ABNORMAL MEDIAN NERVE CONDUCTION, WITH SLOWING AT THE WRIST

IDEALLY:

■ SYMPTOMS HAVE PERSISTED OVER TIME, **AND**

■ NERVE STUDIES CORRECTED FOR CONF-founders
SUSAN FINALLY SEES A DOCTOR

- REFERRED TO ORTHOPEDIST, WHO DID X-RAYS BUT NO LAB WORK
- DIAGNOSED THUMB OSTEOARTHRITIS AND CTS
- SAID HER CONDITIONS WERE WORK-RELATED
- SAID SHE MIGHT NEED SURGERY AND ORDERED ELECTRODIAGNOSTICS (EMG’s)

WHAT ABOUT EMG’s FOR THE DIAGNOSIS OF CTS?
“ABNORMAL” NERVE CONDUCTION IS ASSOCIATED WITH MANY FACTORS:

- AGE
- GENDER
- BODY MASS INDEX (OBESITY)
- ARM TEMPERATURE

FAILURE TO CORRECT FOR THESE FACTORS MAY RESULT IN A FALSE-POSITIVE TEST RESULT
FALSE-POSITIVE NERVE STUDIES ARE COMMON

- A STUDY OF 50 ASYMPTOMATIC PEOPLE SHOWED THAT 46% HAD AT LEAST 1 FALSE-POSITIVE RESULT

- A POPULATION-BASED STUDY IN SWEDEN FOUND THAT 18.4% OF ASYMPTOMATIC PEOPLE HAD ABNORMAL MEDIAN NERVE CONDUCTION STUDIES
NUMB HANDS AND ABNORMAL NERVE TESTS ARE NOT PERMANENT

41 HANDS WITH CTS IN 1984

<table>
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<tr>
<th>Year</th>
<th>Symptoms</th>
<th>Slowing</th>
<th>CTS</th>
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<tr>
<td>1984</td>
<td>41</td>
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<td>1989</td>
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<td>19</td>
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<tr>
<td>1995</td>
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SUSAN HAS SURGERY

- THE EMG’S SHOW MEDIAN NERVE SLOWING AT BOTH WRISTS, CONSISTENT WITH CTS
- THE X-RAYS SHOW SEVERE OSTEOARTHRITIS OF THE BASILAR THUMB (1st CMC) JOINTS
- SHE HAS BILATERAL 1st CMC (BASILAR THUMB) ARTHROPLASTIES AND BILATERAL CARPAL TUNNEL RELEASES

THE SURGERY WORKS GREAT!
THUMB PAIN AND HAND NUMBNESS ALL GO AWAY.
WHY DID THINGS WORK OUT SO WELL?

- SUSAN HAD A REAL **DISEASE** (OSTEOARTHRITIS) CAUSING HER CARPAL TUNNEL SYNDROME

- WHEN THE ANATOMIC DERANGEMENT FROM THE OSTEO WAS CORRECTED, THE PRESSURE ON THE MEDIAN NERVES WAS RELIEVED AND HER CTS DISAPPEARED ALONG WITH THE THUMB PAIN

- THE **ORTHOPEDIST** DID EVERYTHING RIGHT

OVER 40% OF PEOPLE WITH BASILAR THUMB OSTEOARTHRITIS HAVE ASSOCIATED CTS
CTS IS A SYNDROME, NOT A DISEASE

- A SYNDROME IS A SPECIFIC COLLECTION OF SYMPTOMS AND SIGNS THAT AIDS THE PHYSICIAN IN DIAGNOSING THE DISEASE THAT IS CAUSING THE ILLNESS

- SYNDROMES ARE INDICATORS OF POSSIBLE DISEASE BUT ARE NOT DIAGNOSTIC OF ANY SINGLE DISEASE

- WHEN YOU DIAGNOSE A SYNDROME, YOU MUST DEVELOP A DIFFERENTIAL DIAGNOSIS
DIFFERENTIAL DIAGNOSIS OF CARPAL TUNNEL SYNDROME

- **METABOLIC**
  - PREGNANCY
  - THYROID
  - DIABETES MELLITUS
  - ACROMEGALY
  - AMYLOID

- **INFLAMMATORY**
  - WRIST ARTHRITIS,
  - TENOSYNOVITIS,
  - RAYNAUD’S, RA,
  - LUPUS, GOUT,
  - SPONDYLOARTHRITIS
  - PATHY, INFECTION

- **MECHANICAL / DEGENERATIVE / OTHER**
  - OSTEOARTHRITIS, OBESITY, TRAUMA, CYST,
  - LIPOMA, CONGENITAL
PEOPLE DON’T GET BETTER, THEY JUST GET OLDER

- 5 YEARS AFTER SURGERY, AT AGE 58, SUSAN ONCE AGAIN DEVELOPS NOCTURNAL HAND NUMBNESS AND TINGLING
- THIS TIME THE NUMBNESS OCCUPIES THE ENTIRE HAND, AND SHE HAS BEEN UNUSUALLY TIRED
- HAD HER CLAIM REOPENED AND SAW A COMP DOCTOR. ORDERED EMG’s. NO LAB
- EMG’s AGAIN CONSISTENT WITH BILATERAL CTS
- HE SAID SHE HAD TO STOP WORKING OR FACE “PERMANENT NERVE DAMAGE”

DOES ANY OF THIS MAKE SENSE?
NERVE DAMAGE AND CTS

- If symptoms are intermittent, then by definition no nerve damage can have occurred. True nerve damage is rare in CTS.
- Note that the numbness only occurs when her hands are at rest, and goes away when she is moving her hands, and at work.
- Does it make any sense to impose any work restrictions, since work is what makes her feel better?
- There is not a shred of evidence that any particular work restriction helps anyone with CTS.

There is no evidence that any kind of work makes CTS fundamentally worse.
SUSAN’S RED FLAGS FOR CTS

RECURRENT CTS AFTER SURGERY

- SURGERY IS SUCCESSFUL 95% OF THE TIME IN CTS
- FAILURE TO IMPROVE, OR RECURRANT SYMPTOMS SHOULD PROMPT A FRESH EVALUATION

PARESTHESIAS NOT CLASSIC FOR CTS

- HAD SYMPTOMS INVOLVING BOTH THE MEDIAN AND ULNAR NERVE AREAS

SYMPTOMS OF POSSIBLE SYSTEMIC DISEASE

- UNUSUAL FATIGUE, HAIR LOSS, FEVERS, NIGHT SWEATS, WEIGHT CHANGE, SKIN RASHES
- THESE ALL POINT TO A SYSTEMIC PROBLEM, NOT A LOCALIZED ONE

SUSAN ASKS FOR A SECOND OPINION
SUCCESS AGAIN

SUSAN FINALLY GETS LAB WORK DONE FOR CTS

- SERUM TSH IS 24 (NORMAL UP TO 4.8)
- SERUM T4 LOW
- THYROID REPLACEMENT STARTED
- TOLD TO CONTINUE HER REGULAR JOB WITH NO RISK OF NERVE DAMAGE

AFTER 5 MONTHS ALL HAND NUMBNESS GONE, AND ENERGY BACK TO NORMAL
IS CARPAL TUNNEL SYNDROME CAUSED BY REPETITIVE USE?

AN EXAMINATION OF THE CURRENT EVIDENCE
HYPOTHESIS

THAT MANY PEOPLE ALREADY CERTIFIED WITH WORK-RELATED CARPAL TUNNEL SYNDROME HAVE A CONCURRENT MEDICAL DISEASE KNOWN TO BE ABLE TO CAUSE THE SYNDROME
Concurrent Medical Disease in Work-Related Carpal Tunnel Syndrome

Steven G. Atcheson, MD; John R. Ward, MD; Wing Lowe, PhD

Archives of Internal Medicine, July, 1998

The Many Faces of Carpal Tunnel Syndrome

CARPAL TUNNEL syndrome (CTS) is the most common of the nerve entrapment disorders. The symptoms associated with this syndrome result from compression of the median nerve typically as it passes office visits, yet diagnostic laboratory studies were ordered only 25 times. Careful review of these patients by the authors found that up to two thirds of them either had a medical illness or were obese. However, many textbooks have made CTS synonymous with repetitive motion disorder.
CONCURRENT DISEASE IN WORK-RELATED CTS

- 297 PATIENTS CERTIFIED WITH OCCUPATIONAL HAND/ARM PAIN
- DISEASES DIAGNOSED ACCORDING TO STANDARD CRITERIA
- JOBS CATEGORIZED ACCORDING TO TASK DESCRIPTION OR INDUSTRY
- 4 SEPARATE CASE DEFINITIONS OF CTS
MEDICAL DISEASES DIAGNOSED

- **METABOLIC** 41 (13.8%)
  - HYPOTHYROID 18 (6.1%)
  - DIABETES MELLITUS 17 (5.7%)
  - GOUT / OTHERS 6 (2.0%)

- **INFLAMMATORY** 33 (11.1%)
  - RA, SPONDYLOARTHROPATHY, RAYNAUD’S, SLE, UNCLASSIFIED CTD

- **OSTEOARTHRITIS** 35 (11.7%)

**TOTAL: 109 CONDITIONS IN 98 PTS**

PATIENTS WERE UNAWARE OF 2/3 OF THEM
DISEASE OR OBESITY IN WORK-RELATED CTS

<table>
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<tr>
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# OCCUPATION AND CTS

## MEDICAL DISEASE

- OBESITY (BMI > 30)
- INCREASING AGE
- FEMALE SEX

## INDUSTRIAL WORK

- OFFICE/CLERICAL
- DATA ENTRY
- GAMES DEALER
- SUPERMARKET

### Case Definitions

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<th>Case Definition</th>
<th>Value</th>
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<td>Data Entry</td>
<td>36</td>
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<tr>
<td>Games Dealer</td>
<td>59</td>
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</table>
CTS IS SELDOM PURE

- OF 195 PATIENTS DIAGNOSED WITH CTS, 81% HAD SIGNIFICANT MUSCULOSKELETAL SYMPTOMS
- 37% SAID THEY WOULDN’T HAVE SEEN A DOCTOR IF ALL THEY HAD WERE PARESTHESIAS

CTS CAUSES PARESTHESIAS IN THE FINGERS +/- PALM ONLY.

CTS DOES NOT CAUSE WRIST PAIN OR ARM PAIN
NERVE CONDUCTION AND OCCUPATION

CROSS-SECTIONAL STUDIES

1. NO SIGNIFICANT DIFFERENCES IN GROUP OF POULTRY WORKERS VS. THOSE APPLYING FOR WORK
   Schottland, et al

2. NO DIFFERENCE IN SYMPTOMATIC EMPLOYEES USING VDT’s VS. THOSE WITHOUT SYMPTOMS
   Bernard, et al
LONGITUDINAL STUDIES

316 WORKERS; 660 HANDS STUDIED

- TESTED AT BASELINE AND 5 YEARS LATER
- JOBS CLASSIFIED ACCORDING TO RESISTANCE AND REPETITION
- CORRECTED FOR AGE, HAND DOMINANCE, AND OBESITY
- NO MEDIAN NERVE CONDUCTION DIFFERENCES DETECTED BETWEEN JOBS OR WITHIN JOBS

Nathan, et al
COMPUTER USE AND CTS

MAYO CLINIC (2001)

- NO DIFFERENCE IN CTS FREQUENCY BETWEEN COMPUTER USERS AND NON-USERS
- PREVALENCE OF CTS IN COMPUTER USERS SAME AS GENERAL POPULATION

SWEDEN (2007)

- 2,465 PEOPLE SURVEYED, RESPONDANTS EXAMINED
- PREVALENCE OF CTS DECREASED AS COMPUTER KEYBOARD USE INCREASED
- CONCLUSION: INTENSIVE KEYBOARD USE REDUCES THE RISK OF CTS!
REMOVING THE PRESUMPTIVE CAUSE

ERGONOMIC INTERVENTIONS

AFTER A REVIEW OF THE WORLD’S LITERATURE ON WORKPLACE INTERVENTIONS FOR THE PREVENTION OF CTS, THE AUTHORS CONCLUDED:

“...IT IS TROUBLING THAT THE SCIENTIFIC EVIDENCE IN SUPPORT OF PRIMARY PREVENTION INTERVENTIONS IS SO SCANT.”
ENOUGH EVIDENCE IS IN

CARPAL TUNNEL SYNDROME

- IS NOT CAUSED BY ORDINARY REPETITIVE USE
- IS DIAGNOSED FAR MORE OFTEN THAN IT REALLY OCCURS
- IS OFTEN ASSOCIATED WITH UNRECOGNIZED UNDERLYING MEDICAL DISEASES
CARPAL TUNNEL SYNDROME: THE EVIDENCE MANDATES

- THAT ALL PATIENTS WITH SUSPECTED CTS HAVE A THOROUGH EVALUATION FOR CONFOUNDING MEDICAL DISEASE OR OBESITY

- THAT ELECTRODIAGNOSTIC STUDIES HAVE SUCH A HIGH FALSE-POSITIVE RATE THAT THEY BE RESERVED FOR CONFUSING SITUATIONS OR PRE-OPERATIVE CONFIRMATION
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**GIANT RED FLAGS**

"REPETITIVE MOTION" NAMED AS CAUSE OF PROBLEM

CTS DIAGNOSED

THE HARDEST CLAIMS TO CLOSE ARE THOSE THAT NEVER SHOULD HAVE BEEN ACCEPTED
SpecialtyHealth

INTEGRITY

KNOWLEDGE

Results

TRANSPARENCY

URAC

ACREDITED WORKERS COMPENSATION UTILIZATION MANAGEMENT