Carpal Tunnel Syndrome
Description, Diagnosis, and Treatment
Carpal Tunnel Syndrome (CTS)

- Repetitive stress injury
- Due to inflammation of the tissues around the median nerve
- Results in reduced nerve transmission; pain, numbness, and tingling in wrist, hand, and fingers (except little finger)
- Estimated 2.8 million identified cases in 1988
Inflamed Tendons and Tenosynovium
Causes of CTS

<table>
<thead>
<tr>
<th>Work-related</th>
<th>Medically-related</th>
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<tbody>
<tr>
<td>● Repetition</td>
<td>● Fractures</td>
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<tr>
<td>● High force</td>
<td>● Arthritis</td>
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<tr>
<td>● Awkward joint posture</td>
<td>● Diabetes</td>
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<td>● Direct pressure</td>
<td>● Obesity</td>
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<tr>
<td>● Vibration</td>
<td>● Acromegaly</td>
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<tr>
<td>● Prolonged constrained posture</td>
<td>● Long term hemodialysis</td>
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<td>● Pregnancy</td>
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Symptoms

- Pain in wrist and hand
- Numbness and tingling in fingers
- Weakened grip
- Feeling of swelling in hand
- Worsened pain at night with rest
Inflammation

Body’s response to injury: Characterized by blood vessel dilation and increased temperature at site.

Stage 1, Inflammatory: monocytes, fibroblasts & phagocytes migrate to injury.

Stage 2, Proliferative: Fibroblasts increase in #; lymphocytes recruited to provide control signals

Stage 3, Remodeling: Decrease in cellularity and fibronectin production; collagen production
Tendon Structure

- Tendon has low cellularity normally
- Consists of highly organized fibrils of collagen
- Wavy appearance in healthy tendon
- Specialized fibroblasts called tenocytes are aligned between the collagen fibers.
- Each tendon is surrounded by a structure known as tenosynovium; a protective sheath - affected area in CTS – inflamed: CTS = compression of median nerve
Healthy vs. Injured Tendon
Diagnosis

Medical History
- Job
- Symptoms
- Medical conditions

Physical Exam
- Tinel’s sign (tapping median nerve)
- Phalen’s test (compression of nerve)
- Muscle strength (thenar strength)
Diagnosis

Lab tests
- X-ray
- MRI

Electrodiagnostic tests
- Electromyography
- Nerve conduction (electric shocks)
X-ray and MRI

- X-ray: check for arthritis or fractured bones; not useful for detecting CTS
- MRI: around $1,000/test: to estimate severity of CTS: not used routinely but is capable of detecting abnormalities indicative of CTS.
Electromyography (EMG)

- To confirm diagnosis
- Indwelling or surface electrodes; electrical activity is displayed on a screen (benefits vs. disadvantages)
- Conditions such as obesity and anxiety can slow conduction speed and cause skewed results
Nerve Conduction Studies

- Surface electrodes on hand and wrist
- Small electric shocks applied to nerves in fingers, wrist, and forearm (measure speed of conduction)
- Can detect 84% of people with CTS
- Can eliminate 95% of cases that are not CTS
Nerve Conduction Velocity Test
Investigative Tests

- Researchers reported on a computer-assisted device
- Measures pinch and grip strength and finger pressure
- Accurate and consistent way to diagnose CTS (FROM: http://www.medinfo.ufl.edu)

**Example Ref:**
Stats on CTS

- **Estimate:**
  Company costs: $37,000 in lost work time, treatment, rehabilitation per worker
- Workman’s comp figures: $6-10,000/case
- Imp. to find noninvasive, low-cost treatments
- Federal statisticians say repetitive motion injuries account for more than half of all workplace injuries.
Other culprits

- Workplace not always culprit
- Associations with fluid retention: pregnancy, diabetes, sudden weight gain, birth control pills
Treatment

Conservative
- Rest, Ice, Heat
- Brace
- Physical therapy

Drugs
- NSAIDS (ibuprofen, naproxin, aspirin): recommended EARLY in the inflammation cycle
- Corticosteroids: decrease in tendon strength & mass over time
Vioxx, Celebrex (COX-II inhibitors) may act without COX-I associated side effects (platelet aggregation); may increase risk of heart attack.
Treatment (con’t)

**Surgery**
- Endoscopy
- Mini Open Release
- Percutaneous Balloon Carpal Tunnel-Plasty
Surgery
Open release

Transverse carpal ligament cut
Treatment (con’t)

Alternative Therapies

- Vitamins (B6)
- Chiropractic methods
- Acupuncture
- Electromagnetic fields
Ganglion Cysts

- very common, masses (lumps) that grow in the hand and wrist, generally found on the top of the wrist, on the palm side of the wrist, the end joint of a finger (mucous cysts), and at the base of a finger.

- usually come from nearby joints or tendon sheaths, but, no specific cause.

- painful, especially when they first appear or with constant or strenuous use of the hand. Ganglions often change in size and may disappear completely. These cysts are not malignant (cancerous).
Diagnosis & Treatment of Ganglionic Cysts

**Diagnosis.** usually based on location & appearance of the cyst

- X-rays may rule out problems in nearby joints.

**Treatment.** watching for any changes. However, if painful, limits activity, or its appearance is unacceptable to the patient, other treatment may be recommended:
  - Needle aspiration of cyst fluid
  - Wearing of a splint to immobilize joint
  - Surgery to remove the cyst
Some “Good” Web Sources

- http://www.assh.org/
- http://www.carpaltunnel.com/
- http://www.scoi.com/handanat.htm
- http://www.cdc.gov/niosh/topics/ergonomics/
Some “?able” Web Sites

http://www.anyvitamins.com/treatment-carpal-tunnel-syndrome.htm
http://www.geocities.com/cfsdays/ctstreet.htm
http://hypnosismd.com/Treatment/c/carpal-tunnel.htm
SOAP Notes

S- Subjective. Information the patient give you.
O- Objective. Information from tests.
P- Plan. What you are going to do.