Carpal Tunnel Syndrome/ Cubital Tunnel Syndrome
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- Most common compression neuropathies of the upper extremity
- Increasing prevalence
  - CTS 50/1000 subjects
  - Up to 5% lifetime risk
- Significant loss of productivity, income
  - 2011: Median time off work 28 days—longer than fractures, multiple injuries, amputations

Nerve anatomy

Pathophysiology
- Spectrum of neural changes depends on force and duration of compression
- Neural ischemia contributes in acute cases
- In chronic cases changes begin with breakdown of blood-nerve barrier, followed by edema and perineural thickening
- Increased endoneural pressure leads to circulatory changes and makes nerve susceptible to dynamic ischemia
- Then leads to focal demyelination and finally axonal degeneration

- Complaints generally parallel histopathologic changes, as do sensory changes
- Neural changes may not occur uniformly across nerve
  - Le superficial fascicles affected earlier, LF,RF
Carpal Tunnel Syndrome (CTS)

- Symptomatic compressive neuropathy of the median nerve at the wrist, characterized physiologically by evidence of increase pressure within the carpal tunnel and decreased nerve function at that level.
- Structural, biological, genetic factors +/- environmental, occupational
- Idiopathic/DM, RA/HT, Pregnancy/Mass/fracture

Anatomy

- Roof of carpal tunnel is flexor retinaculum (TCL) which spans from hamate and triquetrum ulnarily to scaphoid and trapezium radially
- Contains Median nerve and flexor tendons (4 FDS, 4 FDP, and FPL)

History

- Patients complain of numbness/tingling in digits and/or achy hand pain
  - Duration?
  - Severity/Character?
    - When occur? Night? Driving? Telephone?
  - Intermittent or constant?
  - Aggravating/Alleviating factors?
  - Location?
  - Previous treatments? Bracing? CTR?
  - Functional limitations?
  - Medical history? DM, HT, Obesity, dialysis
- Work issues?

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**Physical exam**

- Observation
  - Thenar atrophy?
- Range of motion
- Strength exam
  - APB
- Provocative tests
  - MNCT
  - Tinel’s
  - Phalen’s
- Sensory Testing*
  - S2PD or Semmes-Weinstein
  - NI 4-5 mm

- SnSp
  - MNCT .04-.78/25-.96
  - Tinel’s .38-.73/44-.95
  - Phalen .46-.80/51-.91

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**Diagnostics**

- Physical exam
- +/- X-rays (AP, LAT, CT view)
- NCS/EMG
  - If diagnosis not straightforward, concern for double crush, or if severe
  - Evaluates only large myelinated fibers
  - Just another piece of the puzzle
- Injection?

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**Treatment**

- Night splinting
  - Neutral!
- Injections
  - Relief prognostic for successful surgery
- Nerve glides
- Nsaids
- Activity modification/work space evaluation
- Surgery

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**Injection**
Nerve glides

Surgical Treatment

- Carpal tunnel release (CTR)
  - Divide TCL
  - Open vs. endoscopic equivalent results
  - Uni vs bilateral
  - Same day
  - Local +/- MAC
  - No splint post-op
  - No antibiotics needed*
  - Activity mod 3-4 wks

Indications

- Failure of conservative care
- Progression of symptoms
- Patient preference
- Severe
  - Constant symptoms
  - Atrophy
  - S2PD changes
- Acute
  - Fracture

Mini-open CTR

When to refer

*No antibiotics needed if not indicated.
Cubital Tunnel Syndrome

- Second most common compression neuropathy
- Ulnar nerve at the elbow
  - C8-T1

- Innervates:
  - FCU
  - RF, SF, FDP
  - Hypothenars (O/A/F)
  - 3, 4 Lumbricals
  - Interossei
  - Adductor Pollicis
  - Dp head FPB

- 5 anatomic sites of compression
  - Arcade of Struthers
  - Medial intermuscular septum
  - Medial epicondyle
  - Osborne's ligament
  - Flexor-pronator aponeurosis

Anatomy

History

- Complaints of numbness, tingling in ring and/or small finger
  - Usually not pain
- May affect hand strength in severe cases
- Worse when driving, sleeping, talking on the phone?
- Constant/intermittent?
- Clumsiness?
- Ask about previous elbow injury (fracture)
- Ask about job demands--prolonged flexion?

Physical exam

- Observation
  - Scars, atrophy
  - Clawing
  - Wartenberg's sign
  - Froment's
  - Range of motion
  - Elbow flexion test/ulnar nerve compression test
  - Tinel's UN
  - Subluxation?
  - Strength (intrinsics)
  - 1st DIP
  - 52PD

- SN
  - Tinel's 70%
  - EFT 75; 89 >40 sec
  - EFT/UNCT 79
Diagnostics
- X-rays (AP, Lat, Cub tunnel)
  - Evaluate for arthritis, trauma
- NCS
  - Rely more on with cubital tunnel
  - Substantiate/refute early, baseline in severe
  - Consider bilateral

Treatment
- Activity modification
  - Avoid prolonged flexion
- Elbow pad
- Extension night splint
- Nerve glide exercises
- Majority of mild/moderate improve with conservative measures
- Surgery

When to refer
- Constant numbness
- Atrophy/weakness
- Abnormal S2PD
- Failure of conservative measures

Surgical treatment
- Cubital tunnel release
  - +/- transposition
  - Sub-cutaneous
  - Intra-muscular
  - Sub-muscular
- Results equivalent between in-situ decompression and transposition
- Do simplest operation that relieves nerve

Take home
- Very common problems
- Diagnosis is largely clinical
- Established non-operative treatments that are successful in majority
  - Splint, inject, OT-nerve glides
- Know when to say when
  - Constant symptoms, abnormal sensory threshold, atrophy