The Numb Hand

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The Nerve

- 3 Types of nerves
  - Motor
    - Muscle control
    - Go from brain to muscles
  - Sensory
    - Sensation
    - Go from body to brain
  - Autonomic
    - Involuntary
    - Heart rate, blood pressure, digestion, sweating
Idiopathic Nerve Damage

- Unknown cause
- Older than 60
- Numbness, tingling and pain
- Unsteady gait
- Weakness or cramps
Toxic Nerve Damage

- Lead, mercury, arsenic, thallium
- Anticonvulsants
- Cancer medications
- Heart or blood pressure medications
- Infection fighting drugs
- Skin condition treatment drugs
Alcohol-Related Nerve Damage

- Abnormal sensations
  - Pain
    - Feels like "pins and needles"
  - Numbness
  - Muscle weakness, cramps, or aches
  - Muscle spasms / contractions
  - Tingling
- Constipation / Diarrhea
- Incontinence (leaking urine) or difficulty with urination
- Impotence in men
- Nausea / vomiting
Inflammatory Nerve Damage

Infectious (with a specific casual agent identified)
- Lyme disease
- HIV / AIDS
- Herpes Zoster (Shingles)
- Hepatitis B and C

Autoimmune or possibly infectious (but with no specific causal infectious agent identified)
- Sarcoidosis
- Polyarteritis Nodosa (PAN)
- Rheumatoid Arthritis
- Systemic Lupus Erythematosus (Lupus)
- Sjögren's Syndrome
The nerves exit from the cervical spine through bone tunnels called *foramen*. They then pass beneath the clavicle (collar bone) as they enter the arm where they become individually named nerves. The network of nerves between the cervical spine and the arm is called the *brachial plexus*. 
The nerves then pass down the arm and innervate different groups of muscles and give sensation to different parts of the arm and hand.
Cervical Nerve Compression

Each nerve provides sensation to a specific area of the arm and hand. Each nerve root from the cervical spinal cord supplies its own particular nerve as seen here.
Sensory Nerve Anatomy

This is the anatomy of the sensory nerves to the arm and hand.
Types of Nerve Injury

• Neuropraxia
  – Slow nerve conduction with an intact nerve
  – Damage is reversible
Types of Nerve Injury

- **Axonotmesis**
  - Severe injury with nerve degeneration
  - Intact nerve fibers
  - Recovery is possible and depends on the distance of nerve lesion to the site of innervation
Types of Nerve Injury

• Neurotmesis
  – Complete disruption of the nerve
  – Full recovery is unlikely
Our Focus

• Nerve compression conditions of the arm and hand
  – Carpal Tunnel Syndrome
    • Anterior interosseus nerve syndrome
    • Pronator Syndrome
  – Cubital Tunnel Syndrome
  – Radial Tunnel Syndrome
    • Posterior interosseus nerve syndrome
    • Wartenberg’s syndrome
Nerve Injuries of the Arm

• More common in younger industrial workers
  – 1994: 93,000 cases of repetitive use disorders
  – 41% of these were carpal tunnel syndrome

• Overall 1 million adults/year require treatment for CTS
### Epidemiology

<table>
<thead>
<tr>
<th>Carpal Tunnel Syndrome</th>
<th>Mean age @ diagnosis</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>50 years</td>
<td>22%</td>
</tr>
<tr>
<td>Females</td>
<td>51 years</td>
<td>78%</td>
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</tbody>
</table>
Compressive Neuropathy

• Associated symptoms
  – Poorly characterized & difficult to label tendon and muscle symptoms
Contributing Factors

• Work place
  – Repetitiveness
  – Force
  – Mechanical stress
  – Posture
  – Vibration
  – Temperature
Contributing Factors

- Carpal tunnel epidemiology studies
  - Higher correlation with health habits & lifestyle
    - Obesity
    - Tobacco use
    - Caffeine

It's kind of ironic; as my computer gets faster and flatter, I get slower and flabbier...
Contributing Factors

• Definitive risk factors
  – Female
  – Pregnancy
  – Diabetes
  – Hypothyroidism
  – Rheumatoid arthritis
Contributing Factors

- Study of idiopathic carpal tunnel syndrome
  – Analyzed the synovium of patients with CTS
- Findings suggested that repeated episodes of ischemia and reperfusion may lead to the development of CTS

  • Freeland, Microsurgery, 22, 2003
Contributing Factors

• Occupational risk factors alone do not explain the occurrence of carpal tunnel syndrome in the workforce

• Carpal tunnel syndrome is due to multiple overlapping factors
Contributing Factors

- Nerve traction injuries
  - Compression at one site may tether the nerve
  - Leads to restricted nerve mobility with traction and stretching of the nerve
Contributing Factors

- Nerve compression impairs microcirculation

Hyperemia (increased circulation) after nerve release of ulnar verve at elbow.
Systemic Factors

• Certain conditions lower the threshold for compressive neuropathy
• This may lead to involvement of both sides when nerve compression syndromes occur
• For example
  – Obesity
  – Diabetes
  – Alcoholism
  – Hypothyroidism
  – Industrial solvent exposure
  – Aging
Phases of Compressive Neuropathy

• Early

• Intermediate

• Late / Advanced
Early Phase

- Low grade compression
- Symptoms come and go
- Conservative treatment is effective
  - NSAIDS
  - Steroid injections
  - Splints
Intermediate Phase

- Intraneural circulation is **persistently** compromised
- *Constant* paresthesias and numbness
- Respond best to nerve decompression

Hyperemia after carpal tunnel release
Advanced Phase

- Continuous edema and compression induce intraneural fibrosis
- *Irreversible* damage with some permanent loss of sensation and motor function
- Surgery stops the continuing nerve damage but does not assure full recovery
  - Permanent nerve damage already exists before surgery

Atrophy (loss of muscle mass, tone and function) due to prolonged, advanced nerve compression
Double Crush Phenomenon

• 2 separate points of nerve compression
  – Compression proximally lowers the threshold for compression neuropathy at a distal point
  • Interrupted transport of enzymes and neurotransmitters along the axon
Double Crush Phenomenon

• Surgical decompression may lead to incomplete symptom relief
  – A nerve may be compressed in 2 locations: e.g., the neck and the wrist
  – Release of the wrist compression (carpal tunnel) may or may not improve symptoms but should be considered to avoid further damage to the nerve
  – Cervical radiculopathy & CTS
    • Still consider CT release
    • Advise the patient
Clinical Presentation

- Dynamic
  - Symptoms are activity specific
  - Exertional
- Insidious
  - Gradual onset
  - Unrelated to activity
  - Worse at night
Carpal Tunnel Syndrome

- Anatomic predisposing factors
  - Decreased size of carpal tunnel
    - Bony abnormalities
    - Thickened transverse carpal ligament
Carpal Tunnel Syndrome

- Anatomic predisposing factors
  - Increased contents of carpal tunnel
    - Ganglion cysts
    - Neuroma, lipoma, myeloma, hypertrophic synovium, fracture callus, osteophytes, hematoma
Carpal Tunnel Syndrome

• Neuropathic conditions
  – Diabetes
  – Alcoholism
  – Thyroid dysfunction
  – Double crush phenomenon
  • Proximal compression of median nerve

A patient with a history of cervical nerve root injury
Carpal Tunnel Syndrome

- Inflammatory predisposing conditions
  - Tenosynovitis
  - Rheumatoid arthritis
  - Infection
  - Gout
Carpal Tunnel Syndrome

- Alterations in fluid balance
  - Pregnancy
  - Long-term hemodialysis
  - Raynaud’s disease
  - Obesity
Carpal Tunnel Syndrome

• Position and use of wrist
  – Repetitive flexion / extension
  – Repetitive forceful squeezing and releasing or torsion of a tool
  – Finger motion with wrist extension
    • Typists, musicians
  – Vibration exposure
Carpal Tunnel Syndrome

- Weightbearing with wrist extension
  - Paraplegia
  - Long-distance cycling
Carpal Tunnel Syndrome

- Immobilization with the wrist flexed
  - Wrist fractures can cause scarring, swelling and crowding of the carpal tunnel
  - Awkward sleep position
Carpal Tunnel Syndrome

- Pain & paresthesias palmar radial hand
- Symptoms worse at night
- Symptoms worse with repetitive forceful use of hands
Carpal Tunnel Syndrome
Diagnostic Tests

- Phalen’s test
  - Numbness / tingling < 60 sec
  - Sensitivity 0.75
  - Specificity 0.47
Carpal Tunnel Syndrome
Diagnostic Tests

- Percussion test (Tinel’s sign)
  - Tingling at site of nerve tapping
  - Sensitivity 0.60
  - Specificity 0.67
Carpal Tunnel Syndrome
Diagnostic Tests

• Compression test
  – Paresthesias < 30 sec
  – Sensitivity 0.87
  – Specificity 0.90
Carpal Tunnel Syndrome Diagnostic Tests

- Hand diagram
  - Appropriate markings on radial digits not on palm
  - Sensitivity 0.96
  - Specificity 0.73
  - Value of a negative test 0.91
Carpal Tunnel Syndrome
Diagnostic Tests

• 2-point discrimination
  – Unable to discriminate 6mm
  – Advanced nerve dysfunction
Carpal Tunnel Syndrome
Diagnostic Tests

• Vibrometry
  – Note asymmetry with contralateral hand or radial versus ulnar
  – Sensitivity 0.87
Carpal Tunnel Syndrome
Diagnostic Tests

- Semmes-Weinstein monofilaments
  - Positive if unable to feel filaments less than 2.83
  - Sensitivity 0.83
Carpal Tunnel Syndrome
Diagnostic Tests

- X-rays are valuable in many cases
  - Trauma
  - Rheumatoid disease
  - Basal joint arthritis
Carpal Tunnel Syndrome
Diagnostic Tests

- Nerve conduction testing
- Sensory testing
  - Positive if latency >3.5mm/sec or if 0.5mm/sec > other hand
Carpal Tunnel Syndrome

Diagnostic Tests

- **EMG**
- Tests the motor part of the nerve
  - Positive if latency >4.5 mm/sec or if 1.0 mm/sec > other hand
Carpal Tunnel Syndrome
Diagnostic Tests

• EMG
  – Tests for denervation of thenar muscles
  – Very advanced nerve damage
  – Objective confirmation
Carpal Tunnel Syndrome Diagnostic Tests

- Chest x-ray
  - Smokers
  - Ulnar nerve symptoms
  - Shoulder pain
- MRI
  - Evaluate nerve compression in forearm

Ganglion cyst compressing carpal tunnel
Carpal Tunnel Syndrome

Diagnostic Tests

• Most sensitive
  – Semmes-Weinstein filament
  – Vibrometry

• Threshold tests

A simple way to test light touch sensitivity
Carpal Tunnel Syndrome

• Consider overall health
• If both hands are involved
  – Consider systemic or metabolic causes
• Consider proximal compression
  – Cervical radiculopathy
  – Pronator syndrome
Carpal Tunnel Syndrome

- Conservative treatment
  - *Nighttime* splinting in neutral
  - NSAIDs to reduce synovitis
  - Manage contributing systemic causes
Carpal Tunnel Syndrome

- Corticosteroid injections
  - Transient relief in 80%
  - Only 22% symptom free at 1 year
Carpal Tunnel Syndrome

• Injections are an excellent predictor of a patient's response to surgery

• Excellent prognostic tool
  – 87% with a positive response to injection had successful surgery
  – 54% with a negative response to injection had successful surgery

• Edgell J Hand Surg {Am} 28, 2003
Carpal Tunnel Syndrome

- Corticosteroid injections
  - *Most effective* if symptomatic for < 1 year
  - Diffuse and intermittent numbness
  - Normal 2-point discrimination

- No weakness or thenar atrophy
- EMG reveals no denervation
- 1-2 millisecond prolongation on NCS
- 40% of this group symptom free at 1 year
Carpal Tunnel Syndrome

- Alternative treatments
  - Vitamin B6 (Pyridoxine)
  - Cold Laser
  - Acupuncture
  - TENS
  - Chiropractic manipulations

- There is no scientific evidence that any of these treatments are effective
Carpal Tunnel Release

• Indicated for failed conservative treatment

• *Earlier* surgery yields better results
  – CTR within 3 years of symptom onset yields better results
Carpal Tunnel Release

• Advanced cases
  – CTR may only prevent progression
  – CTR may not lead to improvement
Carpal Tunnel Release

- Patients with intermittent pre-op symptoms obtain better sensory recovery than patients with constant symptoms.
Carpal Tunnel Release

• Endoscopic
  – Minimal effect on post-op recovery
  – Poor visualization of nerve
  – Increased risk of NV injury
Carpal Tunnel Release

- Randomized trial comparing endoscopic to open CTR
- Endoscopic group
  - Less pain & more grip strength @ 1 and 6 w
  - *No different* from open group @ 12 w
  - Less satisfied than open group
- *The re-operation rate in the endoscopic group was 5% v. 0% in the open CTR group*

  - Macdermid J Hand Surg {Am} 28, 2003
Carpal Tunnel Release

- **Mini-open**
  - Good visualization of nerve & ligament
  - Fewer complications
  - Re-operations are rare
  - Grip strength recovery in 3 months
  - Pinch strength recovers in 6w
Carpal Tunnel Release Complications

- Transient
  - Infection
  - Sensitivity
  - Pillar pain

- Permanent
  - Nerve injury
  - Anatomic variations involving motor branches
Carpal Tunnel Syndrome

- May be associated with ulnar neuropathy @ Guyon’s canal
  - Responds to CTR alone
Carpal Tunnel Release

• Post-op
  – Bulky dressing for 48 hours
  – Remove dressing and use hand as tolerated
  – Keep wound clean, dry and covered with a Band-aid
Carpal Tunnel Release

- Post op course with the open CT release
  - Progressive activities as tolerated at 48 hours
  - Return to work 21 days without restrictions
Carpal Tunnel Release

• The incision @ 3 weeks
  – There may be some wound sensitivity at 6-12 weeks but this resolves in time
Pronator Syndrome

• Median nerve entrapment @ elbow
Pronator Syndrome

• Symptoms
  – Weakness and aching of the thumb muscles
  – Numbness in the thumb, index & middle finger
  – Numbness in the area of the palmar cutaneous nerve
    • mid palm and thenar eminence
Pronator Syndrome

• Diagnostic findings
  – Pain in upper forearm
  – Positive Tinel’s sign in forearm
  – No finger numbness with wrist flexion
  – No symptoms at night
  • Unlike CTS
Pronator Syndrome
Compression Sites

- Compression @ bicipital aponeurosis
  - Resisted elbow flexion with forearm supination
Pronator Syndrome
Compression Sites

- Compression @ pronator muscle
  - Resisted forearm pronation with elbow extended
Pronator Syndrome
Compression Sites

• Compression @
  origin of FDS
  - Resisted isolated
    flexion of the PIP of
    middle finger
Pronator Syndrome

- Nerve conduction tests
  - Not helpful
  - 20-30% of patients with CTS may have conduction delays in forearm
Anterior Interosseous Nerve Syndrome

- Median nerve compression in the forearm
  - Motor deficit
    - Weakness of the long flexors of the thumb and index finger
  - No sensory deficit
Anterior Interosseous Nerve Syndrome

- Examination
  - Precision tip to tip pinch
    - “A OK sign”
    - Pinch (thumb and index finger) weakness
Anterior Interosseous Nerve Syndrome

- Spontaneous onset
- EMG-NCS is helpful
Anterior Interosseous Nerve Syndrome

• Nonoperative Treatment
  – Observation
  – Splinting in elbow flexion
  – Surgery if not improved in 8-12 weeks
Anterior Interosseous Nerve Syndrome

- Surgical decompression of all potential sites of compression

- May take up to 6 months to improve
Cubital Tunnel Syndrome

- Ulnar nerve compression at the elbow
  - “The Funny Bone”
Cubital Tunnel Syndrome

- Sources of compression
  - fascial bands
  - exuberant synovium
  - tumors
  - ganglions
  - anconeus epitrochlearis
  - bone spurs
Cubital Tunnel Syndrome

• Symptoms
  – Numbness along the little finger and ulnar ½ ring finger
  – Weakness of grip & torque
Cubital Tunnel Syndrome

- Pain medial elbow
- Tinel’s sign @ cubital tunnel
- Symptoms worse with elbow flexion
Cubital Tunnel Syndrome

- Pain and numbness on *dorsal and volar* ulnar hand
- Weakness ring & little finger flexors
Cubital Tunnel Syndrome

- Froment’s sign
  - Weak intrinsic muscles of the hand
  - Flexor pollicis longus (flexes the tip of the thumb) compensates for paralyzed thumb adductor
Cubital Tunnel Syndrome

- **Intrinsic muscle weakness**
  - Unable to adduct little and ring fingers due to advanced cubital tunnel syndrome.
Cubital Tunnel Syndrome

• Jeanne’s sign
  – Compensatory hyperextension of the thumb MP joint
Cubital Tunnel Syndrome

- Thumb adductor weakness

- Severe atrophy
  - Muscle wasting
Cubital Tunnel Syndrome

- Pollock’s test
  - Weakness of the flexor strength of the ring and little fingers
Cubital Tunnel Syndrome

- Examine cervical spine
- Consider thoracic outlet syndrome
- Assess elbow for arthritis
- Check for ulnar nerve subluxation (snapping)
Cubital Tunnel Syndrome

- Tinel’s sign @ cubital tunnel
- Elbow flexion test (<60 sec)
Cubital Tunnel Syndrome

- Ulnar nerve pressure test
  - Direct pressure
  - Elbow 20°
  - Forearm supinated
  - Positive if < 60 seconds
Cubital Tunnel Syndrome

- Sensory exam
  - Numbness on all surfaces of little finger
  - S-W monofilament test
Cubital Tunnel Syndrome

• Nonoperative treatment
  – Activity modification
  – Don’t lean on the elbow
  – NSAIDs
  – Night-time extension splints
Cubital Tunnel Syndrome

• Surgical options
  – Simple decompression
  – Medial epicondylectomy
  – Submuscular transposition
  – Subcutaneous transposition
Cubital Tunnel Syndrome

• Medial Epicondylectomy
Cubital Tunnel Syndrome

• Medial Epicondylectomy

Ulnar nerve compression after release of Osborne’s ligament
Cubital Tunnel Syndrome

- Medial Epicondylectomy

- Medial epicondyle removed
- Flexor-pronator attachment released

Elbow @ 90 degrees flexion
Cubital Tunnel Syndrome

• Medial Epicondylectomy

- Medial epicondyle removed
- Flexor-pronator attachment released
- Relaxed ulnar nerve

Elbow @ 90 degrees flexion
Cubital Tunnel Syndrome

- Medial Epicondylectomy

- Ulnar nerve relaxed
- Hand
- Flexor-pronator mass reattached to medial epicondyyle

Elbow flexed 90 degrees
Cubital Tunnel Syndrome

• Medial Epicondylectomy

Elbow flexed 90 degrees

Ulnar nerve relaxed

Hand

Flexor-pronator mass reattached to medial epicondyle
Cubital Tunnel Syndrome

- Submuscular Transposition
Cubital Tunnel Syndrome

Results of the Musculofascial Lengthening Technique for Submuscular Transposition of the Ulnar Nerve at the Elbow

By A. Lee Dellon, MD, and J. Henk Coert, MD

Investigation performed at Union Memorial Hospital, Baltimore, Maryland

88% Good-excellent results
8% failure or recurrence
Compared to 25 – 40% other techniques
This is the procedure I have performed since 2003
Cubital Tunnel Syndrome

- Submuscular Transposition

Decompressed ulnar nerve
Preserved sensory nerves
Hand
Cubital Tunnel Syndrome

- Submuscular Transposition

Preserved sensory nerves
Decompressed ulnar nerve
Hand

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Cubital Tunnel Syndrome

- Submuscular Transposition

Hand

Preserved sensory nerves

Transposed ulnar nerve

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Cubital Tunnel Syndrome

- Subcutaneous Transposition
Cubital Tunnel Syndrome

• Surgical results
  – 80-90% good results
  – Functional recovery 6 months
• Moderate – severe compression
  – Recurrence rates or poor results in 25-30%
• In revision ulnar nerve translocation the ulnar nerve is moved from its previous subcutaneous position and placed in a submuscular position.
  – Studies have shown that placing the nerve in a submuscular position (with tendon z-plasty) is highly successful and reduces the rate of recurrence significantly
Ulnar Tunnel Syndrome

- Ulnar nerve compression in Guyon’s canal
- Symptoms depend on site of compression
  - Motor
  - Sensory
  - Mixed
Ulnar Tunnel Syndrome

- Causes of compression
  - Ganglion cysts
  - Synovial inflammation
  - Fractures of hook of hamate
  - Ulnar artery thrombosis
  - Anomalous muscle
  - Palmaris brevis hypertrophy
Ulnar Tunnel Syndrome

• Evaluation
  – CT scan for hook of hamate fracture
  – MRI for ganglion cyst
  – Doppler ultrasound for ulnar artery thrombosis
Ulnar Tunnel Syndrome

• Treatment
  – Nonoperative
    • Splints
    • NSAIDs
  – Operative
    • Treat underlying cause (cyst, fracture)
    • Nerve decompression
Radial Nerve

- Compression above the elbow
- Posterior interosseous nerve syndrome
- Radial tunnel syndrome
- Wartenberg’s syndrome
Radial Nerve

• Compression above the elbow
  – Rare
  – Fibrous arch of lateral head of triceps
  – Weakness of wrist extensors
  – Sensory changes on top forearm up to the thumb
Radial Nerve

• May be related to humeral fracture callus

• EMG-NCS confirms the diagnosis

• Surgical decompression if not improved in 3 months
Posterior Interosseous Nerve (PIN) Syndrome

- Motor portion of radial nerve compressed in proximal forearm
- Motor only, no sensory function
- Innervates wrist and finger extensors
Posterior Interosseous Nerve (PIN) Syndrome

- Gradual onset

- Subtle loss of strength with radial deviation in wrist extension
  - ECRL (the long wrist extensor muscle) still functional
Posterior Interosseous Nerve (PIN) Syndrome

- EMG: diagnostic
- X-rays: evaluate for radial head
  - Fractures
  - Arthritis
  - Dislocations
- MRI: ganglions cysts, lipomas
Posterior Interosseous Nerve (PIN) Syndrome

• Compression sites
  – Thick fascia @ the front of the elbow joint (radiocapitellar joint)
  – Recurrent radial artery branches
Posterior Interosseous Nerve (PIN) Syndrome

• Compression sites
  – Fibrous edge of ECRB (wrist extensor) muscle
  – Arcade of Frohse @ proximal edge of supinator muscle
Posterior Interosseous Nerve (PIN) Syndrome

• Treatment
  – Avoid aggravating activities
  – NSAIDs
  – Surgical release if not improved in 4-12 weeks
  – Strength recovery may take 18 months
  – 85% good – excellent results
Radial Tunnel Syndrome

- Pain
- No motor or sensory deficits
- Same nerve and compression sites as PIN syndrome
- Work-related
  - Associated with forceful elbow extension or forearm rotation
Radial Tunnel Syndrome

• Symptoms
  – Deep ache on lateral elbow & forearm
  – Night pain
  – Confused with lateral epicondylitis
    • 5% of lateral epicondylitis patients have concurrent radial tunnel syndrome
Radial Tunnel Syndrome

• Examination
  – Provocative tests
    • Resisted supination test with wrist extension
    • Passive pronation with wrist flexion
Radial Tunnel Syndrome

• Examination
  – Tender over radial tunnel
  – Middle finger test
Radial Tunnel Syndrome

- EMG-NCS not helpful

- Diagnostic injection into radial tunnel
  - Causes a temporary posterior interosseus nerve palsy
  - Relieves symptoms at least temporarily
Radial Tunnel Syndrome

- Nonoperative
  - Activity modification
  - Wrist splinting
  - NSAIDs
  - Therapy with modalities
Radial Tunnel Syndrome

• Surgical release
  – 51% good results (Mayo)
  – Maximal recovery @ 9-18 months
  – Workers’ comp do not do as well
  – Worst results
    • Work-related injuries
    • Chronic pain
    • Poorly localized symptoms on exam
Radial Tunnel Syndrome

- Surgical release
Wartenberg’s Syndrome

- Sensory branch of radial nerve
  - Compressed between Brachioradialis & Extensor Carpi Radialis Longus with forearm pronation
  - Constricting jewelry
Wartenberg’s Syndrome

• Symptoms
  – Pain, numbness, paresthesias over dorsal-radial hand
  – Worse with wrist movement & tight pinch with thumb-index finger
Wartenberg’s Syndrome

• Examination
  – Pain with forced forearm pronation
  – Tinel’s sign over nerve
  – Injection test into junction of BR confirms diagnosis
  – Differentiate from deQuervain’s tenosynovitis
Wartenberg’s Syndrome

• Nonoperative Treatment
  – Rest
  – NSAIDs
  – Avoid aggravating activities
  – Wrist splints
Wartenberg’s Syndrome

• Surgical decompression after 6 months of nonoperative treatment

• 75% good results
Thank You
The End