Neurologic Injuries of the Upper Extremity

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Injuries: Acute & Chronic

- Burner / Stinger
- Nerve Entrapment Syndromes
- Suprascapular Ganglions
- Brachial Plexitis
- Cervical Radiculopathy
Cervical Radiculopathy

- Dermatomal +/- neck pain
- +/- weakness, loss of reflex
- Usual cause: disc hernation
- Treatment: rest, PT, epidural steroids
- Surgery rare
Brachial Plexus Injury (Burner / Stinger)

- Injury to upper trunk (C5,6)
- Defensive FB players, wrestlers
  - College FB 50-65% incidence
  - Recurrence 85%
- Mechanism:
  - Stretch
  - Direct blow
  - Root compression
Burner - Presentation

- **Symptoms**
  - immediate sharp, burning pain
  - supraclavicular to arm
  - non-dermatomal paresthesias
  - may only persist for seconds

- **Acute exam – motor NORMAL !**
Burner - Pathogenesis

- **Neurapraxia** (Gd I) – transient (<2 wks)
- **Axonotmesis** (Gd II) – motor +/- sensory (>2 wks); nerve integrity maintained; regeneration possible
- **Neurotmesis** (Gd III) – motor + sensory (>1 yr); nerve discontinuity; no recovery
- EMG may remain abnormal, even after clinical recovery
Burner- Return to Play Decisions

Clinical exam: **full strength** upper trunk
- External rotators
- Deltoid
- Biceps

- Neck symptoms: no return (pain, ROM)
- Sensory deficit: rare, d/t other injury?
- Re-examine after game, weekly x2 wks. for late motor deficit
Burner - Persistent Symptoms

• EMG/NCV at 2-3 weeks
  – Root injury: MRI
  – Upper trunk injury: resolution of all symptoms before return to sport

• Prevention
  – Neck and shoulder strengthening
  – Neck rolls, built-up shoulder pads
Spinal Accessory Nerve Injury

• Motor to trapezius (no sensory)
• Injury mechanism
  – direct blow (hockey or lacrosse stick across the posterior neck)
  – traction injury
• Presentation
  – Shoulder pain
  – Weak shoulder FF/ABD
  – Scapular winging / Atrophy
• Treatment
  – NSAIDs, muscle relaxants, electrical stimulation, sling
  – Primary repair up to 1 yr.
  – Nerve graft, neurolysis best in 6mos.
Long Thoracic Nerve Injury

- C5,6,7 motor to serratus anterior
- Traction: arm overhead, neck turned away
- Shoulder weakness/pain, +/- radiate down the arm or posterior scapula
- Exam: decreased active shoulder elevation; late scapular winging
- Disability to entire upper limb
- Recovery (closed trauma): 75%
- Conservative treatment: ROM, periscapular muscle strengthening
- Surgical treatment:
  - Tendon transfer (pectoralis, teres minor)
  - Tenodesis, fascia lata slings to supplement
Suprascapular Nerve Entrapment
Suprascapular Nerve Anatomy

- C-5,6 roots
- Under transverse scapular ligament
- Nerve to SS
- Around spinoglenoid notch to IS
- Motor to supraspinatus & infraspinatus muscle
- Sensory to ACJ and GHJ
SSN Entrapment - Pathogenesis

- Traction or compression
- Erb’s point, suprascapular notch, spinoglenoid notch
- Repetitive overuse – weightlifters, VB players
- Ganglion – SS or SG notch
SSN Entrapment - Presentation

- Presentation depends upon location
  - Pain – posterolateral shoulder
  - Painless if distal
- SS/IS Weakness, atrophy
- +/- tenderness @ SS notch
SSN Entrapment – Diagnosis

- **EMG/NCV**
  - Electrodes placed in rotator cuff
  - Must tell neurologist what you are looking for!

- **MRI**
  - Ganglions
  - Atrophy
Suprascapular Ganglions

- Extrinsic compression of suprascapular nerve
  - Transverse ligament
  - Spinoglenoid notch
- Extra-articular fluid from defect in postero-superior joint capsule
- SLAP lesion
Treatment

• **Conservative Treatment**
  – Traction injury at Erb’s pont
  – Repetitive Overuse
  – NSAIDs, rest

• **Tranverse Ligament Release**
  – Open or Arthroscopic

• **Ganglion Resection**
  – Normal EMG, small cyst (<1.0 cm): observation
  – Abnormal EMG, large cyst: surgical decompression
  – Decompression accompanied by capsulolabral repair

• May have painless persistent atrophy
• Operate early, before atrophy occurs
Parsonnange-Turner Syndrome

- Most common plexopathy
- Immunologic mediation
- Preceded by: viral illness, surgery, immunization, trauma
- Long thoracic, axillary, suprascapular, musculocutaneous
Presentation

- Sudden onset
- Acute severe pain, deep in shoulder
- Not aggravated by valsalva, head motion
- Exam: atrophy, weakness

Diagnosis

- MRI, CT-arthrogram
- r/o extrinsic lesions of plexus, shoulder, cervical spine
- **EMG / NCVs** – localize to plexus, not involving cervical roots
Treatment

- 85-90% full recovery over weeks to months
- Physical therapy - motion and strength
- Muscle stimulation & re-education
- Corticosteroids
Nerve Entrapment Syndromes at the Elbow

• Pronator syndrome

• Cubital tunnel syndrome

• Radial tunnel syndrome
Pronator Syndrome

- Hypertrophy of pronator teres due to repetitive use
- Compression of median n.
- Repetitive pro / supination
- Racquet / Throwing sports
- Vague, fatigue-type pain in forearm
- No weakness
Pronator Syndrome

• **Exam**
  - Pain with resisted pronation, wrist flexion
  - Tender over pronator...lateral antecubital fossa

• **Treatment**
  - Rest, stretch
  - Surgical release
Cubital Tunnel Syndrome

- Ulnar neuritis
- Compression, traction, mechanical irritation
- Throwers
- Associated with valgus instability (>40%) and medial epicondylitis (>60%)
Ulnar Neuropathy - Pathogenesis

- **Proximal**
  - Arcade of Struthers or IM septum
  - Muscle hypertrophy (triceps, anconeus)

- **Cubital tunnel**
  - Osteophytes, synovitis, thickened retinaculum

- **Distal**
  - FCU aponeurosis
Ulnar Neuropathy - Pathogenesis

- Ulnar n pressure with flexed elbow/extended wrist >3X resting level
- >6X when combined with shoulder abduction in throwing
- Tethering from chronic changes with valgus overload increase intraneural pressures
- Friction from dislocation
- Cumulative effects produce nerve fibrosis, ischemia
Ulnar Neuropathy – Presentation

- Medial elbow pain radiating into forearm and hand
- Paresthesias, finger clumsiness
  - Weakness late
- Painful popping/snapping if nerve subluxating or dislocating
Ulnar Neuropathy - Evaluation

- **Exam:**
  - r/o cervical radiculopathy
  - May have (+) Tinel’s or elbow flexion test
  - Palpate nerve through ROM: may feel “doughy”
- **Xray** – spurs
- **MRI** – soft tissue masses
- **EMG/NCVs**
  - Negative study doesn’t r/o dx
  - Most helpful with equivocal dx or in differentiating between cervical, elbow, & more
Treatment

- **Non-operative:** rest, NSAIDs, splints, no steroids
- **Throwers** – likely recurrence
- **Surgery**
  - Indications: failed Rx, subluxation, other elbow surgery
  - Options: decompression, epicondylectomy, anterior transposition (submuscular vs subcutaneous)
  - **TREAT INSTABILITY!**
Radial Tunnel Syndrome

- Compression deep branch radial nerve at radial tunnel
- Pain radiates to dorsal forearm
- Pain increases with repetitive pronation and supination
- Night pain
- Exam:
  - point tender where PIN dives under supinator
  - +/- finger and wrist extensor weakness
  - Pain on resisted supination of the extended forearm, especially with wrist flexion
- A lidocaine block test to r/o lateral epicondylitis
Radial Tunnel Syndrome - Treatment

- Conservative treatment – rest
- Surgical release:
  - recurrent symptoms
  - release all sites
Summary

• Upper extremity neurologic syndromes: must rule out cervical cause (acute and chronic)

• Consider nerve entrapment syndromes in differential of chronic upper extremity pain – May not include paresthesias!