Ultrasound of Elbow Nerves
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Outline:
• Entrapment neuropathies
  – Ulnar: cubital tunnel syndrome
  – Radial: posterior interosseous nerves syndrome
  – Median: pronator teres syndrome
• Trauma

Ulnar Nerve: anatomy
• Behind medial epicondyle of humerus:
  – Cubital tunnel retinaculum or Osborne fascia
• Distal to epicondyle:
  – True cubital tunnel
  – Between ulnar and humeral heads: flexor carpi ulnaris
  – Under arcuate ligament


Ulnar Nerve: cubital tunnel syndrome
• Hypoechoic and enlarged
  – > 9 mm² area
  – Ratio greater than 2.8 compared to proximal¹
• Mild hypoechogenicity alone: may be normal
• Causes:
  – Idiopathic, overuse, joint process
  – Anconeus epitrochlearis: compression
• Normal variant accessory muscle

¹Thoirs K et al. J Ultrasound Med 2008; 27:737
²Yoon JS et al. Muscle Nerve 2008; 38:1231
Cubital Tunnel Syndrome

Anconeus Epitrochlearis

Ulnar Nerve Dislocation
- Occurs in elbow flexion
- Reduces in extension
- Nerve irritation, predisposes to injury
- Found in 20% asymptomatic volunteers

Okamoto, J Hand Surg 2000; 25B:85

Technique: ulnar nerve subluxation

Isolated Ulnar Nerve Dislocation

Subcutaneous Submuscular

Ulnar Nerve Transposition

Short Axis
**Symptomatic Ulnar Nerve Transposition**
- Nerve area enlarged if symptomatic
- 17.3 mm² (+/- 9.9 mm²)

*Voskian MM et al. 2014; 33:1647*

**Snapping Triceps Syndrome**
- Ulnar nerve and medial triceps dislocate over apex of medial epicondyle
- Ulnar nerve and medial triceps remain in contact with each other
- Palpable snap felt through transducer

*Radiology 2001; 220:601*

**Snapping Triceps Syndrome: dynamic imaging**

**Radial Nerve: deep branch**
- Supinator syndrome:
  - Motor deficits (wrist, finger extension)
  - Abnormal electrodiagnostic studies
  - Nerve enlargement: entrapment
- Radial tunnel syndrome:
  - Pain, no motor deficits, normal EMG
  - Muscle denervation on MRI
  - No nerve enlargement

*Ferdinand BD et al. Radiology 2006; 240:161*

**Radial tunnel**
- Radial nerve: deep branch
  - Originates from radial nerve between brachioradialis and brachialis
  - Passes between deep and superficial layers of supinator muscle
  - Exits as posterior interosseous nerve

*Jacobson JA. et al. Sem Musculoskel Rad 2010; 14:473*

**Supinator Syndrome**

*Abnormal* | *Normal*
Supinator Syndrome

Radial Nerve: deep branch
- As it enters into supinator under Arcade of Frohse
- Normally flattens in AP dimension: 50%
- Cross-sectional area does not change


Median Nerve: pronator teres

Pronator Teres Syndrome
- Median nerve compression between humeral and ulnar heads
- Trauma, congenital, pronator teres hypertrophy
- Rare
- Forearm pain, numbness, weakness


Pronator Teres Syndrome

Anterior Interosseous Nerve Syndrome

Denervation changes
Nerve Transection

- Hypoechoic and retracted nerve ends if complete
- Neuroma formation:
  - Disorganized and tangled nerve end
  - Normal response to nerve transection
- After amputation:
  - US important to determine if symptomatic

J Clin Ultrasound 1997; 25:85
Take-home Points:

- Key entrapment sites
- Hypoechoic nerve enlargement
- Symptoms with sonopalpation
- Dynamic evaluation:
  - Ulnar nerve dislocation
  - Snapping triceps syndrome

Syllabus on line and other educational material:
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