Ulnar sided wrist pain
“The low back pain of the wrist”

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Disclosures

• I have no disclosures/conflicts of interest relevant to this talk

• Often referred to as “black box” of the wrist
  – Complex anatomy
  – Challenging differential diagnosis
  – Variable treatment outcomes
Anatomy

• Normal ROM (Pronation/Supination)
  – 150 to 180 Degrees
• Axis of rotation
  – Through center of radial head and ulnar head
• Ulnar head translation with rotation
  – DORSAL translation with PRONATION
  – PALMAR translation with SUPINATION

Anatomy

• Sigmoid Notch
  – Dorsal rim – acute angulation
  – Volar rim – rounded with cartilaginous lip
  – Flat notch may lead to instability (Tolat 1996)
  – Radius of curvature of sigmoid notch greater than ulnar seat (Af Ekenstam and Hagert 1985)

Ulnar Head

• Distal Ulna
  – Sigmoid Articular
    – Up to 220 degrees of articular cartilage
  – Distal Articular
    – Spherical to flat
    – Semilunar area of cartilage
    – Articulates with TFCC Disc
  – Fossa
    – No cartilage
    – Attachment site for Radioulnar and Ulnocarpal ligaments
    – Very vascular
  – Ulnar Styloid
    – 2-6 mm
    – ECU sheath attachment
    – Radioulnar ligament attachment
Joint Reactive Forces

- Neutral Position (af Ekenstam 1984)
  - Capitate through SLL to articular ridge of distal radius
  - 84% of load transmitted through radius

- Ulnar Deviation
  - Through central articular disk
  - Force can increase 150%

- Ulnar variance (Palmer 1988)
  - Neutral Variance = 16-18% load through ulna
  - Shortening by 2.5mm = 4% ulnar load
  - Lengthening by 2.5mm = 42% ulnar load

DRUJ Stability

- Intrinsic
  - Dorsal and palmar radioulnar ligaments

- Extrinsic
  - ECU
  - ECU Sheath
  - Pronator quadratus
  - Intemnsseous ligament of forearm

TFCC Anatomy

- Superficial Radioulnar Ligaments
  - Insert onto STYLOID
  - Acute angle of insertion

- Deep Radioulnar Ligaments
  - Insert onto FOVEA
  - Obtuse angle of insertion is mechanically advantageous
  - Ligamentum subcruentum (Kauer 1975)
TFCC Anatomy

• Hagert (1994)

- SUPINATION
  • Palmar superficial - tight
  • Dorsal deep - tight

- PRONATION
  • Dorsal superficial - tight
  • Palmar deep - tight

Evaluation

• Divide ulnar sided wrist pain into
  – Acute traumatic
  – Chronic overuse
  – Chronic degenerative

Physical Exam

• Position patient across from you with elbow 90 and fingers toward ceiling
  – Inspection
  – Palpation
    • LT
    • ECU/FCU
    • Fovea
    • DRUJ
Special maneuvers

• LT snuff box test
• LT shuck
• Foveal Sign
• Ulnocarpal stress test
• Piano key test
• ECU synergy test
• ECU subluxation test

Imaging

• X-rays
  – Standard PA and Lateral
  • Don’t depend on lateral to dx DRUJ dislocation/subluxation
  – Check for ulnar variance
  • May use clenched fist to eval for dynamic variance
  • May change >1mm from pronation to supination
  – Lateral Stress Views
  – Signs of DRUJ injury
  • Ulnar styloid base fx
  • Widening of DRUJ
  • >20° dorsal radial angulation
  • >5mm shortening of distal radius

• CT Scan
  – Helpful in identifying pathology of DRUJ
  • Malunions, degenerative changes
  – Eval both wrists: neutral, supinated, pronated

• MRI
  – Variable sensitivity, specificity for TFCC tears
  – Arthrogram improves
  • Better at detecting central TFCC tears and SL tears than peripheral TFCC and LT tears

• Ultrasound
  – Low cost and non-invasive
  – Can be used with hardware without artifact issues
TFCC Tears

- Palmer Classification (1989)
- Class 1: Traumatic
  - A: Central
  - B: Ulnar Avulsion
  - C: Carpal Avulsion
  - D: Radial Avulsion

Chronic TFCC Tears

- Class 2: Degenerative
  - A: TFCC wear
  - B: TFCC wear + chondromalacia
  - C: TFCC perf + chondromalacia
  - D: TFCC perf + chondromalacia + LT lig perf
  - E: TFCC perf + chondromalacia + LT lig perf + UC Arthr.

Treatment of Acute Injuries

- Surgical management is necessary for
  - DRUJ instability
  - Displaced fractures leading to DRUJ malalignment/instability
- Absent instability treatment is conservative
  - Splinting
  - NSAIDs
  - Corticosteroid injection
  - Therapy
Surgical repair

- Open technique described by Hemansdorder and Kleinman
- Variety of arthroscopic techniques
  - Inside out
  - Outside in
  - All inside
- No direct comparisons of techniques
- Key in all is avoid injuring dorsal sensory branch of ulnar nerve
- Success rate of surgery 80-90% in published data

Taken from Arthrex technique guide for knotless TFCC repair
**Chronic TFCC Tears**

- Most of Palmer Class 2 tears result from excessive loading between the distal ulna and triquetrum
- Degenerative tears are not amenable to repair
- Treatment: Debridement +/- ulnar shortening

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**Ulnar Impaction Syndrome**

- Due to acquired or developmental ulnar positive variance
- Exam
  - Ulnar sided wrist pain and swelling
  - ↑ pain with pronated ulnar deviation and grip
- Imaging
  - X-ray
  - Consider stress radiographs
  - Dynamic ulnar variance
  - MRI

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**Ulnar Impaction Syndrome**

- Treatment
  - Conservative tx first (splinting, activity mod, NSAIDS, injection)
  - Surgery if conservative tx fails
  - Wafer Procedure (Feldon 1992)
    - Partial distal ulnar resection (2-4mm max)
    - Preserves styloid and fovea
    - Arthroscopic or open
  - Ulnar shortening osteotomy
    - Contraindicated with DRUJ arthritis
Ulnar shortening osteotomy

- Converts ulnar positive wrist to ulnar negative
- Generally performed in distal 1/3
- Standard technique is compression plating with transverse or oblique osteotomy
  - Variety of cutting guides now available
- Results of USO overall very good
  - Complications
    - 0-5% nonunion
    - Hardware irritation
- Avoid in patients with DRUJ arthritis and dorsal DRUJ dislocations

Wafer Procedure

- First described as open procedure by Feldon in 1992
  - Reported good to excellent results in 12 of 13 patients
- Arthroscopic technique gaining popularity
  - Create 2-3mm ulnar neg variance using power burr through defect in TFCC
  - Can resect about 5mm of ulna using this technique
- Bernstein et al compared USO to wafer
  - Found similar results overall
  - Recommend wafer
  - No hardware issues
  - No risk of nonunion

LT ligament injuries

- Seen in isolation or in combination with other radiocarpal and intercarpal injuries
- Isolated injuries can be seen from fall on outstretched wrist or direct blow
- Present with ulnar sided pain and swelling
- On exam may show positive provocative maneuvers
- Imaging
  - VISI pattern on lateral radiograph
  - MR arthrogram best test
### Treatment

- **Acute stable injuries**
  - Cast immobilize in neutral for 4-6 weeks
- **Late stable injuries**
  - Corticosteroid injection into midcarpal joint

### Failure of conservative treatment

- **Arthroscopic evaluation**
  - Evaluate Radiocarpal and Midcarpal joint
  - Geissler I and II
    - Debride tear
  - Geissler III and IV
    - Repair
    - Pinning
    - Fusion

<table>
<thead>
<tr>
<th>Geissler Classification</th>
<th>Findings</th>
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</thead>
<tbody>
<tr>
<td>I</td>
<td>Attenuation or hemorrhage of ligament</td>
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<tr>
<td>II</td>
<td>Incongruity seen from midcarpal joint-less than probe</td>
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<tr>
<td>III</td>
<td>Incongruity seen from midcarpal and radiocarpal</td>
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<td>IV</td>
<td>Gross instability-arthroscopic drive through</td>
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### ECU tendonitis

- **Common cause of ulnar sided wrist pain**
  - Difficult to differentiate from intra-articular pathology
- **Multiple causes**
  - Traumatic
  - Chronic overuse
Treatment

- Start with conservative therapy
  - Bracing
  - NSAIDs
- If diagnosis unclear
  - MRI
  - Diagnostic Injection
    - Fill sheath with local +/- corticosteroid

Operative Intervention

- Complete release of fibro-osseous tunnel of 6th dorsal compartment
  - Possible to cause tendon subluxation
- In advanced cases may need to debride tendon
  - Consider interposition graft with severe tendon damage in chronic cases

ECU subluxation

- Can result from trauma
  - Direct blow with wrist supinated and ulnar deviation
- Exam
  - Tenderness over ECU
  - Illicit subluxation
**Treatment**

- Initial treatment with immobilization
  - Long arm cast with wrist extended, pronated and radial deviated (4-6 weeks)
  - Transition to short arm cast (4 weeks)
  - Physical therapy

**Operative Intervention**

- Repair
  - Can be difficult in chronic cases
  - Consider deepening of the groove

- Reconstruction
  - Variety of techniques
  - Use local retinaculum flap
  - Use of palmaris graft