Ulnar-Sided Wrist Pain

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Ulnar Wrist Pain

- Causes
  - TFCC
  - Ulnar Impaction
  - ECU
  - DRUJ
  - LT tears
  - Hook of Hamate
  - Pisiform
  - FCU tendonitis
  - Radial wrist issues

Anatomy of Ulnar Wrist

- Ulnar wrist --> powerful grip
- Intrinsic ligaments
  - Capitohamate ligament
  - Lunotriquetral ligament
    - Volar component most important
    - Central and dorsal most commonly torn
Anatomy

- Extrinsic ligaments
  - Stabilize ulna to volar carpus
    - Ulnotriquetral ligaments
    - Ulnolunate ligaments
      - Volar aspect of TFCC, ulnar styloid

Ulnar Wrist Anatomy

- TFCC
  - Helps stabilize DRUJ
  - Triangular fibrocartilage articular disc
  - Palmar/ Dorsal radioulnar ligaments
  - Meniscal homolog
  - Ulnar collateral ligament
  - ECU tendon subsheath

- Ulnar collateral ligament
  - Capsular structure from base of ulnar styloid
  - Meniscal homolog
    - Extends from discoid section of the TFCC to triquetrum, lunate, 5th metacarpal
Anatomy

- TFCC vascularity
  - Anterior interosseous artery
  - Ulnar artery
  - Peripheral portion of disk well vascularized
  - Central, radial, poor vascularity

TFCC Injury

- Acute traumatic injuries
  - Fall, twisting, asymmetric mechanical load
- Chronic overuse injuries
  - ECU, FCU tendinitis
- Chronic degenerative conditions
  - Remote trauma, systemic inflammatory diseases
Physical Exam

- Position of ulna
  - Prominent: possible DRUJ injury
- Position of carpus
  - Supination, volar translation
  - RA
  - Laxity
- Palpation

- Provacative maneuvers

- Piano key test

- DRUJ pathology
  - Dorsal to volar load across ulna proximal to the DRUJ
- Injections
Imaging

- Radiographs
  - PA, Lateral, Oblique
  - Pronation grip view
- CT Scan
  - DRUJ pathology
    - Pronation, supination, neutral
    - Malunions
- CT Scan can

Imaging

- MRI
- MR Arthrography
  - DRUJ
  - Midcarpal joint
  - Radiocarpal joint
  - Sensitivity 88-100% TFCC central tear
  - LT tears sens 40-75%
  - LT tears spec 64-100%

Imaging

- MR IV contrast
  - Bone marrow pathology
  - Ulnocarpal impaction syndrome
TFCC Tears

- Triangular Fibro Cartilage Complex
- Most common cause of ulnar-sided wrist pain
- Stabilizer of DRUJ
- Stable DRUJ, treatment for pain
  - Splinting
  - Cortisone
  - Arthroscopy: fix vs. debride

TFCC Tear Classification

MRI

Figure 1: Normal MRI Wrist
Figure 2: Triangular Fibrocartilage Complex T1
Wrist Arthroscopy

- 2.7mm scope
- Wrist tower
- 3-4, 4-5, 6R/6U portals

MRI – Ulnar Sided Wrist Pain

Arthroscopic Debridement
TFCC Tears

- Most common source of ulnar sided wrist pain
- Traumatic or degenerative

Palmer classification
- 1A: traumatic, central
- 1B: avulsion TFCC from insertion distal ulna
  - Peripheral, vascular zone
- 1C: detachment of TFCC from distal attachment to lunate (rare, high energy)
  - Ulnocarpal instability, palmer translocation
- 1D: detachment of TFCC from radius

Degenerative
- 2A: thinning of TFCC, no perforation
- 2B: wear of TFCC, chondromalacia
- 2C: central tear of TFCC
- 2D: tear with LT tear
- 2E: degenerative arthritis of the ulnocarpal joint
**TFCC Tears**

- Conservative management
  - Rest, splint, casting
  - Steroid injections
- Wrist arthroscopy
  - Persistent symptoms
  - Debridement
    - Create stable rim of TFCC

**TFCC Tears**

- Arthroscopic debridement 1A tears
  - Success rates range 66-87%
- Failures
  - Subsequent ulnar shortening osteotomy increased success from 87-99%
    - Hulsizer, JHS, 1997
  - Failure rate of arthroscopic debridement in ulnar positive wrists 13-60%
    - Minami, JHS, 1996
- Ulnocarpal unloading procedure
**TFCC Tears**

- Repair of 1B tears
  - Inside-out repair
  - Outside-in repairs
  - 2-0 PDS suture
    - TFCC repaired to peripheral rim and ECU tendon sheath
    - Dorsal sensory branch of ulnar nerve
- Post op
  - Long arm cast, supination 4-6 wks
  - Progressive increase in use over 3 months

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**Arthroscopic repair outcomes**

- Corso, Arthroscopy, 1997
  - G/E 44/45 pts
- Degreef
  - Minimal-absent pain 47/52 wrists
- Estrella, Arthroscopy, 2007
  - G/E 26/53 pts (74%)
  - Healing of TFCC 7/9 second look scopes
- Ruch, Arthroscopy, 2005
  - Poor outcomes after TFCC repair correlated with
    - Advanced age
    - Decreased supination
    - Positive ulnar variance
    - Loss of grip strength

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**Debridement**
Ulnar Impaction

- Degenerative condition
- Abutment of distal ulna against ulnar carpus
- Ulnar neutral wrist ulnocarpal joint absorbs 20% load
- 2.5 mm ulnar positive: 40%
- 2.5 mm ulnar negative: 4%
- Increased dorsal tilt also increases load
  - 40 deg dorsal: 65%
  
Ulnar Impaction

- Found in patients
  - Ulnar positive variance
  - Distal radius malunions
  - Madelung's deformity
  - Trauma
  - Essex-Lopresti lesions

Ulnar Impaction

- Radiographs
  - Relative lengthening of ulna at neutral or pronated grip views
  - Subchondral sclerosis, cysts
    - Ulnar head
    - Triquetrum
    - Lunate
- MRI
  - Abnormal signal ulnar aspect of
Ulnar Impaction

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Treatment: Ulnar Impaction

- Symptomatic treatment
  - Immobilization
  - NSAIDs
  - Injections
- Surgery
  - Decompress (unload) ulnocarpal joint
  - Wafer procedure
  - Ulnar shortening osteotomy

Ulnar Shortening Osteotomy

- Convert ulna positive wrist to ulna negative wrist
  - Back et al, JBJS, 2005
    - G/E results 20/31 ulnas
  - Iwasaki et al, CORR, 2007
    - Improved modified Mayo wrist score
  - Fricker et al, Arch Ortho Trauma, 1996
    - 89% pt satisfaction
    - Improved grip strength, ROM, decrease
**Ulnar Shortening Osteotomy**

- Poor outcomes associated with
  - DRUJ degenerative changes
  - Long duration of symptoms
  - Workers compensation
    - Bernstein et al, Arthroscopy, 2004
- 5% nonunion rate
- Hardware irritation

**Ulnar Impaction**

- Contraindications
  - DRUJ arthritis
  - Dorsal DRUJ dislocation
- Relative contraindications
  - Wrist arthritis
  - Reverse oblique sigmoid notch
Wafer procedure

- Open wafer (Feldon, JHS, 1992)
  - Remove the most distal 2-3 mm of the distal ulna
  - G/E results in 12/13 pts
  - Recovery may be slow

Arthroscopic Wafer

- Remove 1-2 mm distal ulna arthroscopically, through defect in TFCC
  - Rotate the wrist to expose entire surface
  - Image

Wafer Procedure

- Limitations
  - Only 2-3 mm can be removed
  - What if there is no TFCC tear?
Impaction Treatment

- USO vs Wafer
  - Similar pain relief, comparable complication rates
    - Constantine et al, JHS, 2000
  - Comparison arthroscopic wafer and USO
    - Similar results
    - No need for hardware removal with wafer
    - Bernstein et al, Arthroscopy, 2004

Lunotriquetral Ligament Tears

- Early vs late presentation
- Can occur in isolation or with other ligament injuries
  - Perilunate, reverse perilunate
  - Pronated, extended, radially deviated hand
- Conservative management
  - Immobilization

LT ligament tears

- Late
  - Immobilization
  - Steroid injection
  - Arthroscopic treatment
  - Geissler Classification
  - Debridement
    - May improve symptoms
    - Weiss et al, JHS, 1997
    - 43/43 pts with partial tears had improved symptoms
LT tears

- Arthroscopic debridement partial tears
  - Excellent results 13/14 pts SL or LT tears
    - Ruch et al, JHS, 1996
  - 4/5 poor results, debridement LT tears
    - Westkaemper et al, Arthroscopy, 1998

LT Tears - Unstable

- Debridement and pinning
  - 16/20 pts complete pain relief
    - Osterman et al, Hand Clinics, 1995
- Shin et al, JBJSB, 2001
  - Direct repair
  - LT reconstruction
  - LT arthrodesis

LT Tears

- Salvage
  - Midcarpal fusion
  - Proximal row carpectomy
**ECU Sub-sheath Tear**

- Supination and ulnar deviation
- Immobilization
- Cortisone

**ECU Subluxation**

- Painless subluxation
- Tenosynovitis - pain
- Tendon rupture
- Surgery
ECU Stabilization

- Origin lateral epicondyle
- Insertion base of small finger metacarpal
- Travels across ulnar head
  - Angular path
- Has own subsheath
  - Stabilizes tendon within ulnar groove

ECU

- Symptomatic recurrent subluxation
  - Vulpis, Acta Orthop Scand, 1964
  - Athletes, racket/stick sports
  - Forceful supination, flexion, ulnar deviation
  - Rupture tendon sheath
    - Volar subluxation
  - Painful snapping, clicking sensation
ECU

- Conservative treatment
  - Splinting, casting
  - Injection
- Surgery: ECU tendon sheath reconstruction
  - Direct repair
  - Reconstruction
    - Extensor retinaculum
    - Fascial patch
    - Tendon grafts

ECU Sub-sheath tear

- Image of surgical procedure
  - Tendon repair
  - Extensor mechanism reconstruction

- Image of post-operative healing
  - Tendon healing
  - Functional recovery
Ulna Neck fractures

Ulna Styloid Fractures

DR Fx with Ulna Styloid Fx
**ORIF DR & Ulna Styloid Fx**

**DRUJ Dislocation**
- Uncommon injury
- Dorsal
  - Reduce and immobilize in Supination
  - Pin if unstable
- Volar
  - Very uncommon
  - Immobilize in pronation

**Volar DRUJ Dislocation**
DRUJ Injury

Hamate Fracture
- Easily missed injury
- Vague c/o ulnar wrist pain
- Direct Blow/Gripping Sports
  - Baseball
  - Golf
  - Tennis

Demographics
Hook of Hamate Fractures

- Baseball: 9.9%
- Golf: 33.3%
- Diving: 4.8%
- Tennis: 4.8%
- Weightlifting: 4.8%
Hamate Fractures

- Can play with pain
- CT scan for Dx
- Acute: SAC Tx – 15% nonunion
- Subacute/Chronic: Hamulus excision
- Ulnar Nerve Motor branch
Triquetral Fracture

- Second most common carpal fracture
- May only see on lateral
- SAC 4-6 weeks
- Painless fibrous union

Pisotriquetral Pain
Pisiform Fracture

- Uncommon
- Direct Blow
- SAC
- Supination-oblique xray
- CT