The Thrower’s Elbow

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Tommy John Surgery “Epidemic”

- In MLB, more Tommy John Surgery performed in 2014 than during the entire decade of the 90’s

Bigger & Faster...

- # of pitchers with 94 mph average fastball has doubled

Elbow Biomechanics in Pitching

- Effect on Medial Side = Valgus forces
  - Late cocking/early acceleration phase = 64 N·m (Up to 100 N·m?)
  - Ultimate strength of MCL in cadaver = 33 N·m (Up to 80 N·m?)
  - To protect MCL, shoulder internal rotation and forearm pronation (flexor-pronator) provide dynamic stabilization

Valgus Extension Overload Syndrome

- Combination of large valgus load + rapid elbow extension
  - Tension medially
  - Compression laterally
  - Shear posteriorly

- Basic pathophysiologic model of most of the common elbow injuries in the throwing athlete

Medial Elbow Pain in the Thrower

- Differential Diagnosis
  - UCL Injury
  - Flexor-Pronator Strain
  - Ulnar Neuritis
  - Subluxating Medial Triceps
  - Posteromedial Impingement
  - Posteromedial Trochlear Chondral Erosion

Range of Motion

- Active
  - Crepitus?
  - Pain?
  - Mechanical symptoms?

- Passive
  - “End Feel” at full extension and full flexion
    - Bony end feel in terminal flexion = likely osteophyte

  - Flexion Contracture
    - Up to 50% of pro pitchers have a flexion contracture
    - Not indicative of injury, but of DJD

Palpation

- Bony landmarks
  - Important in throwers:
    - Medial epicondyle
    - Radial head
    - Proximal olecranon

- Soft tissue landmarks
  - Flexor-Pronator Mass
    - Pain common in throwers with medial injury
  - Ulnar collateral ligament
    - At 60° flexion, medial muscle mass moves anteriorly from UCL

Neurovascular Exam

- Ulnar nerve
  - Sensation/Motor Function
  - Elbow Tinel’s Sign
  - Ulnar nerve subluxation with elbow flexion

Taking the History

- Location and duration of Pain?
- Prior elbow injuries?
- Shoulder problems?
- Changes in training regimen?
- Previous treatment?

Taking the History

- For throwing athletes
  - Accuracy
  - Velocity
  - Stamina
  - Phase of throwing

- Neurovascular complaints
  - Numbness/tingling/pain radiation

Physical Examination

Range of Motion

- Active
  - Crepitus?
  - Pain?
  - Mechanical symptoms?

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Subluxating Medial Triceps

- Triceps subluxation in flexion
- Ulnar nerve subluxation / dislocation
- “2 snaps”
- “Push-up test” (pain with resisted extension)
- Tenderness along medial triceps posterior to epicondyle, especially with compression during flexion-extension

Specific Diagnostic Tests

Valgus Extension Overload Test

- Detects presence of:
  - Posteromedial olecranon osteophyte
  - Olecranon fossa overgrowth
- Stabilize humerus, then apply valgus stress while quickly maximally extending the elbow.

Static Valgus Stress Test

- Evaluate anterior bundle of UCL
- Supine, forearm pronated, elbow flexed 20 - 30 °
- Note pain or instability
- Complete sectioning of MCL only results in 1-2 mm of opening (Calloway, et al.)

Milking Maneuver

Valgus stress is exerted on the elbow by pulling down on the humerus.

Arthroscopic Valgus Stress Test

- Evaluate anterior bundle of UCL
- Supine, forearm pronated, elbow flexed 20 - 30 °
- Note pain or instability
- Complete sectioning of MCL only results in 1-2 mm of opening (Calloway, et al.)

Role of Imaging Studies
Plain X-Rays
- Plain Radiographs
  - AP, LAT, 2 Obliques
  - Oblique Axial with 120° flexion

Stress X-Rays
- Comparison Views
- Stress Radiographs
  - Not standardized
  - Uninjured baseball pitchers have mild laxity at baseline
- Ultrasound Stress

Ultrasound
- Advantages:
  - Can identify:
    - Tendon ruptures
    - Ligament tears
    - Nerve subluxation
  - Dynamic examination
    - Stress views
    - Visualize subluxation
  - Color-flow doppler can identify inflammation
- Disadvantages
  - Operator-dependent

MRI
- Nonenhanced MRI
  - Potter and Glady et al. (HSS)
  - Good sensitivity/specificity
- Saline-enhanced MRI
  - Schwartz et al. (ASMI)
  - 92% sensitivity
    - Complete tears 95%
    - Partial tears 92%
  - 100% specificity
- Intraarticular contrast-enhanced MRI

Elbow UCL Reconstruction
- Conway (50pts): 60% RTP at same level for at least 1 yr
- Thompson (33pts): 60% RTP in 2 yr
- Azar (53pts): 81% RTP avg 2 yr
- Altchek (32pts): 80% RTP avg 3.5 yr

UCL Reconstruction in High School Baseball players
Petty (ASMI) AJSM 2004
- 27 players (avg F/U 35 mos.)
- 74% returned to same level of higher

Risk Factors for UCL injury:
- Seasonal or event overuse
- Throwing velocity > 80 mph
- Throwing breaking pitches before age 14
- Year-round throwing (without rest period)

UCL Injury Treatment Options?
- Treat the patient, not the MRI...
- Decision-making:
  - Sport, Fast Pitch, Age, Level of Competition
  - Partial vs. Full Thickness tear
  - Length of Nonoperative Treatment
  - Timing of Surgery (Red-shirt)
  - Reconstruction with graft vs. Repair (Internal Brace)
  - Choice of graft
  - Choice of fixation technique
  - Choice of surgical approach
  - Ulnar nerve transposition

Thank You