ADVENTURES AND LESSONS LEARNED … ON THE UCL

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NOTES

Eastern Athletic Trainers Association
Philadelphia, PA
January 7-10, 2011

I. INTRODUCTION – QUESTIONS TO BE ASKED
1. What’s the big deal? (Epidemiology)
2. Is it what I think it is? (Diagnosis)
3. How do you fix that? (Surgical Technique)
4. Coach, when can I go back in? (Outcomes and Return to Play)

II. WHAT’S THE BIG DEAL?
1. MLB Statistics
   a. ~ 1/5th of medical costs involve the elbow joint
   b. 2nd only to shoulder joint
2. Anatomic considerations
   a. Anterior bundle is primary valgus restraint from 30° - 120°
3. Biomechanical considerations
   a. Phases of throwing – late cocking/early acceleration
   b. Average angular velocity – 5000 deg/sec
   c. UCL provides 70-75% valgus stability at 90°
4. Epidemiology (Andrews, AOSSM/AAOS, 2007)
   a. Occurrence in elite throwers thought to be secondary to overuse/poor mechanics
   b. Increasing # of youth and high school baseball players with UCL injury
      (~ 200% increase/year since 2000 – Andrews et al, 2007)
   c. Increased occurrence or awareness?
   d. Presumed risk factors:
      • Velocity > 80 mph (radar gun) (73%)
      • Year-round throwing (69%)
      • Early breaking pitches (67%)
      • Seasonal overuse (62%)
      • Event overuse (42%)
      • Inadequate warm-up (23%)
5. Epidemiology Studies … provide insight on athletes at risk

III. IS IT WHAT I THINK IT IS?
1. History
   a. Repetitive throwing
   b. Pain during late cocking/acceleration phases
   c. +/- sudden pop
2. Physical examination
   a. Tenderness over UCL
   b. Pain with valgus stress
   c. + Milking Test
3. Imaging
   a. Plain x-rays (AP, lateral, oblique, axial)
      - Asymptomatic abnormalities exist
   b. Stress x-rays (manual vs. Telos)
      - >2-3 mm opening compared to contra-lateral elbow.
      - Asymptomatic abnormalities exist
   c. MRI
      - Non-enhanced requires special sequences
      - Enhanced with improved sensitivity, especially partial tears
      - Studies suggest asymptomatic abnormalities occur
      - Studies indicate that injury (especially deep and partial thickness) may be missed
   d. Ultrasound
      - Safe
      - Rapid
      - Non-invasive
      - Less expensive
      - Dynamic
   e. “Stress Ultrasonography of the UCL in Elite Baseball Players” (Nazarian and Ciccotti, 2006 and 2008)
      - 155 pro baseball players undergoing DUS at spring training over 6 year period
      - UCL evaluated for thickness, hypoechoic focii, calcifications, and joint space width (at rest and stressed with Telos at 30°)
      - In dominant elbow of asymptomatic, elite pitchers, UCL was:
         - thicker
         - more hypoechoic signals
         - more calcifications
      - 70% of players with multiple DUS showed increased joint space gapping with time
      - No increase in hypoechoic signals/calcifications with time
      - Players who subsequently incurred a UCL injury had significantly increased:
         - joint space gapping (>1 to 1.5 mm)
         - calcifications
         - compared to asymptomatic players
   4. Diagnostic evaluation … continues to improve
IV. **HOW DO YOU FIX THAT?**

1. Nonoperative treatment
   a. Rest
   b. Heat/Ice/NSAID
   c. AROM when pain free
   d. Strengthening follows
   e. Throwing program at 6-12 weeks

2. Operative Indications
   a. Throwers with complete tear
   b. Throwers with partial tear unresponsive to nonop treatment
   c. Nonthrowers with ADL symptoms

3. Operative Techniques
   a. Repair – poorer results compared to reconstruction
      (Conway, JBJS, 1992; Andrews, AJSM, 1995)
   b. Jobe Technique
      - Original Procedure
        - Reconstruct ant. bundle of UCL
        - Flex-Pron mass detached
        - Bone tunnels in ulna and med. epi (into cubital tunnel)
        - Free tendon graft in “Figure-of-8” fashion
        - Ant. submuscular transposition of ulnar nerve
      - Andrews Modification
        - Elevate flex-pron tendon without detaching
        - Same ulnar and med. epi. tunnels
        - Subcutaneous ulnar nerve transposition
      - Yocum Modification
        - Flex-Pron muscle-tendon split without detaching
        - Same ulnar tunnel
        - “Y” shaped med. epi tunnel with exit through separate ant. third split
          in flex-pron mass (not into cubital tunnel)
        - No ulnar nerve transposition
   c. Docking Technique
      - Flex-pron muscle-tendon split
      - Same ulnar tunnel
      - Single humeral tunnel in med. epi
      - Krakow stitch tendon fixation
   d. Alternative Techniques
      - Implant Fixation (Hechtman et al, AJSM, 1998)
        - Free Tendon Graft
        - Suture anchor fixation in med. epi + ulnar bone tunnels
        - Suture anchor fixation in both hum. + ulna
        … limited data available
DANE Procedure (Conway, AOSSM, 2003)
- Free Tendon Graft
- Flexor-Pron muscle-tendon splitting
- Docking technique in Humerus
- Single tunnel in ulna with biotenodesis screw fixation
... limited data available; simpler technique with decreased OR time

4. Biomechanical Comparison (RI)
“A Quantitative Evaluation of Two Reconstructive Techniques of the Ulnar Collateral Ligament”
A. 12 pairs of fresh frozen cadaver elbows
B. 3 degree of freedom loading device
C. potentiometers, torque sensors
D. 6 underwent Jobe technique; 6 underwent Docking (matched elbows)
E. Results:
  • Load to Failure: Native UCL>Jobe, Docking
  • Load to Failure: Jobe = Docking
  • Flexibility of Native UCL, Jobe, Docking all similar at 90 degrees

4. Surgical Techniques … continue to evolve

V. COACH, WHEN CAN I GO BACK IN?

1. Postoperative Rehabilitation
   A. Splint for 7-10 days
   B. Hinged elbow brace for additional 2-4 weeks
   C. Batting at 3 months
   D. Tossing at 4 months
   E. Throwing from mound at 6 months
   F. Return to play 10-16 months

2. Does the end justify the means?
   • Original Jobe Technique (Conway et al, JBJS, 1992)
     - 56 pts
     - mean F/U = 6.3 yrs
     - 80% good/excellent
     - 68% return to pre-injury level at mean of 12 months
     - 12 of 16 professional pitchers returned
     - 22% with postop ulnar nerve symptoms
   • Andrews Modified Jobe Technique (Azar et al, AJSM, 2000)
     - 59 pts
     - min F/U = 12 months
     - 81% returned to pre-injury level at mean of 9.8 months
     - only 1 pt. with postop ulnar nerve symptoms which resolved
• Yocum Modified Jobe Technique (Thompson et al, ASES, 2001)
  - 83 pts (54 professionals, 18 collegiate, 11 recreational)
  - 94% good/excellent
  - 82% return to pre-injury level at mean of 13 months
  - 5% with postop ulnar nerve symptoms - all transient

• RI experience (Yocum Modified Technique)
  - 54 pts (31 pitchers)
  - avg F/U = 34m (12-62m)
  - 88% with FROM (90% of pitchers)
  - 92% return to pre-injury level
    (87% of pitchers) at mean of 11 months
  - no postop ulnar nerve symptoms

• Docking Technique (Rohrbough et al, AJSM, 2002)
  - 31 pts
  - avg F/U = 2.6 yrs
  - 97% return to pre-injury level
  - no postop ulnar nerve symptoms

• Overall outcomes
  - High % return with minimal ROM deficits
  - Younger athletes may have difficulty advancing

3. Return To Play Data (Cohen, Sheridan, Ciccotti AOSSM, 2008; Sports Health, 2010)
   A. we may not be as good as we think
   B. 50% returned to pre-injury level at 2 years

   A. 449 pts undergoing UCL Recon from 1994-2005
   B. Types of complications:
      • Postop ulnar symptoms (7.3%)
      • Non-specific elbow pain (5.1%)
      • Posterior Impingement (4.9%)
      • Arthrofibrosis (4%)
      • Retear of UCL recon (2%)
      • Flex-pron symptoms (1.8%)
      • Med. epi. Avulsion fx (1.3%)
   C. Return to play
      • Overall (84%)
      • Ulnar nerve symptoms (84%)
      • Arthrofibrosis (72%)
      • Non-specific elbow pain (70%)
• Secondary post-op impingement (50%)
• Medial epicondylar avulsion (50%)
• Chronic flex-pron symptoms (50%)
• Retear of UCL Recon (22%)

5. Outcomes and Return to Play … may not be as good as we think

VI. WHAT HAVE WE LEARNED?
… Case Presentation

VII. SUMMARY
1. What’s the Big Deal?
   … epidemiology provides insight on athletes at risk
2. Is it what I think it is?
   … diagnostic evaluation continues to improve
3. How Do You Fix That?
   … surgical techniques continue to evolve
5. Coach, When can I go Back In?
   … outcomes and return to play may not be as good as we think
REFERENCES:
