Ulnar Collateral Ligament Injuries in the Throwing Athlete . . . Amateur to Professional

Michael G. Ciccotti, MD
The Everett J. and Marian Gordon Professor of Orthopaedics
Chief, Division of Sports Medicine
Director, Sports Medicine Fellowship and Research
Rothman Institute at Thomas Jefferson University
Head Team Physician, Philadelphia Phillies
Neither I, Michael G. Ciccotti, nor any family member(s), author(s), have any relevant financial relationships to be discussed, directly or indirectly, referred to or illustrated with or without recognition within the presentation.

- Consultant – Stryker Endoscopy
- Consultant – Venture MD
- Research Support – Arthrex
History

- 25 y.o. RHD professional pitcher
- Acute R medial elbow pain while throwing one pitch
- Unable to throw
History

- 19 y.o. RHD elite javelin thrower
- Progressive right medial elbow pain and stiffness for 6 months
History

- 17 y.o. RHD elite high school pitcher
- Right medial elbow pain and stiffness after 6 plus innings
- Able to recover by next start
ADVENTURES and LESSONS LEARNED . . . on the UCL
4 QUESTIONS

- What’s the Big Deal? (Epidemiology)
- Is it what I think it is? (Diagnosis)
- How do you fix that? (Treatment Techniques)
- Coach, when can I go back in? (Outcome and Return to play)
WHAT’S the BIG DEAL?

... Epidemiology
HOW BIG IS THE PROBLEM?

$1 BILLION

ANKLE $50 MILLION
BACK $140 MILLION
SHOULDER $250 MILLION
KNEE $160 MILLION
HAMSTRING $110 MILLION
ELBOW $200 MILLION
WRIST/HAND $80 MILLION

Rothman Institute of Orthopaedics at
Thomas Jefferson University
Anatomic Stabilizers
Anatomic Stabilizers

- Anterior Band is primary valgus restraint (30-120 deg)
Methods

- 12 cadaveric elbows
- Baseline stress ultrasound (SUS) of the medial elbow at 30 degrees of flexion both at rest and with applied Telos valgus force (15lbs)
- Sequential sectioning of medial elbow structures was then carried out
- SUS with Telos valgus stress (15lbs) performed at each step of sectioning

STRESS ULTRASOUND EVALUATION of MEDIAL ELBOW INSTABILITY in a CADAVERIC MODEL

Rothman Institute of Orthopaedics at Thomas Jefferson University
## Results

<table>
<thead>
<tr>
<th>Delta’s (Combined Sectioning Sequences)</th>
<th>Mean Increase in Laxity</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addition of Stress</td>
<td>1.1 mm</td>
<td>0.5-1.8 mm</td>
</tr>
<tr>
<td>Transverse Band Cut</td>
<td>0.7 mm</td>
<td>0.2-1.3 mm</td>
</tr>
<tr>
<td>Posterior Band Cut</td>
<td>0.8 mm</td>
<td>0.3-1.3 mm</td>
</tr>
<tr>
<td>Ant. Bundle of Ant. Band Cut</td>
<td>2.0 mm</td>
<td>1.1-2.8 mm</td>
</tr>
<tr>
<td>Post. Bundle of Ant. Band Cut</td>
<td>1.4 mm</td>
<td>0.6-2.2 mm</td>
</tr>
<tr>
<td>Flexor-Pronator Mass Cut</td>
<td>0.5 mm</td>
<td>0.0-0.9 mm</td>
</tr>
</tbody>
</table>

**STRESS ULTRASOUND EVALUATION of MEDIAL ELBOW INSTABILITY in a CADAVERIC MODEL**

Rothman Institute of Orthopaedics at Thomas Jefferson University
Conclusion

- SUS can identify progressive laxity with sequential sectioning of medial elbow structures
- Sectioning of the Anterior Band is the greatest contributor to medial elbow instability in the cadaver model

STRESS ULTRASOUND EVALUATION
of MEDIAL ELBOW INSTABILITY in a CADAVERIC MODEL

Rothman Institute of Orthopaedics at Thomas Jefferson University
BIOMECHANICS
Act of Throwing
PHASES OF THROWING

Wind-up → Early cocking → Late cocking → Acceleration → Deceleration → Follow-through

Start → Hands apart → Foot down → Maximum external rotation → Ball release → Finish
- Avg. Angular Velocity = 5000 deg/sec
- Peak Angular Velocity = 500,000 d/s
- UCL provides ~ 70-75% resistance to valgus at 90 degrees of flexion
- Angular Forces may exceed tensile strength of UCL . . .

. . . resulting in UCL injury
UCL INJURY

- Medial Laxity
- Lateral Compression
- Posterior Shear
EPIDEMIOLOGY

- Increased occurrence in elite throwers thought secondary to overuse/poor mechanics
- Increased # of youth & high school UCL injuries (~200%/yr since 2000)
- Increased occurrence or awareness?

Andrews et al, AOSSM/AAOS/AJSM, 2007
EPIDEMIOLOGY

Risk Factors for UCL Injury

- Velocity > 80mph (73%)
- Year-Round Throwing (69%)
- Early Breaking Pitches (67%)
- Seasonal Overuse (62%)
- Event Overuse (42%)
- Inadequate Warm-up (23%)

Andrews et al, AOSSM/AAOS/AJSM, 2007
Risk Factor-Overuse

- **Year- ’round** - Average of 8 months competition/yr
- **Seasonal** - Most with < 4 days rest between appearances
- **Event** - > 100 throws in an outing
- 85% of adolescent players undergoing UCL Recon had at least one overuse factor

Andrews et al, AOSSM/AAOS/AJSM, 2007
Risk Factor - Velocity

- At 80mph, ~32 Nm of valgus force transmitted thru UCL
- UCL failure load is ~ 32 Nm
- ? Excessive emphasis on radar gun

Andrews et al, AOSSM/AAOS/AJSM, 2007
Epidemiology of Professional Baseball Elbow Injuries

James Andrews MD, Christopher Ahmad MD, Dave Altchek MD, Scott Sheridan PT ATC, Michael G. Ciccotti MD

- **Purpose** – To describe the burden, distribution, and clinical characteristics of elbow injury among Professional Baseball Players during the 2011, 2012 and 2013 Seasons

- **Hypothesis** - Professional baseball players have a high incidence of elbow injuries influenced by multiple factors.

- **Study Design** - Descriptive epidemiological review of elbow injury types and severity.
# Epidemiology of Professional Baseball Elbow Injuries

## Table 1:

<table>
<thead>
<tr>
<th>Level of Play</th>
<th>N (%)</th>
<th>Age Mean (Std)</th>
<th>Days Missed Mean (Median)</th>
<th>Required Surgery</th>
<th>Re-Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor</td>
<td>2,753 (81.2%)</td>
<td>22.8 (3.2)</td>
<td>27.9 (13)</td>
<td>487 (17.7%)*</td>
<td>61 (2.2%)*</td>
</tr>
<tr>
<td>Major</td>
<td>637 (18.8%)</td>
<td>28.9 (3.9)</td>
<td>27.8 (12)</td>
<td>122 (19.2%)*</td>
<td>19 (3.0%)*</td>
</tr>
<tr>
<td>Total</td>
<td>3,390</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Percent calculated within Level of Play
# Epidemiology of Professional Baseball Elbow Injuries

<table>
<thead>
<tr>
<th>Minor &amp; Major League</th>
<th>Frequency</th>
<th>Requiring Surgery</th>
<th>Days Missed Non-Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td>Mean (Median)</td>
</tr>
<tr>
<td>Event Position</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pitcher (Defense)</td>
<td>1129 (33.3%)</td>
<td>386 (34.2%)</td>
<td>32.0 (20.5)</td>
</tr>
<tr>
<td>Position Player (Defense)</td>
<td>316 (9.3%)</td>
<td>64 (20.3%)</td>
<td>17.1 (9.0)</td>
</tr>
<tr>
<td>Base Runner (Offense)</td>
<td>24 (0.7%)</td>
<td>3 (12.5%)</td>
<td>13.5 (4.0)</td>
</tr>
<tr>
<td>Batter (Offense)</td>
<td>437 (12.9%)</td>
<td>8 (1.8%)</td>
<td>4.1 (2.0)</td>
</tr>
<tr>
<td>Not Classified</td>
<td>1,484 (43.8%)</td>
<td>148 (10.0%)</td>
<td>27.6 (15.0)</td>
</tr>
</tbody>
</table>
# Epidemiology of Professional Baseball Elbow Injuries

<table>
<thead>
<tr>
<th>SMDCS</th>
<th>Diagnosis Type</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ligament</td>
<td>Ligament</td>
<td>730</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>-UCL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Other</td>
<td>116</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tendon</td>
<td>-Medial</td>
<td>0</td>
<td>272</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>-Lateral</td>
<td>0</td>
<td>0</td>
<td>36</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>-Other</td>
<td>0</td>
<td>255</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nerve</td>
<td>-Ulnar</td>
<td>0</td>
<td>0</td>
<td>224</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>-Other</td>
<td>0</td>
<td>0</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>Bone</td>
<td>-Post Imping</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>-Fracture</td>
<td>0</td>
<td>0</td>
<td>38</td>
<td>0</td>
</tr>
<tr>
<td>Cartilage</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Loose Body</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>89</td>
</tr>
<tr>
<td>Misc</td>
<td>-Bursitis</td>
<td>0</td>
<td>43</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>-Contusion</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>724</td>
</tr>
<tr>
<td></td>
<td>-Infection</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>-Other</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>654</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>851</td>
<td>666</td>
<td>248</td>
<td>128</td>
</tr>
</tbody>
</table>
# Epidemiology of Professional Baseball Elbow Injuries

<table>
<thead>
<tr>
<th>Diagnosis Type</th>
<th>Minor League</th>
<th></th>
<th>Major League</th>
<th></th>
<th>Minor &amp; Major League</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
<td>%Yes*</td>
<td>No</td>
<td>Yes</td>
<td>%Yes*</td>
</tr>
<tr>
<td>Ligament</td>
<td>430</td>
<td>290</td>
<td>59.5%</td>
<td>62</td>
<td>69</td>
<td>56.6%</td>
</tr>
<tr>
<td>Tendon</td>
<td>474</td>
<td>25</td>
<td>5.1%</td>
<td>153</td>
<td>14</td>
<td>11.5%</td>
</tr>
<tr>
<td>Nerve</td>
<td>177</td>
<td>21</td>
<td>4.3%</td>
<td>45</td>
<td>5</td>
<td>4.1%</td>
</tr>
<tr>
<td>Bone</td>
<td>38</td>
<td>60</td>
<td>12.3%</td>
<td>13</td>
<td>17</td>
<td>13.9%</td>
</tr>
<tr>
<td>Misc</td>
<td>1,147</td>
<td>91</td>
<td>18.8%</td>
<td>242</td>
<td>17</td>
<td>13.9%</td>
</tr>
<tr>
<td>Total</td>
<td>2,266</td>
<td>487</td>
<td></td>
<td>515</td>
<td>122</td>
<td></td>
</tr>
</tbody>
</table>

*Rothman Institute of Orthopaedics at Thomas Jefferson University*
ULNAR COLLATERAL LIGAMENT INJURY in PROFESSIONAL FOOTBALL QUARTERBACKS

Christopher C Dodson, Nicholas G. Slenker, Steven B. Cohen, Michael G. Ciccotti

... ALL SUCCESSFULLY TREATED NONOPERATIVELY!

ISAKOS, 2011
JSES, 2011
WHAT’S the BIG DEAL?

... Epidemiologic data indicates that both elite and youth athletes at risk primarily due to overuse & technique
IS IT
WHAT
I THINK
IT IS?

... Diagnosis

Rothman Institute of Orthopaedics at
Thomas Jefferson University
FLEX-PRON TENDINOSIS
MYSTERY OF THE MEDIAL ELBOW IN THE ATHLETE

VEO

UCL TEAR

ULNAR NEURITIS
TENDINOSIS
History

- Repetitive activity
- Peri-epicondylar pain
- Insidious onset
- Acute onset if torn
Maximal tenderness 5-10mm distal and lateral to med epi; +/- defect if torn

Tenderness & weakness with resisted wrist flexion/forearm pronation
NEURITIS
History

- Insidious/intermittent
- Repetitive athletic activity
- Clumsiness/heaviness
- Paresthesias in ring & little fingers
- Snapping sensation if subluxating
- Subluxation
- Tinel’s
- Sensory deficits – 4th & 5th digits
- Strength deficits – hand intrinsics
- + Elbow Flexion Test
- Repetitive throwing
- Pain during acceleration through release
- Posteromedial elbow pain
- Progressive loss of control with exertion
- +/- Locking/catching (if loose bodies)
VEO Examination

- Posteromedial tenderness worsened with extension
- Loss of full extension
- Valgus Extension Overload Test (Andrews, 1995)
- Arm Bar Test (O’Driscoll, 2008)
Elbow Injury

... the UCL
UCL INSTABILITY
History

- Repetitive throwing
- Pain during late cocking/early acceleration phases
- +/- sudden pop
UCL INSTABILITY
Examination

- Tenderness at Distal Insertion
- Pain with valgus stress

Jobe, JBJS, 1985
■ Milking Test

O’Brien, AJSM, 1997
Plain X-Rays
• Calcifications
• Radiocapitellar chondrosis
• Posteromedial spurring

ASYMPTOMATIC ABNORMALITIES EXIST!

Conway, 2003
Plain X-Rays

Stress X-Rays

- MANUAL
- TELOS
• Joint space widening *compared to contralateral side*

• > .5-2mm difference

Conway, JBJS, 1992
Rijke, RAD, 1994
Ellenbecker, AJSM, 1998

ASYMPTOMATIC ABNORMALITIES EXIST!
MRI
Enhanced MRI

Kooima, AOSSM, 2003
Popovic, IJSM, 2001
Jobe, AAOS, 2001

... not perfect
... asymptomatic abnormalities exist
... subtle injuries may be missed
STRESS ULTRASONOGRAPHY of the ULNAR COLLATERAL LIGAMENT in ELITE BASEBALL PLAYERS: A 10 Year Experience

Alfred Atanda, Steven B. Cohen, Levon N. Nazarian, Christopher C. Dodson, Lauren Holmes, Michael G. Ciccotti

AOSSM, 2003
AJR, 2003
Herodicus, 2007, 2013
AOSSM, 2012
MLB TPA, 2012
AJSM, 2014
Purpose

- To longitudinally evaluate MLB players over a 10 year period with Stress US to determine if it can be predictive of possible UCL injury.
Methods and Materials

- Stress US on 348 professional pitchers at each Spring Training over a 10 year period
- Mean age = 22.8 yrs
- Mean time as pro = 2.5 yrs
- Dominant and non-dominant arms

STRESS ULTRASONOGRAPHY of the UCL in ELITE BASEBALL PLAYERS

Rothman Institute of Orthopaedics at Thomas Jefferson University
Methods and Materials

- UCL evaluated for:
  - Thickness
  - Hypoechoic focii
  - Calcifications
  - Joint space width at rest and stressed (30°)

STRESS ULTRASONOGRAPHY of the UCL in ELITE BASEBALL PLAYERS

Rothman Institute of Orthopaedics at Thomas Jefferson University
Methods and Materials

- Baseline SUS data on all players
- Longitudinal comparison in players with multiple SUS during study
- Players who subsequently incurred UCL injury had their pre-injury SUS findings compared to asymptomatic players

STRESS ULTRASONOGRAPHY of the UCL in ELITE BASEBALL PLAYERS

Rothman Institute of Orthopaedics at Thomas Jefferson University
Medial Elbow of Pitching Arm

Bony and Soft Tissue Landmarks

- Medial Epicondyle Of Humerus
- Flexor Tendon
- UCL
- Trochlea
- Coronoid Process

Rothman Institute of Orthopaedics at Thomas Jefferson University
Conclusions

Those players with:
- Dom – Non-Dom Joint Space Gapping $>1.5$-$2.0$mm
- Dom UCL hypoechoic foci

... may be at higher risk for UCL injury and close monitoring of ROM, strength, endurance, technique and exposure should be carried out.
4 QUESTIONS

IS IT WHAT I THINK IT IS?

... Diagnostic evaluation continues to improve and ultimately may be predictive.

Rothman Institute of Orthopaedics at Thomas Jefferson University
4 QUESTIONS

HOW DO YOU FIX THAT?

... Techniques of Treatment

Rothman Institute of Orthopaedics at Thomas Jefferson University
Nonsurgical Treatment

- Rest for 3-6 weeks
- Heat/Ice/NSAID
- Modalities
- +/- Injection (Biologics)
- No throwing/overhead sports for 3-6 weeks

Podesta et al, AJSM, 2013
Nonsurgical Treatment

- ROM as comfort allows
- Strengthening follows
- Optimize “Kinetic Chain” – Legs, Core, Shoulder
- Swinging a bat/club/racquet at 4-6 wks
- Throwing Program at 6-12 wks
• 20-30% position players
• <5% pitchers

Rothman Institute of Orthopaedics at Thomas Jefferson University
SURGICAL INDICATIONS

- Throwers with complete tear
- Throwers with partial tear unresponsive to non-op tx
- Non-throwers with ADL symptoms
In the beginning there was Tommy John.
Surgical Approach

- Split the Flex-Pron at post. 1/3rd
- Expose the UCL
- Split the UCL
- Valgus the joint
Graft Harvest

Palmaris Longus
Hamstring
Plantaris
Med. Achilles
Allograft
SURGICAL OPTIONS

- JOBE
- MODIFIED JOBE
- DOCKING
- ALTERNATE
SURGICAL OPTIONS

JOBE or DOCKING

Rothman Institute of Orthopaedics at Thomas Jefferson University
A Quantitative Evaluation of Two Reconstructive Techniques of the Elbow Ulnar Collateral Ligament

Christopher Spagnola, John Thinnes, Monish Romani, Sorin Seigler, Michael G. Ciccotti

AAOS, AOSSM Specialty Day
AJSM, 2008
Materials & Methods

- 12 pairs of fresh frozen cadaver elbows
- Potentiometers
- Torque sensors
- 3-Degree of Freedom Loading Device
- Opto-electrical Tracking System for Anterior band of UCL
Materials & Methods

- Tested at 30, 60, 90, 110 degrees
- UCL loaded to failure at 80 deg.
- Reconstruction - Jobe/Docking on each pair of elbows
- Testing repeated
Conclusions

- **Load to Failure:**
  - Native UCL > Jobe, Docking
  - Jobe = Docking

- **Flexibility of Native UCL, Jobe, Docking**
  - all similar at 90 degrees (throwing position)
"You don’t always get what you want … but sometimes you get what you need"

Mick Jagger
4 QUESTIONS

HOW DO YOU FIX THAT?

... Techniques continue to evolve
COACH, WHEN CAN I GO BACK IN?

... Outcomes & Return to Play
Splinted for 7-10 days
- Hinged elbow brace for additional 2-4 weeks
- ROM begins at 2 weeks
- Strengthening at 6 weeks
- Focus on entire “Kinetic Chain” – legs, core, shoulder
Postoperative

- Review sport technique
- Swinging a bat/club/racquet at 3 months
- Tossing Program at 4 months
- Throwing from mound at ~6 months
- Return to play at ~10-16 months
Postoperative

SCAPULA

Shoulder ROM

CORE

Hip and Legs

...Kinetic Chain...
Systematic Review of Outcome after UCL Reconstruction in Overhead Athletes

- 8 Level III (retrospective, cohort) studies with 1 yr F/U
- 83% overall excellent results with 10% complication rate
- Improved results with:
  1) muscle-splitting
  2) abandoning ulnar nerve transposition
- Inconsistency in levels of competition (selection bias)

Vitale & Ahmad, AJSM, 2008
44 professional baseball players over 4 seasons undergoing shoulder/elbow surgery

All procedures by experienced, fellowship trained surgeons

Evaluated for return to play

12 UCL Reconstructions

50% return at 2 yrs

... we may not be as good as we think

Cohen, Sheridan, Ciccotti, Sports Health, 2011
Complications after UCL Recon

- 449 pts undergoing UCL Recon from 1994-2005
- Return to Play:
  - Overall (84%)
  - Ulnar nerve symptoms (84%)
  - Arthrofibrosis (72%)
  - Non-specific elbow pain (70%)
  - Posterior Impingement (50%)
  - Med Epi Avulsion Fx (50%)
  - Flex-pron Symptoms (50%)
  - Retear of UCL Recon (22%)

Andrews, AOSSM/AAOS, 2007
MLB Elbow Study Group
STUDY PROJECTS

I - Epidemiology of Professional Baseball Elbow Injuries
II - Ulnar Collateral Ligament Surgery in Professional Baseball – Players Perspective
III - Prospective Evaluation of Outcome after Elbow Surgery in Professional Baseball
IV – Biomechanical Evaluation of Throwing in Normal and UCL Reconstructed Players
V – Media Perception of UCL Reconstruction
VI – Risk Factors for UCL Injuries in the Professional Pitcher: A Prospective Study
Continued, focused evaluation of UCL Injury

Involvement at Major League Baseball level (not just Minor Leagues)

Evaluation of youth baseball players to determine future risk of injury

Consider other factors that may lead to apparent “epidemic” of UCL injuries
COACH, WHEN CAN I GO BACK IN?

. . . Outcomes & Return to Play may not be as good as we think, but research efforts continue . . .
And so . . .

What have we learned?
4 QUESTIONS

- What’s the Big Deal? (Epidemiology)
- Is it what I think it is? (Diagnosis)
- How do you fix that? (Treatment Techniques)
- Coach, when can I go back in? (Outcome and Return to play)
Ulnar Collateral Ligament Injuries in the Throwing Athlete... Amateur to Professional

Michael G. Ciccotti, MD
The Everett J. and Marian Gordon Professor of Orthopaedics
Chief, Division of Sports Medicine
Director, Sports Medicine Fellowship and Research
Rothman Institute at Thomas Jefferson University
Head Team Physician, Philadelphia Phillies
Case Presentations

Elbow Injury
History

- 25 y.o. RHD minor league pitcher
- Right medial elbow pain and stiffness for 6 months
- Diagnosed by MD with ulnar neuritis – treated nonoperatively
- Pain persisted
Exam

- Minimal swelling
- ROM: 5 – 135 deg
- No Flex/Pron tendernessness
- NVI; - Tinel’s; - Elbow Flex Test
- + Milking Test
Dominant elbow > 1.5mm gapping (3.3mm)
Stress Ultrasound

Nondominant elbow < 1.5mm gapping (0.1mm)
Diagnosis: Partial UCL Tear

- Undersurface UCL tearing noted at surgery
- Underwent R UCL Modified Jobe Reconstruction
- Returned to play at 16 months
- Advanced to MLB
History

- 17 y.o. RHD elite high school pitcher
- Right elbow pain and stiffness after 6 plus innings; able to recover by next start
- Pain – posterior and medial
- Diagnosed by MD with Post-Med Impingement (VEO)
Exam

- Minimal swelling
- Posterior tenderness over the olecranon tip
- ROM: 5 – 145 deg
- No laxity
- No Flex-Pron deficits
- NVI
- + Arm Bar Test
Plain X-ray
Rothman Institute of Orthopaedics at
Thomas Jefferson University
Diagnosis: Posteromedial Impingement

- Treated nonoperatively for 6 months
- Symptoms persisted
- Underwent R elbow arthroscopic excision of olecranon spur
Follow-up

- Completed postoperative rehabilitation
- Returned to preinjury level of pitching at 7 months without difficulty
- Pain returned after 18 months
Exam

- Minimal swelling
- ROM: 5 – 145 deg
- NVI; - Tinel’s; - Elbow Flex Test
- No Flex/Pron tenderness
- + Milking Test
Stress Ultrasound

Dominant elbow > 1.5mm gapping (3.7mm)

Rothman Institute of Orthopaedics at Thomas Jefferson University
Stress Ultrasound

Nondominant elbow < 1.5mm gapping (0.3mm)
Diagnosis: Partial UCL Tear

- Treated nonoperatively for 6 months (including PRP x 2)
- Symptoms persisted
- Significant undersurface UCL tearing noted at surgery
- Underwent R UCL Docking Reconstruction
- Returned to play at 12 months
- Able to pitch in college
History

- 19 y.o. RHD elite javelin thrower
- Acute R medial elbow pain while throwing
- Unable to throw
Exam

- Moderate swelling
- ROM – 12-125 deg
- NVI; - Tinel’s
- Mild Flex/Pron tenderness, but no defect
- Pain with valgus stress and milking test
MR Imaging

Rothman Institute of Orthopaedics at Thomas Jefferson University
Stress Ultrasound

Dominant elbow > 1.5mm gapping (2.5mm)
Diagnosis: UCL Tear

- Underwent R UCL Modified Jobe Reconstruction
- Rehab progressed smoothly
- At 8 months postop developed vague, recurrent R medial elbow pain while throwing
Exam

- No swelling
- ROM – 5-145 deg
- No Flex/Pron tenderness
- NVI; - Tinel’s
- Milking Test
- Vague posteromed pain
Rothman Institute of Orthopaedics at Thomas Jefferson University
Dominant elbow < 1.5mm gapping (0.6mm)

Rothman Institute of Orthopaedics at Thomas Jefferson University
Diagnosis: Kinetic Chain Deficits

- Underwent focused Kinetic Chain rehab
- Improved throwing mechanics
- Symptoms completely resolved; returned to competition
- Premier NCAA Javelin thrower
THANK YOU.