Cleveland Clinic
Sports Health

Non-operative Management of UCL Injuries

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Disclosures

Arthrex

DJO
Smith & Nephew

Journal of Shoulder and Elbow Surgery
Journal of Bone and Joint Surgery
American Journal of Sports Medicine
Orthopaedic Journal of Sports Medicine
The Physician and Sports Medicine

AOSSM Education and Industry Relations Committee

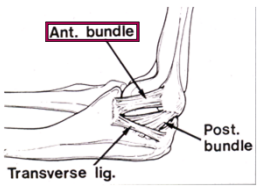
"Classic" UCL Anatomy

- MUCL complex consists of 3 distinct ligaments/bundles:

1. Anterior Oblique
2. Posterior Oblique
3. Transverse

- Anterior Bundle has 3 distinct bands:

1. Anterior
2. Central
3. Posterior

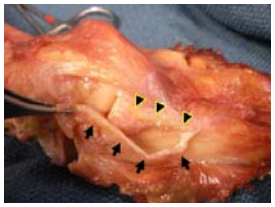


Quantitative Analysis of the Medial Ulnar Collateral Ligament Ulnar Footprint and Its Relationship to the Ulnar Sublime Tubercle

Lutul D. Farrow,*† MD, Andrew J. Mahoney,† MD, John J. Stefancin,‡ MD, Mihra S. Taljanovic,§ MD, Joseph E. Sheppard,† MD, and Mark S. Schickendantz,‖ MD
Investigation performed at the Arizona Institute for Sports Medicine at the University of Arizona College of Medicine, Tucson, Arizona

AJSM 2011

- MUCL has a ***much longer ulnar insertion than previously described***.
  - Sublime Tubercle averaged 5.8mm from joint line
  - The MUCL ridge length was 21.6 mm in length
  - The ulnar soft tissue attachment averaged 29.2 mm
  - The average length of the entire anterior band of MUCL was 53.9 mm



Treatment

Natural history not well understood:

- Surgeon preference and expert opinion predominate
- Literature almost exclusively addresses surgical treatment techniques and results
- Most recent studies have focused on performance metrics after UCL reconstruction
- Non-operative treatment rarely reported

Azar AJSM 2000, Cain AJSM 2010 , Ahmad Phys.Sportsmed 2012,, Jones JSES 2013, Erickson OJSM 2015, Erickson AJSM 2015, Hodgins AJSM 2016, Ford et. al AJSM 2016

Magnetic Resonance Imaging Predictors of Failure in the Nonoperative Management of Ulnar Collateral Ligament Injuries in Professional Baseball Pitchers

Salvatore J. Frangiamore,* MD, MS, T. Sean Lynch,† MD, Michael D. Vaughn,* MD, Lonnie Soloff,‡ MS, Michael Forney,§ MD, Joseph F. Styron,* MD, PhD, and Mark S. Schickendantz,‖¶ MD

July 2017

- Retrospective Cohort – Level III
- 32 pitchers (mean age 22.3 years) who underwent initial non-operative management of UCL injuries were evaluated.
  - Data collected from one MLB organization (all levels) from 2006 to 2015
- 34% (11/32) **failed** and required subsequent ligament reconstruction.
- 66% (21/32) successfully returned to the same level of play for 1 year without surgical intervention.
- No significant difference seen in physical exam findings or performance metrics between these patients

MRI findings:

- 82% (9/11) (p<0.001) who failed non-operative management (could not RTPSL) had distal tears
- 81% (17/21) who were able to RTPSL had proximal tears (p<0.001).

- When adjusting for age, location and evidence of chronic changes on MRI, **the likelihood of failing non-operative management was 12.4 times greater (P=.02) with a distal tear.**

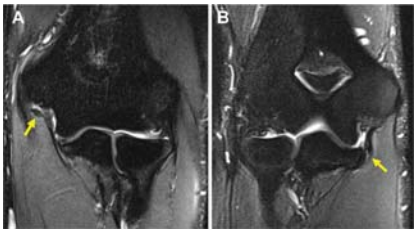


Figure 1. Coronal fat-suppressed proton density–weighted magnetic resonance imaging showing a partial-thickness tear of the (A) proximal ulnar collateral ligament (UCL) (arrow) and (B) distal UCL (arrow) in pitchers with successful nonoperative management.

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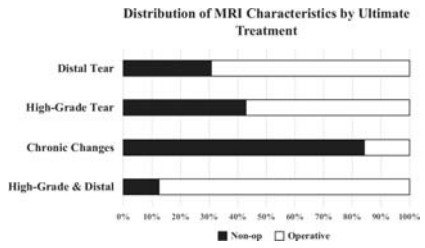

Figure 4. Distribution of magnetic resonance imaging characteristics of pitchers initially managed nonoperatively based on ultimate treatment. Of patients with distal tears, 31% (4/13) were treated successfully nonoperatively, and 69% (9/13) were treated successfully operatively. Of patients with high-grade tears, 43% (6/14) were treated successfully nonoperatively, and 57% (8/14) were treated successfully operatively. Of patients with chronic changes, 84% (16/19) were treated successfully nonoperatively, and 16% (3/19) were treated successfully operatively. When combining patients with high-grade and distal tears, 88% (7/8) failed nonoperative management.

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WHY DO DISTAL TEARS DO WORSE?

Like other anatomic areas

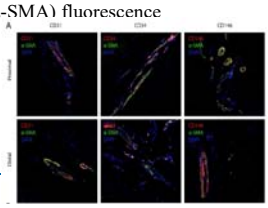
- Other areas where distal lesions do worse:
  - MCL Knee
  - UCL Thumb
- WHY??
  Blood supply – decreased healing?
  Less stability – biomechanics?

Evaluation of Microvascular Density and Regenerative Cell Populations in the Proximal and Distal UCL of the Elbow: A Comparative Study

Investigation performed at the Steadman Phillipon Research Institute

The presence of vascular-derived progenitor cell populations in the UCL was assessed with four staining groups:

1) CD31 immunohistochemistry (IHC)
2) CD31/α-smooth muscle actin (α-SMA) fluorescence
3) CD34/α-SMA fluorescence
4) CD146/α-SMA fluorescence



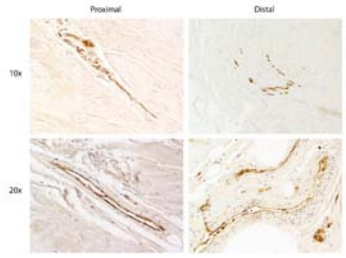


Figure 1. Immunohistochemistry of tissue samples demonstrates that immature blood vessels are present in both proximal and distal portions of the ulnar collateral ligament (UCL), demonstrated by brown CD31 staining.

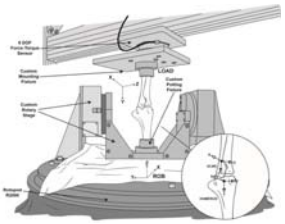
Analysis of adult UCL tissues demonstrated a uniform distribution of markers of microvasculature and vascular-derived regenerative cell populations throughout the proximal and distal regions of the UCL.

Biomechanical Analysis of Elbow Medial Ulnar Collateral Ligament Tear Location and its Effect on Rotational Stability

Investigation performed at the Cleveland Clinic Lerner Research Institute

- 16 cadaveric elbow specimens (all male, ages 65-82, average age: 73.5)
- The native UCL (after dissection) was tested with the 6-axis force-torque sensor (Theta, ATI Industrial Automation, Apex, NC) and controlled using custom simVITRO® software
- Each elbow was flexed to 70, 90 and 120 degrees
- At each flexion angle, valgus torques of 2.5 Nm and 5 Nm were applied and held consecutively for 45 seconds

- Each specimen had a 50% of fibers lesion created with a sharp 15-blade.
- The partial cut location was either
  - 1)anterior-distal
  - 2)posterior-distal
  - 3)anterior-proximal
  - 4)posterior-proximal



Results

- At valgus angles generated from 2.5 Nm intact torques, the posterior-distal insertions contributed to 51 ± 26% ($p<0.03$) intact rotational stability
- at valgus angles generated from 5 Nm intact torques, the posterior-distal insertions contributed to 41 ± 17% ($p<0.02$) intact rotational stability.
- For overall stiffness, the posterior-distal insertions contributed to 31 ± 12% ($p<0.045$) intact stiffness.
- Overall, ***the posterior distal insertion of the UCL contributed most to rotational stability*** and stiffness of the medial elbow when subjected to valgus stress

Conclusion

- Distal partial lesions (especially posterior distal) to the UCL appear to be biomechanically inferior to proximal UCL lesions at resisting valgus moment arms in cadaver elbows
- Our results lend biomechanical support to MRI findings associated with successful clinical non-operative treatment of MUCL injuries

Study Limitations

- Dissection may disrupt important secondary soft tissue restraints to the medial elbow
- Only 16 specimens
- Accuracy of cuts (exactly 50%?)
  - Attempted to account for this by measuring with ruler and marking
  - Cut with UCL under valgus tension to improve accuracy
- Age of cadavers not representative of throwing population
- Changes in throwers elbows – adaptive anatomy

Non-operative Treatment

- General guidelines:
  - Rest and protect the UCL
  - No valgus stress
  - No throwing minimum 6 weeks
  - No rehab or conditioning activities that load the medial elbow
  - Take the opportunity to address the entire kinetic chain
  - Maintain cardio fitness

Post Injury Rehab Progression

- Week 1:ROM
- Week 2:Pre's including protected cuff
- Week 3: advanced cuff and forearm work in 90/90 with stabilization
- Week 4: 2 handed plyos
- Week 5: 1 handed plyos
- Week 6: ITP

Return-to-Play Outcomes in Professional Baseball Players After Medial Ulnar Collateral Ligament Injuries

Comparison of Operative Versus Nonoperative Treatment Based on Magnetic Resonance Imaging Findings

Gregory M. Ford,*† MD, MS, James Genuario,† MD, MS, Jason Kinkartz,† MD, Thomas Githens,‡ DO, and Thomas Noonan,† MD
Investigation performed at Steadman Hawkins Clinic–Denver, Greenwood Village, Colorado, USA

AJSM 2016

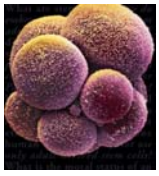
- 43 pro baseball players with 43 UCL sprains
- 8 complete by MRI => early surgery
- 35 partial (24 pitchers, 11 position players)
  - 7/35 went on to surgery
  - 26/28 non-op RTP at same level

ORTHOBIOLOGICS??


Many different protocols/products/applications
EBM studies ongoing

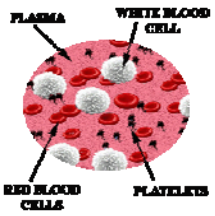
Orthobiologics

- Goal is to optimize the local healing environment
- Categories include:
  - Cells (e.g. PRP, stem cells)
  - Non-viable compounds (e.g. growth factors)
  - Tissues (e.g. allograft, placental tissue)



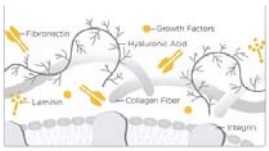
Orthobiologics

- Sources include:
  - Autologous/autograft (PRP; bone marrow aspirate)
  - Allograft
  - Xenograft
  - Synthetic

Human Placental Tissue

- Technically an allograft; supplement and/or replace damaged connective tissue
- Extracellular Matrix of:
  - Collagen
  - Growth factors
  - Bioactive molecules
- No blood draw or aspiration



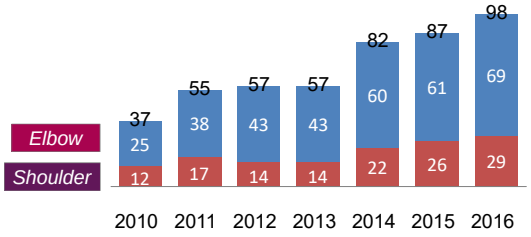
Biologics

- Very little EBM to support routine use in the treatment of ligament injuries
- Majority of literature focuses on laboratory studies (most of it positive)
- Multitude of products available; most have no clinical trials demonstrating efficacy or safety

REGARDLESS, MANY OF US ARE USING THEM!

Orthobiologic Injections for Arm Injuries

of PRP/Stem Cell Injections, 2010-2016



Our Current Protocol

- Proximal sprain (partial or complete)
- Select distal injuries (typically partial)
- Inject within the 1st week after injury

Platelet Rich Plasma

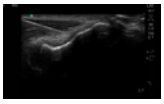
- Current clinical usage for tendon or ligament injury:

  Leukocyte Rich Tendon Protocol, LR-PRP

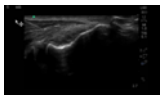
- Small aliquot intra-ligamentous injection:

  Typically, .5 to 1.0 maximal injection

- Fascial dissection is key with remaining injectate:



1.0 to 2.0 cc MSK US guided separation of UCL from scarred Flexor/Pronator using "floating ligament" technique



Post Procedure Pearls

- NSAIDs
  - Avoid, where possible, for 7 days prior and 7 days post.
  - No NSAID-containing topical for 7 days
  - Usually oral narcotic day of procedure and for 2 days post.
- Ice
- No icing for first 3 days, then ok to resume on limited basis
- Gentle ROM
  - Begin flushing maneuvers at 3 days
- Return to throw
  - Typical time down 4 weeks to allow progression through inflammation-to-remodeling cycle

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Case Study : RK

- 23 yo LHD AA Starter
- Last week of ST 2017 experienced UCL soreness
- Made 1 start of regular season prior to shut down

RK

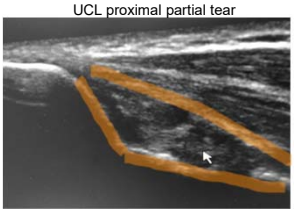
US guided injection 0.5cc of BioRenew PX50 and .75cc of normal saline was injected into the Left UCL and surrounding fascia

RK

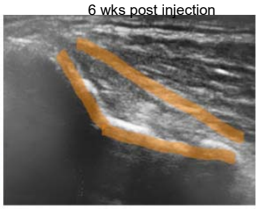
- Followed post procedure protocol
- US at 6 weeks showed improvement
- Started throwing progression at 6 weeks post-injection
- RTP 17 weeks post injection; no further issues

RK

UCL proximal partial tear



6 wks post injection



Treatment of Partial Ulnar Collateral Ligament Tears in the Elbow With Platelet-Rich Plasma

Luga Podesta,*†‡ MD, Scott A. Crow,† MD, Dustin Volkmer,† MD, Timothy Bert,† MD, and Lewis A. Yocum,† MD
Investigation performed at the Kerlan-Jobe Orthopaedic Clinic, Los Angeles, California

AJSM 2013

- 34 athletes (27 baseball players; 2 pro, 11 college)
- Partial MUCL sprain
- Failed 2 months other treatment
- Single US guided injection of leukocyte-rich PRP (Arteriocyte)
- 88% RTP at 12 weeks
- Significant decrease in medial joint valgus laxity

Final Thoughts

- Not all UCL injuries are created equal!
- Consider the location of the injury when deciding treatment options
- Proximal injuries (particularly lower grade) usually respond well to non-operative treatment
- The role for Orthobiologic treatments is evolving and may expand the indications for non-operative management of these injuries

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Thank You!

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