Efficacy of Ulnar Collateral Ligament Repair (UCL)
Jon Rozeboom
BIOL 499-A Independent Study: Efficacy of Ulnar Collateral Ligament Repair (UCL)
Central College, Pella, Iowa 50219

Anatomy

- **UCL: Ulnar Collateral Ligament**
- There are three bands which stabilize the elbow.
- The anterior bundle stabilizes the elbow by attaching the ulna to the humerus. This prevents excessive external rotation of the forearm.

Origin of UCL Tears

- UCL tears have drastically become more common in baseball at all age levels.
- **Training:** Training has evolved, making athletes throw harder by strengthening accelerators, but in many cases neglects the decelerators.
- **Extreme Stress:** The throwing motion can create angular velocities upwards of 10,000 degrees/sec (Donatelli), resulting in over 14lbs of valgus stress and upwards of 67lbs of force on the medial elbow (Deal).
- **Improper Mechanics:** Excessive supination of the forearm prevents flexor and pronator muscles to contract and attenuate the excessive stress (Oliver).
- Various mechanical flaws may occur due to lack of hip and thoracic mobility, as well as lack of strength in the decelerators.

MRI of UCL Tear

- A tear is evident from the leaking of the dye. The dye exceeds the joint capsule, which can be seen in the circle on figure 2.

Reconstruction vs Repair

- For a repair, as described by Jones et al., a longitudinal cut is placed in the UCL, allowing the knotless anchor to be drilled into the distal insertion. The anchor is preloaded with collagen-coated FiberTape and a nonabsorbable suture.
- The suture is passed through the UCL, tying it down, repairing it to the original insertion site.
- Three sutures are used to repair the longitudinal cut.
- The second anchor is drilled into the proximal insertion. The FiberTape is loaded into the anchor.
- Three absorbable sutures are placed through the ligament and around the FiberTape.

Significance of the Repair Procedure

- For the repair surgery, the original ligament is still present as opposed to the reconstruction.
- The body does not need to adapt to the new tendon that replaces the ligament.
- The collagen-dipped FiberTape is a high-strength polyethylene material, providing long-lasting durability and resistance to stretching (Anthrex).
- Recovery time is significantly shorter.
- Because the original ligament is salvaged, it is able to heal more quickly than reconstructing a new ligament.
- The rehab program below is a modified version of that for the reconstruction, designed by Dr. Dugas and Dr. Wilk.

- **Weeks 1-6:** Progressive ROM of the elbow, performing scapular strengthening/stability exercises.
- **Week 7-9:** Initiate 2-hand and 1-hand plyometrics (wk 8) while progressing shoulder exercises.
- **Week 10:** Initiate Interval Hitting Program.
- **Week 11-16:** Initiate Interval Throwing Program Phase I. Continue exercises from weeks 9-10.
- **Weeks 12-20:** Initiate Interval Throwing Program Phase II (off-mound).
- **Weeks 20+:** Gradual return to competitive throwing.
- Returning to game play occurs approximately 5 months with the repair vs approximately 12-15 months with the reconstruction.

References

- Donatelli, Robert A., et al. "Overhead throwing not natural: many factors determine if a patient can receive the repair surgery over the reconstruction. It is a case by case situation.
- Degree of tear: The severity of the tear matters because there needs to be enough of the native ligament present in order to heal with the brace.
- Tissue quality: The quality of surrounding tissue greatly affects how well it will heal with the brace. Strong, healthy tissue provides optimal results.
- Ultimately, based on this evidence, the surgeon can develop a very good idea of which procedure to perform. This cannot be 100% confirmed until the surgeon cuts into the arm and can see the ligament.

Hitting & Throwing Rehab

- **Hitting and throwing alternate days, 6 days/week with one off day.**
- **Hitting and throwing are progressive in regards to intensity and reps.**
- **Each step needs to be completed, pain free, 2-3 times before beginning the next.**
- **If there is any pain, the prior step is repeated.**

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**figures and citations:**

- Figure 1: Vincent, Ulnar Collateral Ligament Anatomy, September, 2019.
- Figure 3: Dugas, Figure 1C: February 16, 2018.
- Figure 4: Dugas, Figure 1D: February 16, 2018.
- Figure 6: Wilk, Interval Hitting Program, February, 2020.
- Figure 7: Dugas, Internal Throwing Program, February, 2020.

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**Text:**

- Improper Mechanics: Excessive supination of the forearm prevents flexor and pronator muscles to contract and attenuate the excessive stress (Oliver).
- Various mechanical flaws may occur due to lack of hip and thoracic mobility, as well as lack of strength in the decelerators.

**Diagrams:**

- Diagram of UCL anatomy and repair procedures.
- Diagram of rehabilitation process.

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**Books:**

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