

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.

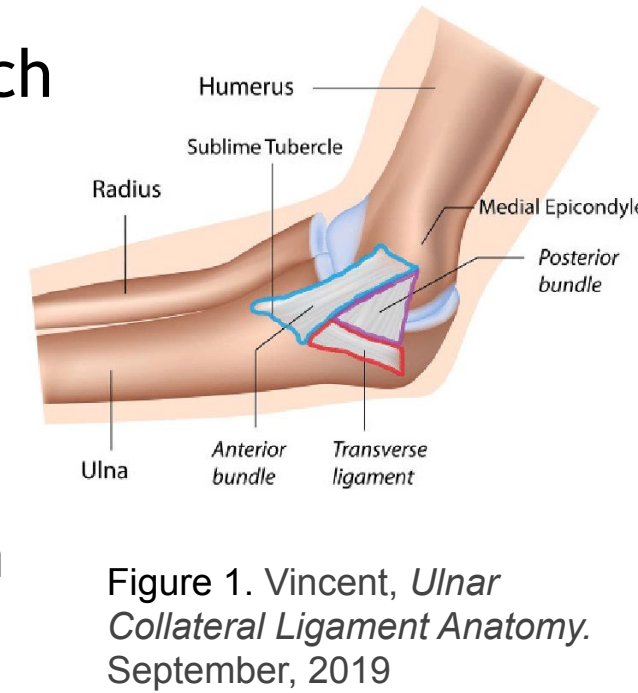


Figure 1. Vincent, Ulnar Collateral Ligament Anatomy. September, 2019

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.

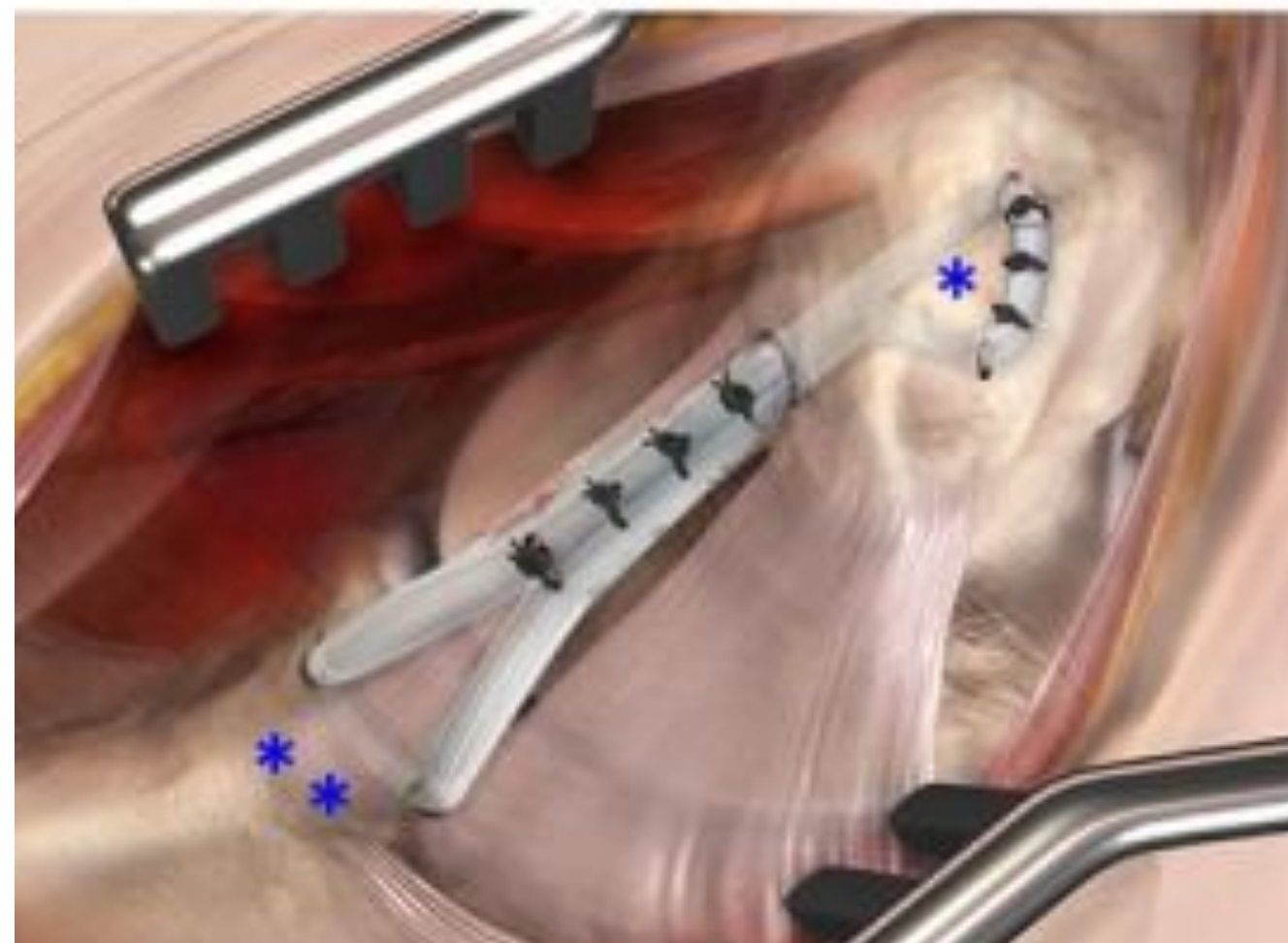
MRI of UCL Tear

- 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.

Figure 2. Lynch, Fig 6 July, 2014

Reconstruction vs Repair

Figure 3. Dugas, Figure 1C. February 16, 2018



- A UCL reconstruction ("Tommy John") requires a tendon taken from somewhere else in the body, such as the forearm, hamstring, knee, or calf.
- Two tunnels are drilled, one on the humerus and the other on the ulna.
- The tendon is looped through, and sutured to itself in the middle.
- Remnants of the native UCL are attached for extra strength (Jones).

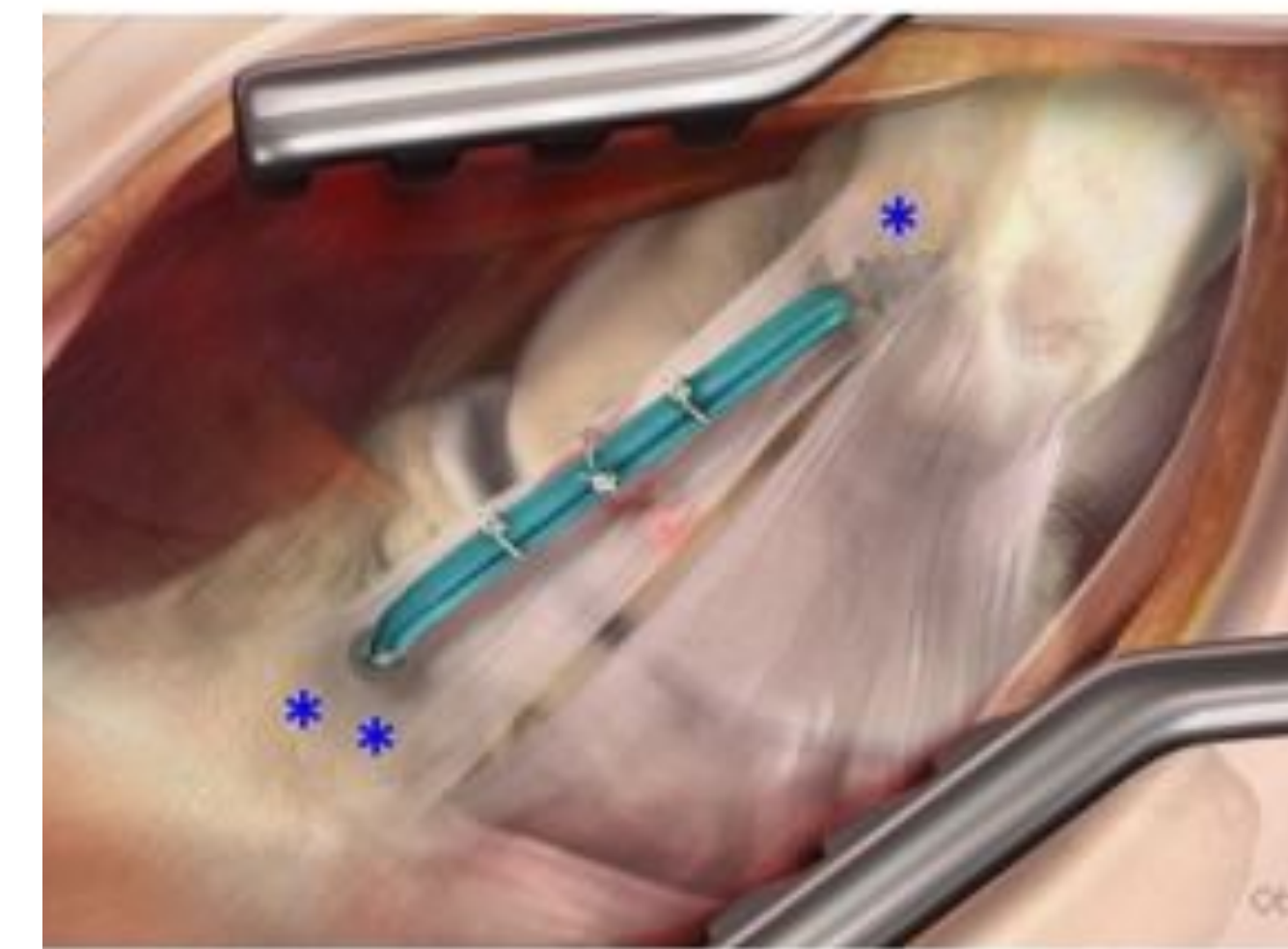


Figure 4. Dugas, Figure 1B. February 16, 2018

- 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. Brace is removed at the end of week 6.
 - **Weeks 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.

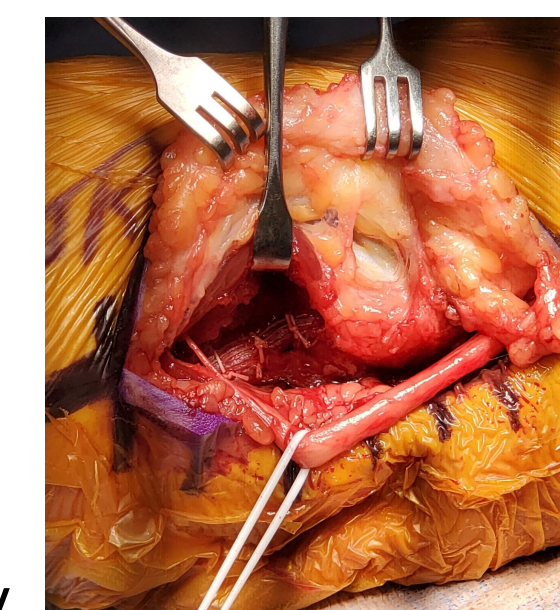


Figure 5. Jon Rozeboom UCL Repair surgery, December 4, 2019

Qualifications for Repair

- 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.

Figure 6. Wilk, Interval Hitting Program, February 2020

INTERVAL HITTING PROGRAM	
Step 1: 50% effort (15-20 swings)	
Step 2: 75% effort (15-20 swings)	
Step 3: 90-100% effort (15-20 swings)	
Step 4: 90-100% effort (15-20 swings)	
Step 5: 90-100% effort (15-20 swings)	
Step 6: 90-100% effort (15-20 swings)	
Step 7: 90-100% effort (15-20 swings)	
Step 8: 90-100% effort (15-20 swings)	
Step 9: 90-100% effort (15-20 swings)	
Step 10: 90-100% effort (15-20 swings)	
Step 11: 90-100% effort (15-20 swings)	
Step 12: 90-100% effort (15-20 swings)	
Step 13: 90-100% effort (15-20 swings)	
Step 14: 90-100% effort (15-20 swings)	
Step 15: 90-100% effort (15-20 swings)	
Step 16: 90-100% effort (15-20 swings)	
Step 17: 90-100% effort (15-20 swings)	
Step 18: 90-100% effort (15-20 swings)	
Step 19: 90-100% effort (15-20 swings)	
Step 20: 90-100% effort (15-20 swings)	

Phase I for pitcher			
Day 1	Day 2	Day 3	Day 4
1. Warm-up Throwing (10-15 swings)	1. Warm-up Throwing (10-15 swings)	1. Warm-up Throwing (10-15 swings)	1. Warm-up Throwing (10-15 swings)
2. 50% Effort Throwing (15-20 swings)	2. 75% Effort Throwing (15-20 swings)	2. 90-100% Effort Throwing (15-20 swings)	2. 90-100% Effort Throwing (15-20 swings)
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20. 90-100% Effort Throwing (15-20 swings)	20. 90-100% Effort Throwing (15-20 swings)	20. 90-100% Effort Throwing (15-20 swings)	20. 90-100% Effort Throwing (15-20 swings)

Figure 7. Dugas, Interval Throwing Program, February, 2020

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