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Baseball throwing biomechanics

and what to watch for.

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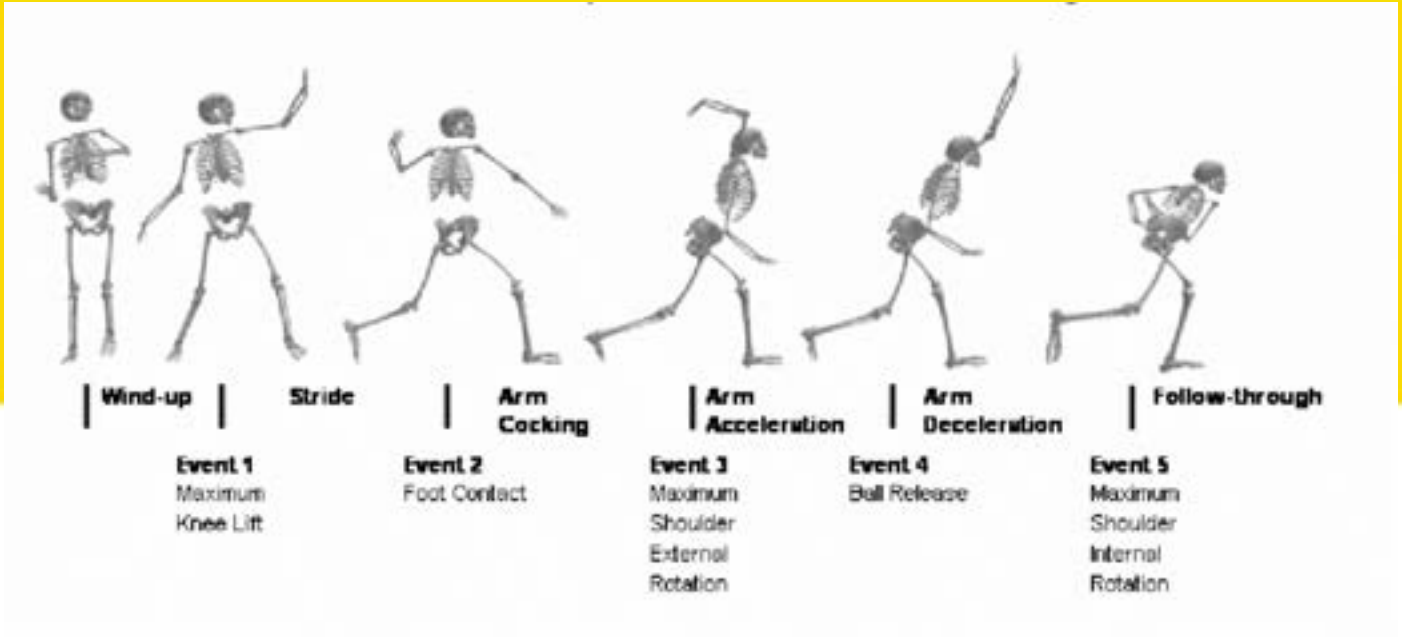
Former Division 1A Baseball Player, PhD in BioMechanics and Clinical Doctor of Physical Therapy

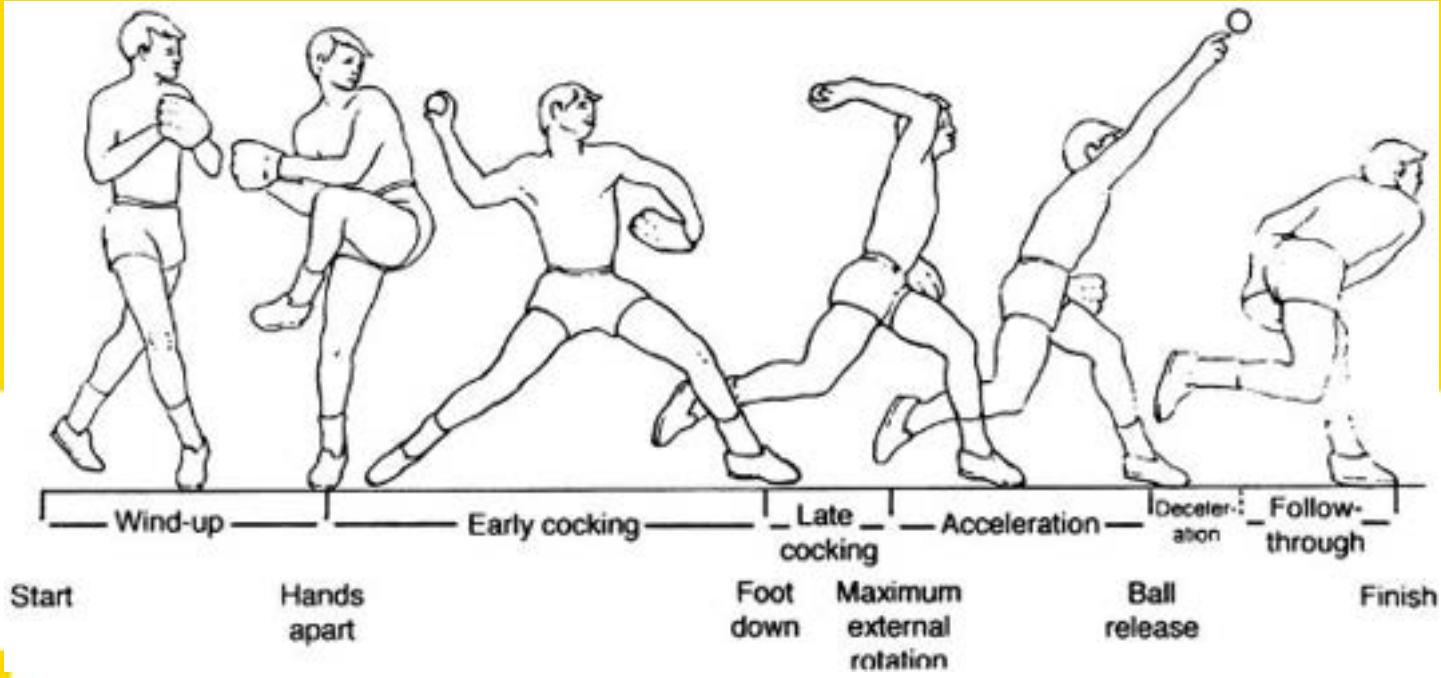
Agenda

1. Throwing phases, and how compare with biomecanics
2. Wind up.
3. Early cocking
4. Late cocking
5. Acceleration
6. Ball release/deceleration
7. Follow through
8. Shoulder exercises
9. Leg exercises
10. Questions

Throwing phases: peeling back the layers



Throwing phases: less layers more of what you see



Windup: high leg kick vs. low leg kick

The phase of wind-up begins with the initiation of the stride leg and ends when the ball separates from the glove and the stride leg reaches the highest point. The ipsilateral leg and trunk rotate approximately 90° and the contralateral hip and knee flex.

Top two photos:
pre-assessment

Bottom two photos:
6 weeks post-training assessment

Early cocking: knee collapses vs. able to load

It begins with the end of the windup phase or when the stride leg reaches its maximum height and it ends when the stride leg contacts the mound/ground. During an ideal pitch, at this point, the throwing arm is in 'semi-cocked' position.

Top two photos:
pre-assessment

Bottom two photos:
6 weeks post-training assessment

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Mid cocking: knee continues to collapse and is arm level (bottom) or in dropped position (top)

During the cocking phase, the humerus externally rotates until it reaches maximum external rotation. Following maximum external rotation, the very brief acceleration phase occurs in which the humerus rapidly internally rotates, the elbow extends and the wrist is flexed.

Pre-assessment

Six weeks post-training assessment

Late cocking: where is elbow up or dropped? Where is chest? Where are hips/dropped?

The late cocking phase is initiated as the lead foot contacts the ground and ends with the maximum external rotation (MER) position of the throwing shoulder. The focus of the pitching motion in late cocking is on the trunk, shoulder and elbow movement patterns.

Pre-assessment

Six weeks post-training assessment

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Late cocking: look at ER of shoulder. Is it able to rotate and does elbow continue to drop (top)?

The late cocking phase is initiated as the lead foot contacts the ground and ends with the maximum external rotation (MER) position of the throwing shoulder. The focus of the pitching motion in late cocking is on the trunk, shoulder and elbow movement patterns.

Pre-assessment

Six weeks post-training assessment

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Acceleration: is back arched (top)? or slight, back view? Do you see lateral lean/listing? Does hip drop (top)?

The acceleration phase of throwing is the explosive phase that propels the ball towards the target. It's the fourth phase of throwing, beginning when the shoulder is maximally cocked and ending when the ball is released.

Pre-assessment

Six weeks post-training assessment

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Deceleration/ball release: Where is ball release? In front or to side? Is back arched or straight?

The deceleration phase of throwing is the period when the arm slows down and controls its rotation after releasing the ball. It's the most violent phase of throwing and can lead to overuse injuries.

Pre-assessment

Six weeks post-training assessment

Follow through: Where does pitcher naturally land? Are they in players position or turned?

The follow-through phase of throwing is the final phase of the throwing motion, when the body rebalances and stops moving forward. It's one of several phases that make up the throwing motion, including the wind-up, cocking, acceleration, and deceleration phases.

Pre-assessment

Six weeks post-training assessment

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Recap

Pre-assessment

Six weeks post-training assessment

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Baseball throwing

Wind up vs. stride

Release Points

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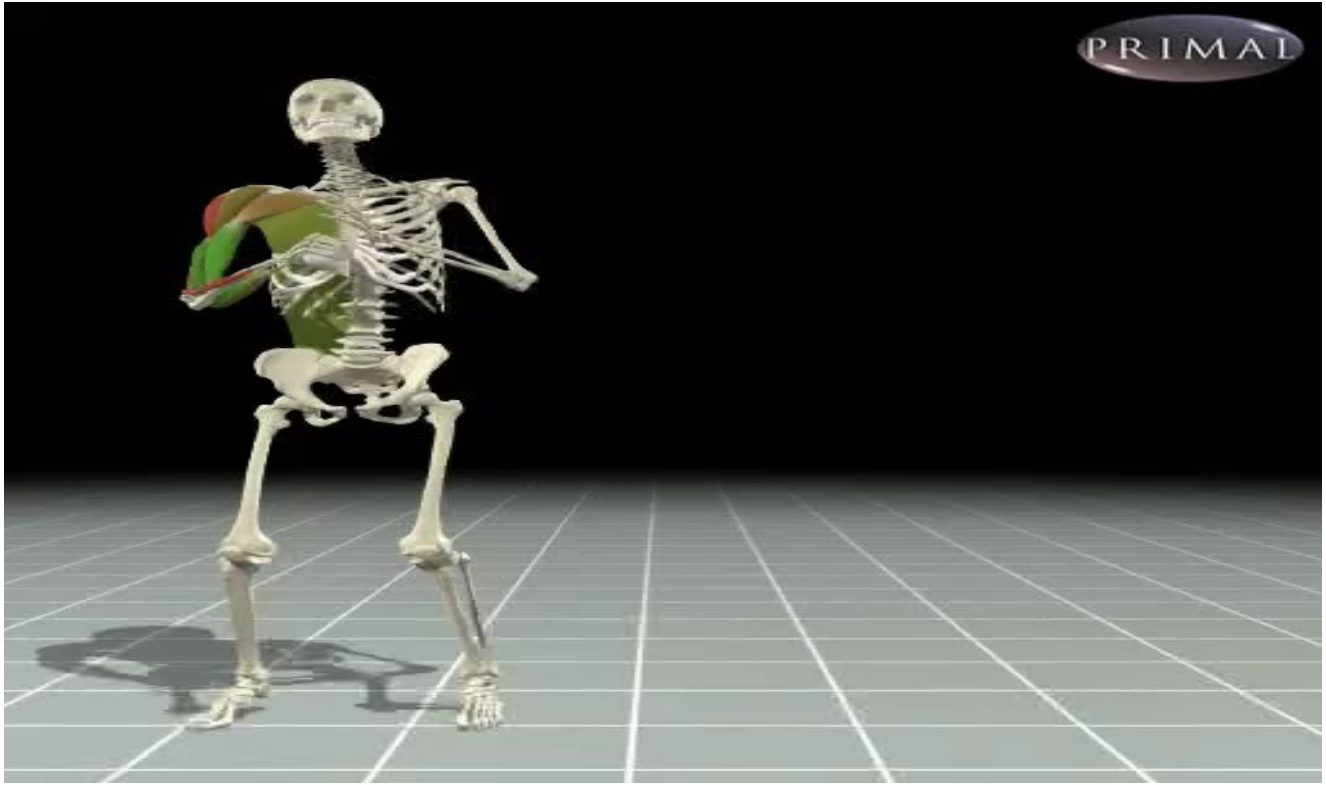
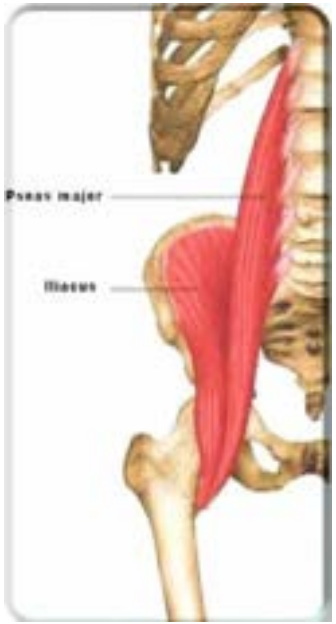
Recap- Remember those layers



Basic exercises that matter for throwing and hitting

Hip flexor stretch (Quad, front hip flexor stretch)



1. Begin in simple lunge with one foot forward, opposite leg extended behind the body.
2. Placing the weight on the forward foot, bend the back leg and hold the back foot in the same side hand.
3. Gently pull the foot toward the buttocks and allow the hip to fall toward the floor.
4. Exhale through the stretching hip and quadriceps.
5. You may place the free hand on the forward knee or floor for support, if necessary.

Shoulder external rotation at 90 degrees

Figure 1. 90-90 Shoulder External Rotation (start position)

Figure 2. 90-90 Shoulder External Rotation (end position)

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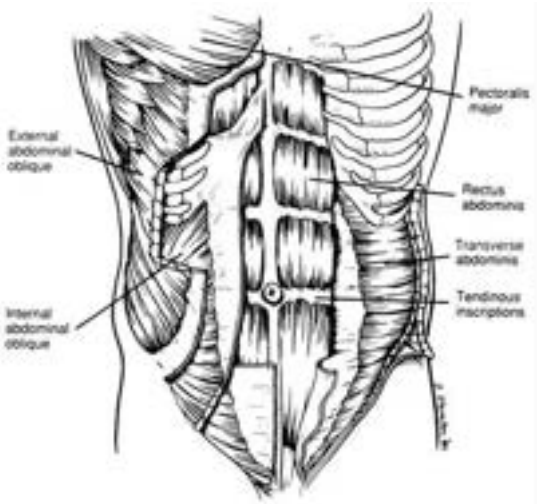
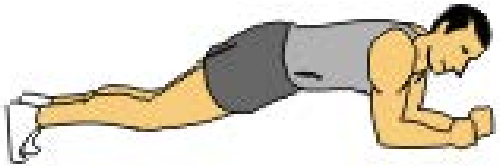
Plank bridge



1. Start by lying face down on the ground. Place your elbows and forearms underneath your chest.
2. Prop yourself up to form a bridge using your toes and forearms.
3. Maintain a flat back and do not allow your hips to sag towards the ground.
4. Hold for 10-30 seconds or until you can no longer maintain a flat bridge. Repeat 2-3 times.



Serratus anterior

- Outstretching your arms, place ab wheel on wall and step back a few inches so that you're leaning forward into the wall

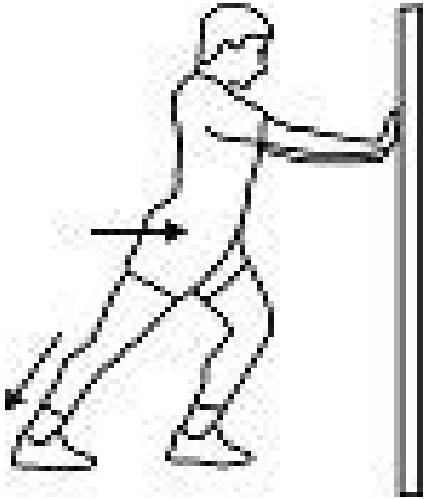
Adductor stretch

1. Stand with feet as wide apart as is comfortable.
2. Shift weight to one side as knee bends.
3. Reach towards extended foot and hold.
4. Repeat for other side.

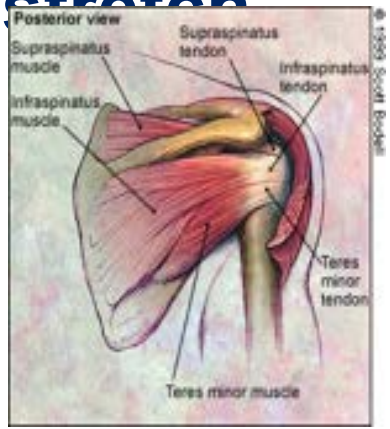
Standing calf

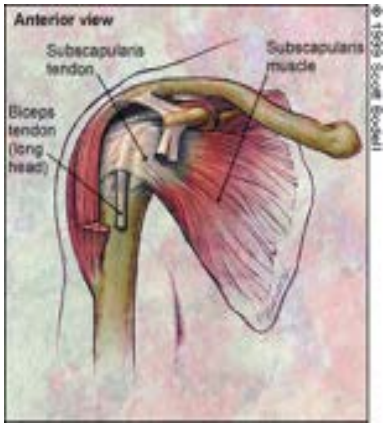
Figure 1

1. Place feet in front of each other about 18 inches apart.
2. Keep back leg straight and heel on the floor.
3. Push against a wall to increase the stretch.
4. Hold and repeat with other leg.

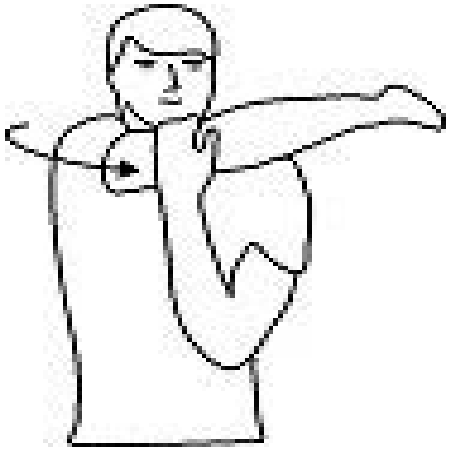


Posterior shoulder (capsule) or rotator cuff stretch



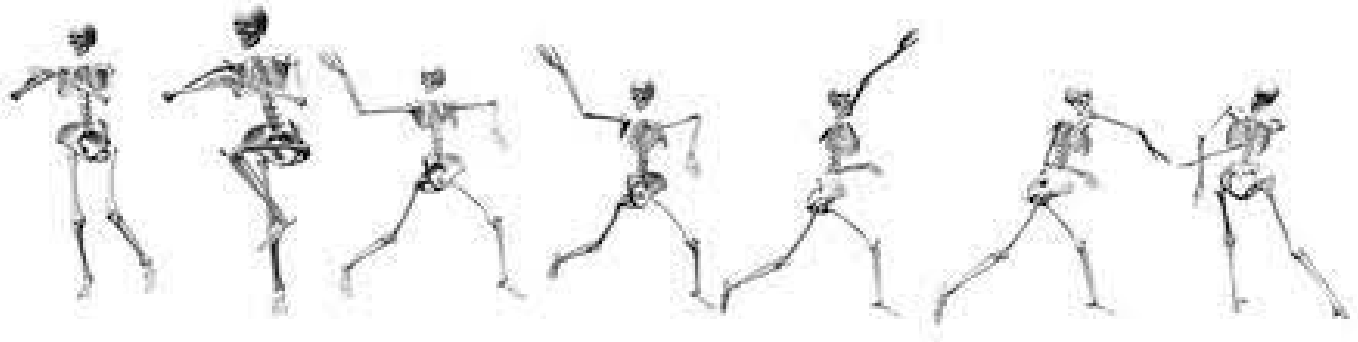


1. Place one arm straight across chest.
2. Place hand on elbow and pull arm towards chest and hold.
3. Repeat with other arm.



Thank you! Questions?

It’s how we build athletes one layer at a time.



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To schedule a physical therapy biomechanical evaluation, please call **301-916-8500.**

We will be happy to verify your insurance and set up your appointment right away.

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Tommy John
UCL Reconstruction
My Preferred Technique

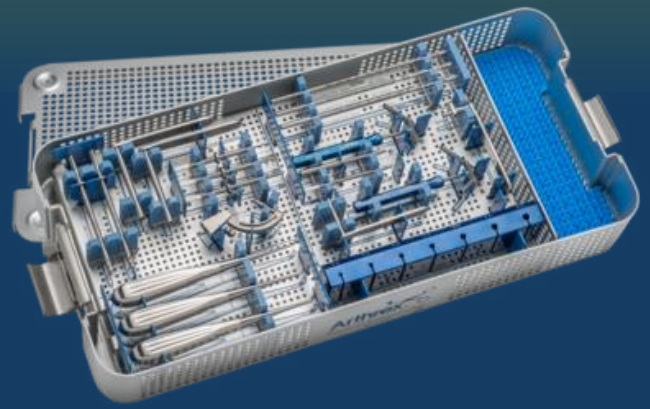
Wiemi A. Douoguih, MD

Regional Medical Director

MedStar Sports Medicine

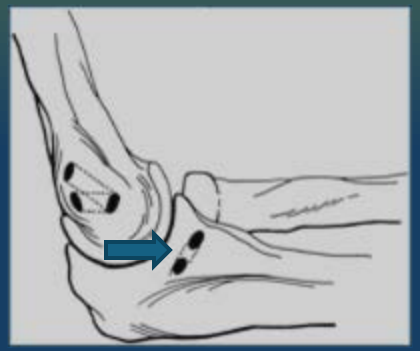
UCL Reconstruction Options

- Figure of eight
- Docking
- Modified Docking
- DANE TJ



Modified Jobe Technique for ulnar collateral ligament reconstruction

- My preferred technique
  - Drilling ulnar tunnels
    - Identify Sublime tubercle
    - Drill 2, 3.5mm ulnar holes on either side of the sublime tubercle
    - Bone bridge of 7-10 mm

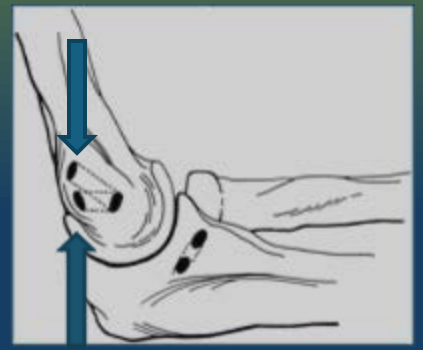


Modified Jobe Technique for ulnar collateral ligament reconstruction

- My preferred technique
  - Drill humeral origin tunnel
    - Start with 3.5mm
    - Enlarge tunnel
      - 3.5mm drill, manually enlarge
      - 4.5mm drill

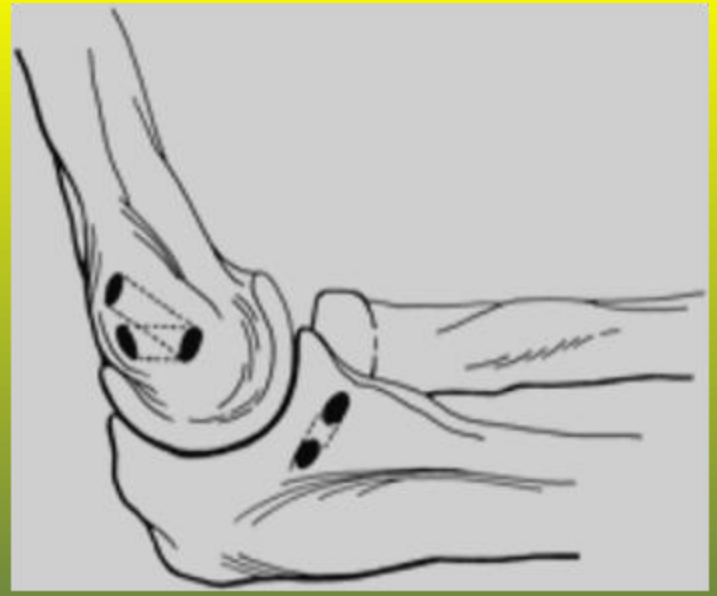
Modified Jobe Technique for ulnar collateral ligament reconstruction

- My preferred technique
  - Drill two proximal humeral tunnels
    - Allow for figure of eight passage of tendon graft



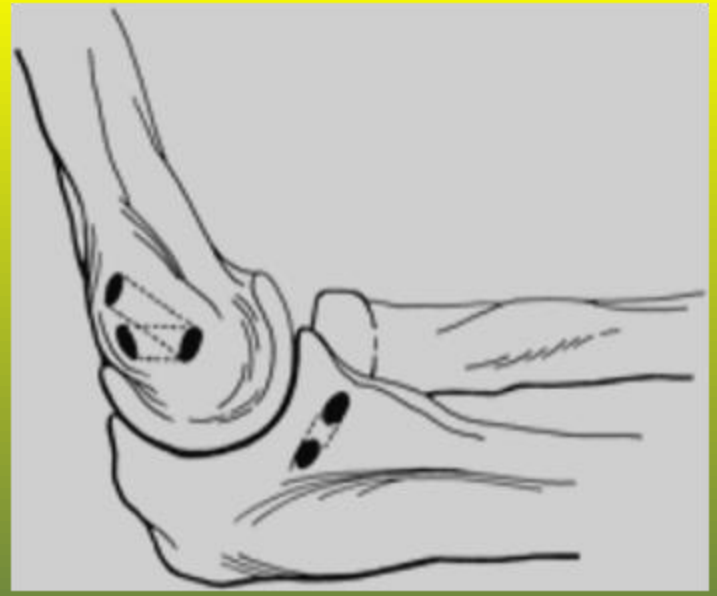
Modified Jobe technique for ulnar collateral ligament reconstruction

- My preferred technique
  - Graft passage through ulnar tunnel
    - Curved suture passer
    - Second suture for third passage of tendon across the joint



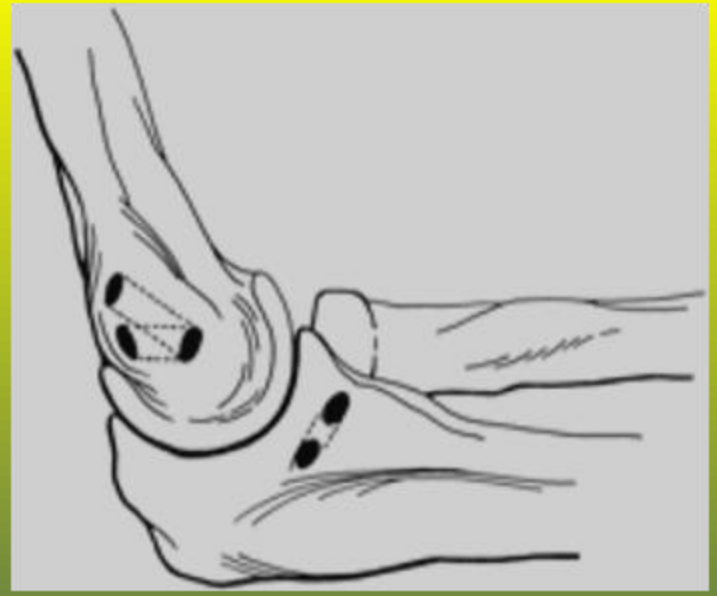
Modified Jobe technique for ulnar collateral ligament reconstruction

- My preferred technique
  - Passing the graft through the humeral tunnel



Modified Jobe technique for ulnar collateral ligament reconstruction

- My preferred technique
  - 2nd pass across humeral tunnel

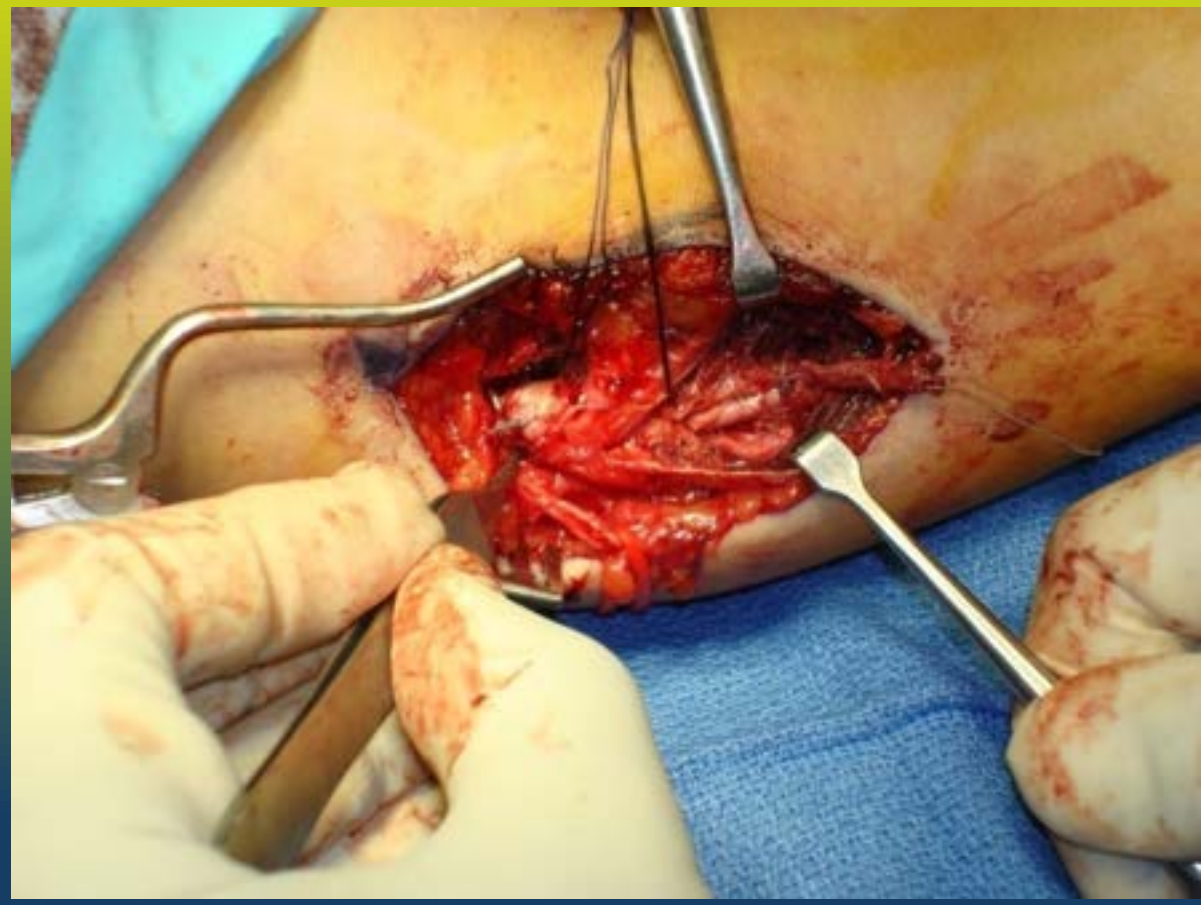


Modified Jobe technique for ulnar collateral ligament reconstruction

- My preferred technique
  - Suturing tendon graft to itself

Modified Jobe technique for ulnar collateral ligament reconstruction

- My preferred technique
  - Final construct



What's New?

- Hybrid TJ UCLR
  - Drill Tunnels
  - Harvest the Graft
  - Place hybrid repair stitch in the native ligament creating a "tunnel" through which graft will be passed
  - Dock the sutures outside the humeral tunnels
  - Pass the graft
  - Suture the graft
  - Tighten and secure the hybrid repair stitch tying over the humeral tunnels

Thank You!