Medial Elbow Instability

Outline

- Overview
- Clinical presentation in the athlete
- Anatomy, biomechanics
- Surgical Options & outcomes

Overview

The anterior bundle of the MCL is the primary structure resisting valgus.

Trauma to this ligament rarely leads to symptomatic instability.

An important exception to this is athletes with repetitive overhead or throwing sports (due to repetitive valgus stress)

Clinical Presentation - History

Classic story is medial elbow pain in late cocking or acceleration phase of motion.

N.B. - prior injury esp. dislocation

ulnar n. Sx

? Locking, loss of extension -?post. Loose bodies

(late finding)

Clinical Presentation - History

3 scenarios

- Acute “pop” or sharp pain @ medial elbow
  - Inability to throw
- Gradual onset of elbow pain with throwing
- Pain following an episode of heavy throwing
  - Inability to throw > 75% of usual max.

  +/- recurrent pain or paresthesias in ulnar nerve distribution

N.B. - actual complaints of instability are rare.

Clinical Presentation - physical exam

Valgus stress test

"Milking" test

Clinical Presentation - physical exam

- Tender over Ulnar collateral ligament complex

+/- Positive Tinel's sign over cubital tunnel

+/- snapping of ulnar nerve

Investigations

- Xray
- Stress Views
- Ultrasound
- MRI

Investigations - Xray

Rule out associated pathology

- May see ossification within UCL
- Loose bodies bodies in post compartment
- Marginal osteophytes
- Olecranon and condylar hypertrophy
- Osteochondritic lesions of capitellum

Investigations - stress Xrays

- N.B. comparison to contralateral side because normal elbow may open in uninjured population.

Am J Sports Med. 1998 May-Jun;26(3):425-7.

Elbow valgus stress radiography in an uninjured population.

Investigations - Ultrasound

- Controversial

- Medial elbow pain was associated with widening of the medial joint space ($p < 0.05$) and with the presence of attenuation of the ulnar collateral ligament ($p < 0.01$)
- Absolute difference 2.7mm vs. 1.6mm

J Bone Joint Surg Am. 2002 Apr;84-A(4):525-31

Sasaki J, Takahara M,Ogino T, Kashiwa H, Ishigaki D, Kanauchi Y *Ultrasonographic assessment of the ulnar collateral ligament and medial elbow laxity in*

Investigations - MRI

- Diagnostic test of choice
- Equally effective in acute and chronic tears
- Increased sensitivity with intraarticular contrast

Conservative Management

“PRINCE”

Protect (splint - initial 2-3/52)

Rest (3/12 away from provocative activities), repeat X 1

Ice

NSAID

Compress / Elevate (not as important)

Steroids not indicated.

Work modification critical to long term

Conservative Management

N.B. if goal is joint stability and pain relief - non-operative treatment has ~80% good to excellent results.

However, if the patient wants to return to competitive sports involving overhead or throwing sports, results are not as good (42% - Rettig et. al)

Operative indications

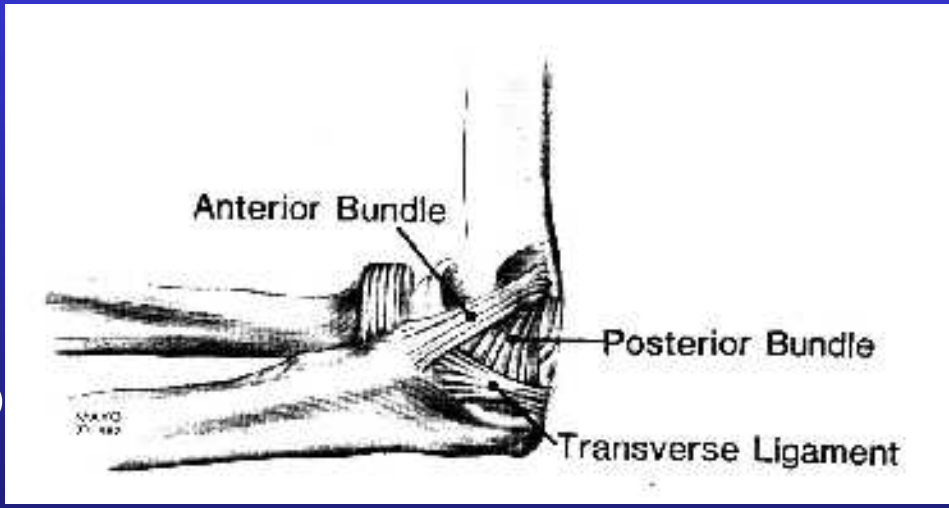
- Failure of non-operative Rx in throwing athletes
- Valgus instability leading to degenerative arthritis with osteophyte and loose body formation
- Symptomatic Ulnar nerve impairment (40%)

Anatomy of medial elbow stabilizers

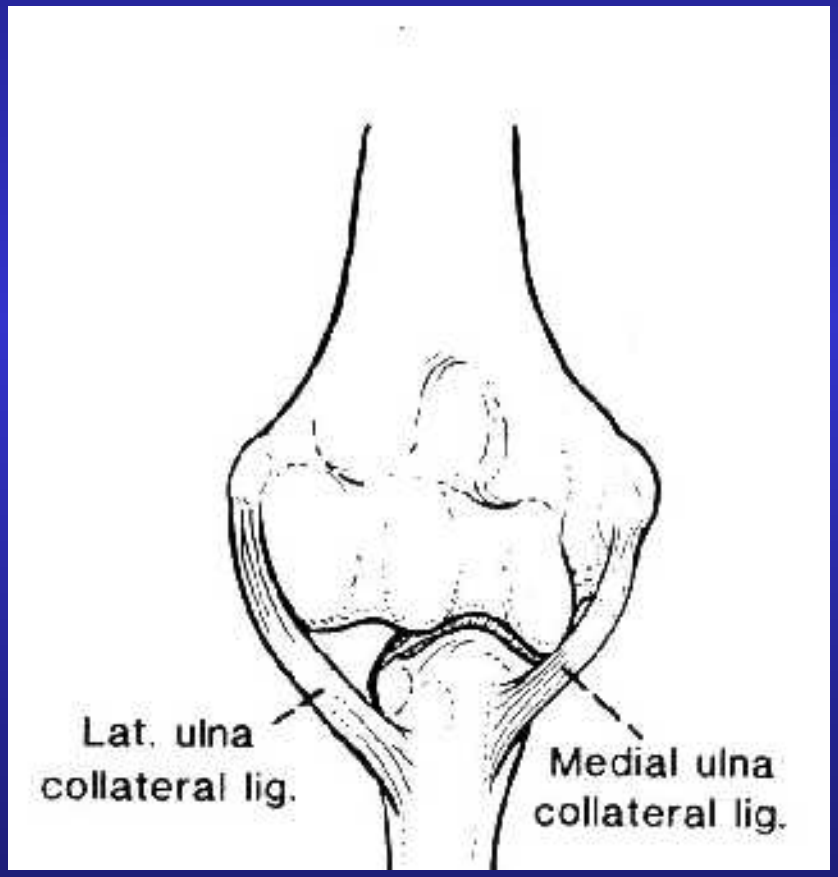
- Primary static stabilizers
  - Ulnohumeral joint (esp. coronoid)
  - MCL
- Secondary static stabilizers
  - Radial head
  - Common flexor origin
- Dynamic stabilizers
  - FCU
  - FDS

Medial (Ulnar) Collateral Ligament

- Humeral origin posterior to flexion axis
  - Tension varies with flexion
- Resists valgus force
- 1. **Anterior bundle** (most important)
  - Tightens from 0 - 60°
  - Then isokinetic
- 2. Posterior band
- 3. Transverse band
  - Between coronoid and tip of olecranon



Primary static stabilizers



Secondary static stabilizers

- Radial head
  - Buttress to valgus force
  - Contributes when MCL is injured

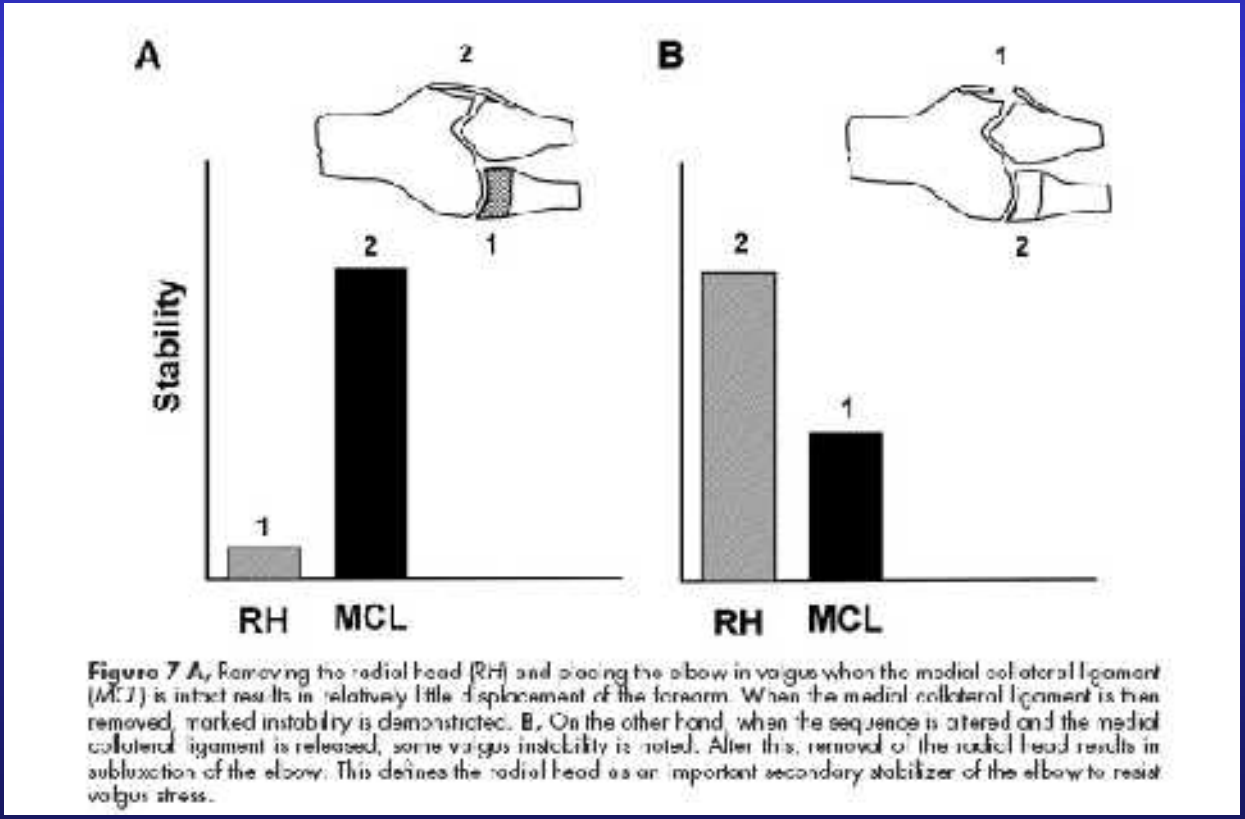


Figure 7 *A*, Removing the radial head (RH) and placing the elbow in valgus when the medial collateral ligament (MCL) is intact results in relatively little displacement of the forearm. When the medial collateral ligament is then removed, marked instability is demonstrated. *B*, On the other hand, when the sequence is altered and the medial collateral ligament is released, some valgus instability is noted. After this, removal of the radial head results in subluxation of the elbow. This defines the radial head as an important secondary stabilizer of the elbow to resist valgus stress.

Dynamic stabilizers

- Less important

than lateral side

Biomechanics

- Between 20-120 degrees MCL is primary valgus restraint.
- At 90 degrees, the MCL provides 78% of resistance to elbow distraction.
- Pitching motion has rotational speeds of up to 7000 degrees/second

MCL competency is critical to effective throwing motion.

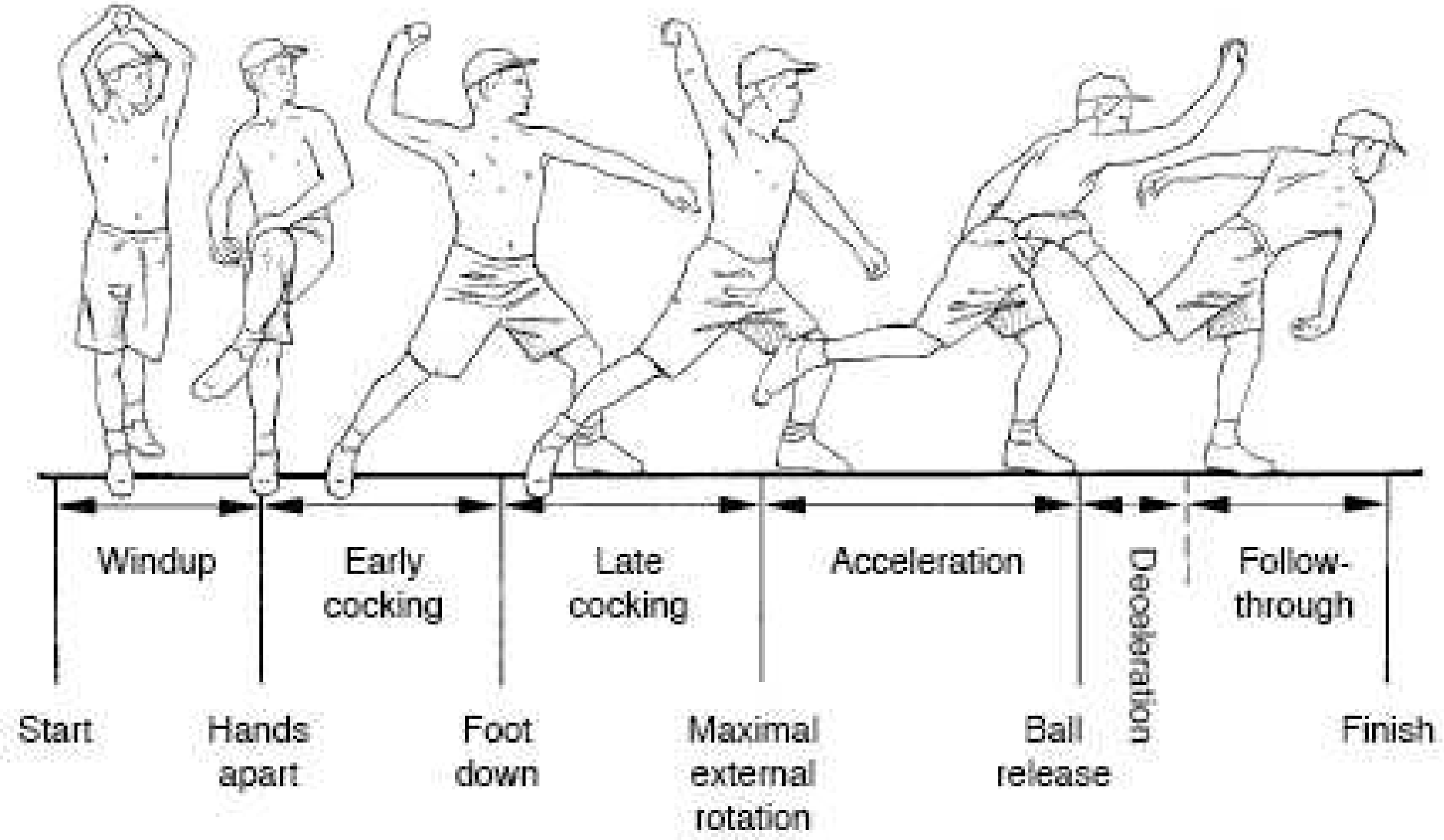


Figure 3 The five main stages of the overhead throwing motion. (Adapted with permission from DiGiovine NM, Jobe FW, Pink M, Perry J: An electromyographic analysis of the upper extremity in pitching. *J Shoulder Elbow Surg* 1992;1:15-25.)

Biomechanics

- Medial tension overload causes UCL attenuation, lateral radiocapitellar compression, and extension overload.

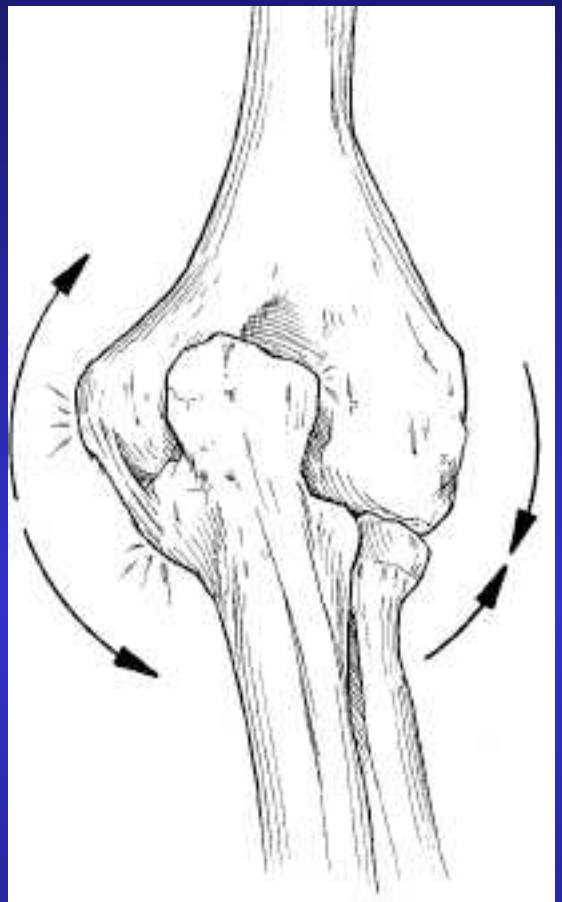
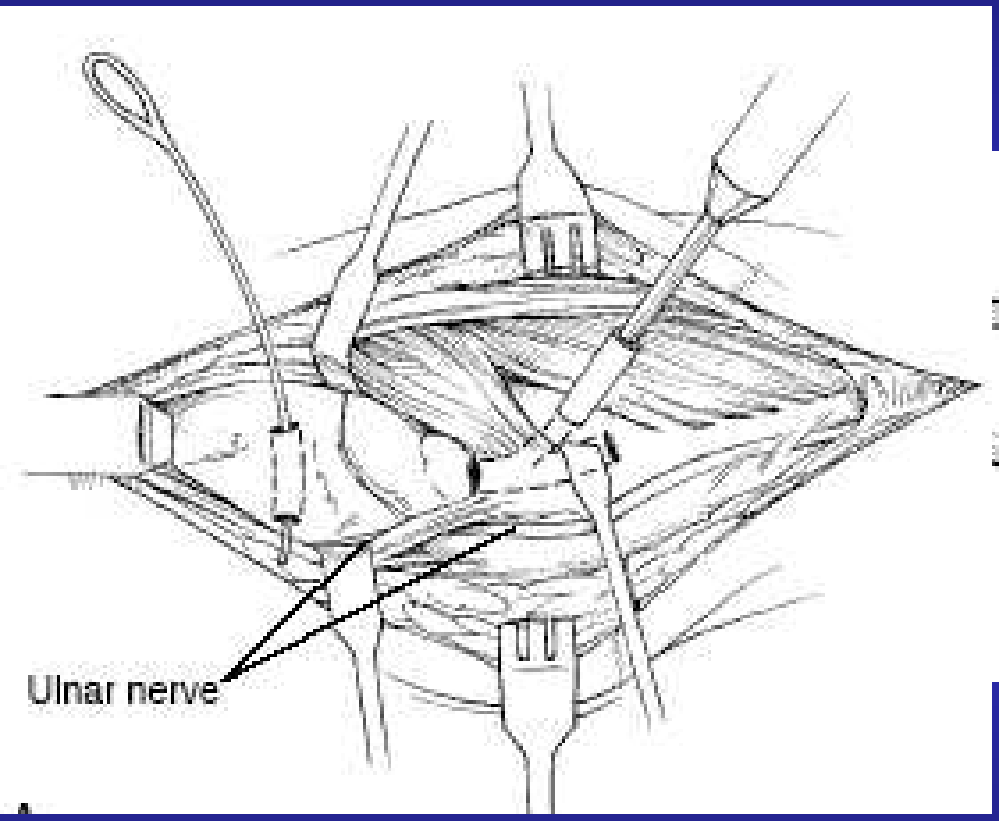
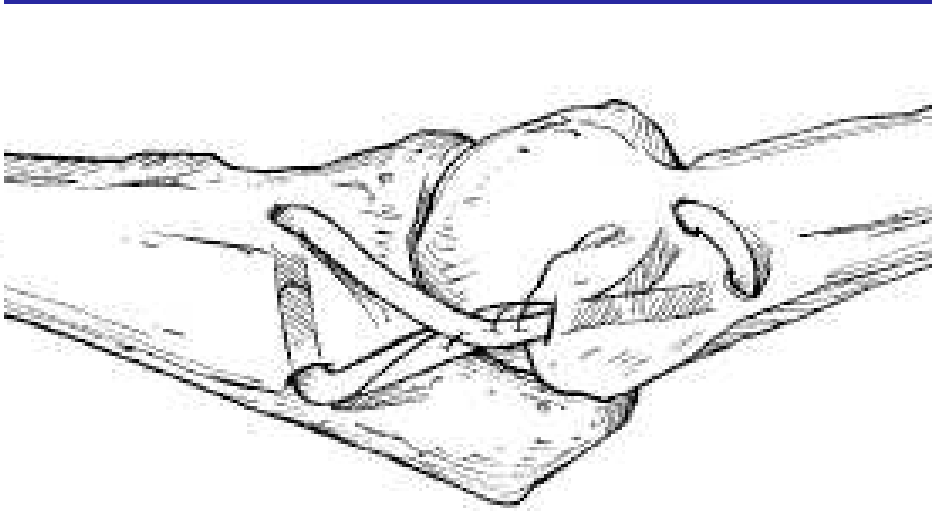


Figure 7 Medial tension overload secondary to repetitive valgus stress at the elbow, resulting in attenuation of the UCL complex medially, lateral radiocapitellar compression, and extension overload within the posterior compartment. (Adapted with permission from Kvitne RS, Jobe FW: Ligamentous and posterior compartment injuries, in Jobe FW [ed]: *Techniques in Upper Extremity Sports Injuries*. Philadelphia: Mosby-Year Book, 1996, p 414.)

Surgical Procedures

- 1st generation - Jobe et. al (JBJS 1986)
  - Autograft tendon passed through multiple bony tunnels in distal humerus and proximal ulna
  - Submuscular ulnar nerve transposition
  - Complete elevation of flexor mass from medial humeral epicondyle
- 63% of elite throwers returned to sport
- 31% complication rate (ulnar nerve)


Ulnar nerve

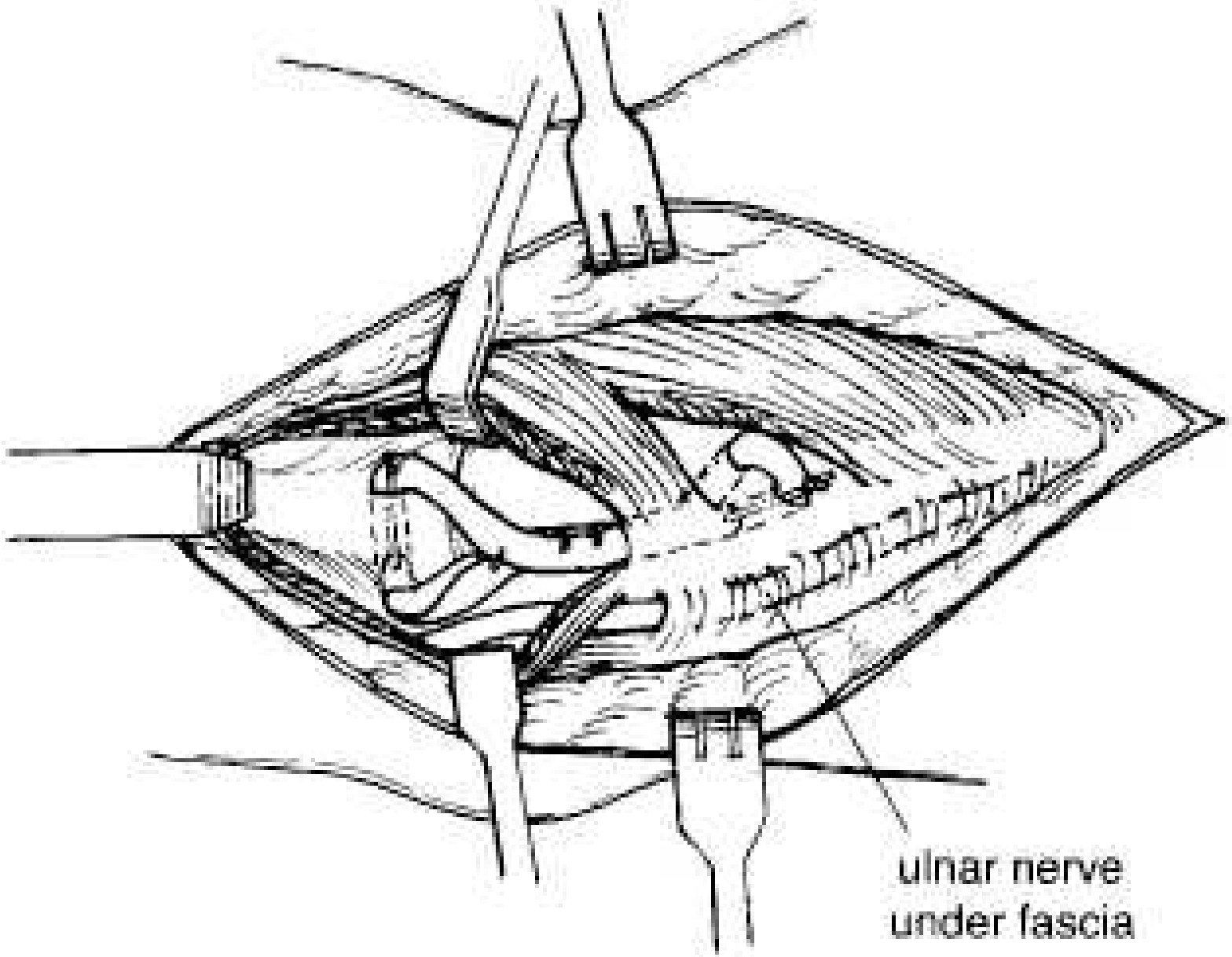


Surgical Procedures

- 2nd generation - Smith et. al (Am J Sports Med. 1996; 24:575-580)
  - “safe zone of medial elbow”
  - Muscle splitting approach through FCU
  - Don’t need to detach Flexors or transpose ulnar nerve

Thompson et. Al J Shoulder Elbow Surg 2001; 10:152-57

5% rate of postop ulnar nerve symptoms (33 patients)


ulnar nerve
under fascia

Surgical Procedures

- Use of suture anchors
  - Early review showed 30% failure rate (Altchek, 2003)
  - Unable to tension graft
  - Placement of graft within a bony tunnel essential to stability

Surgical Techniques

- Docking technique
  - Single humeral tunnel (not 3 like Jobe technique)
  - Triangular graft configuration facilitates placement of well-tensioned graft
  - 36 elite athletes
  - 92% returned to same activity level at 3.3 year follow-up

Postoperative regimen

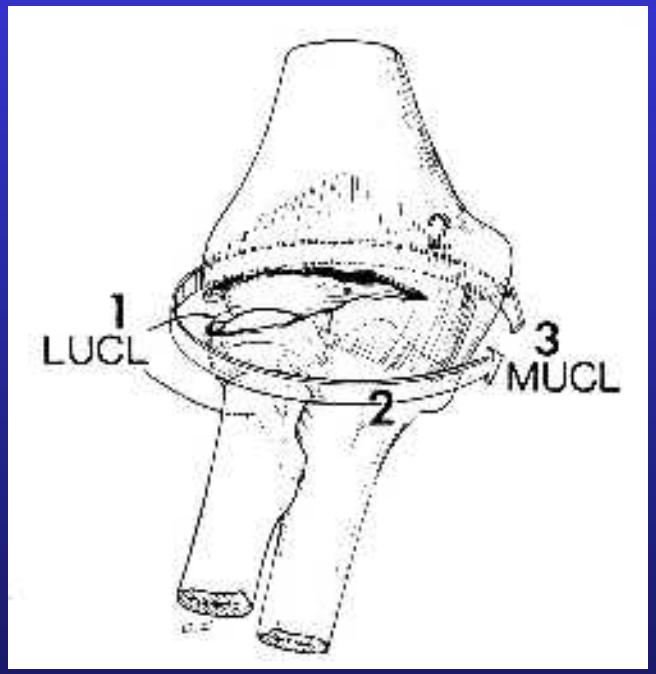
- Varies widely
- N.B. Prevention of H.O.
- Expected recovery period 9-12 mos.

Acute Traumatic Medial Instability

- Direct repair indicated if possible, especially if proximal avulsion
- If not, early reconstruction indicated.
- May need to protect repair with hinged ex-fix if associated with dislocation.

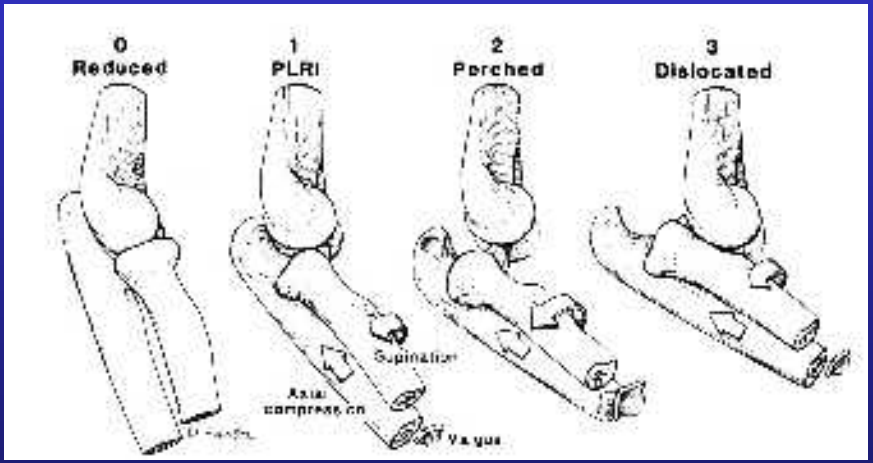
Pathomechanics

- Lateral to medial “Horii circle” disruption
- As disruption progresses medially, instability increases



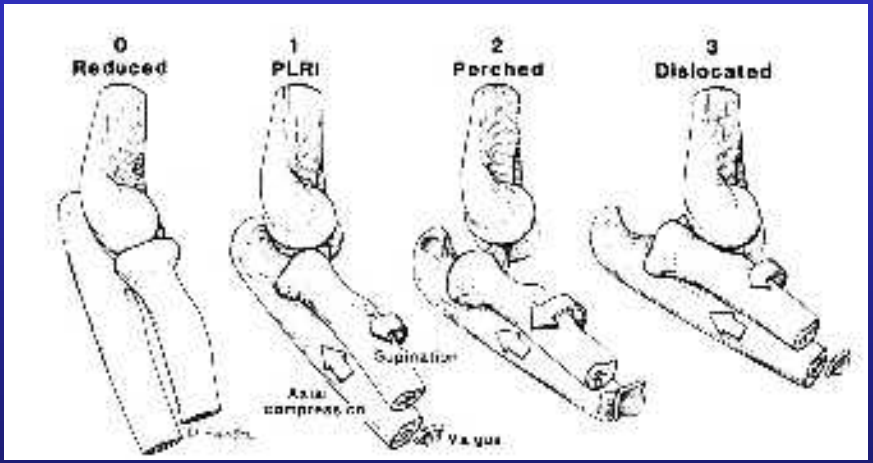
LCL disruption

- Mainly ulnar component
- Posterolateral rotatory instability (PLRI)
- Reduces spontaneously



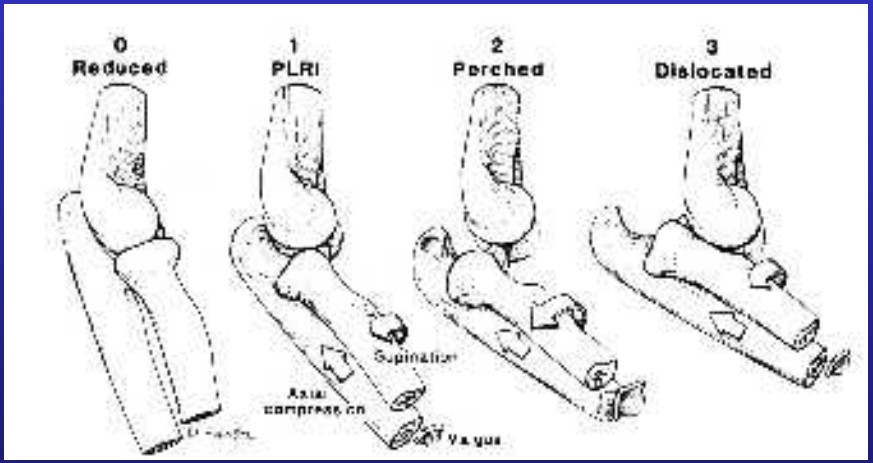
Previous + ant./post. capsule disruption

- Coronoid perched on trochlea
- Reduces easily



Previous + MCL disruption

- If anterior band intact elbow will pivot posteriorly on this band
- If disrupted, elbow dislocates easily



Summary

- Primary stabilizers
- Axial compression; supination; valgus force
- Lateral to medial disruption