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Assessment and Rehabilitation of the Unstable Elbow

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Who’s out there?

A. I’ve never treated anyone with an elbow injury
B. I see about 10 elbow injuries per year
C. I see about 10 elbow injuries per month
D. I see 10 elbow injuries per week or more
Unstable or Not

• Many elbow injuries do NOT cause instability

• For most of this talk we are talking about a smaller subset of injuries that DO

Objectives

• After this course, participants will be able to identify the important anatomical structures of the elbow and their relative contributions to stability

• After this course, participants will be able to understand the difference between the different types of instability and their management

• After this course, participants will be able to outline orthotic options for management throughout the continuum of care for the unstable elbow
Elbow Instability

- Second most commonly dislocated major joint

- The bony configuration makes the elbow inherently stable
Stabilizers of the Elbow

- Bony Constraints
- Ligaments
- Muscles

Bony Constraints
Ligaments of the Elbow

MCL Complex
Anterior Band – Green*
Posterior Band – Pink
Transverse Band - Yellow

LCL Complex
Lateral Ulnar Collateral – Red*
Radial Collateral– Blue
Annular - Yellow

Dynamic Stabilizers

• Muscles are important stabilizers of the ligament deficient elbow

• Encourage active elbow mobilization following ligament injuries
Muscle Activation

- Joint compression increases contact area
- Larger contact area contributes to stability

Eckstein et al: 1995

Summary
After Trauma

The Capsule Thickens and the Elbow Stiffens

This is why we can’t just immobilize forever!

With Most Elbow Injuries – The Ligaments DRIVE Therapy
3 Types of Instability

- Posterolateral Rotatory Instability (PLRI)
  - Valgus Instability
- Posteromedial Rotatory Instability (PMRI)

What forearm position is safest during rehabilitation for a patient with posterolateral rotatory instability?

A. Neutral
B. Pronation
C. Supination
D. This guy is from Canada so must be talking French right now
Elbow Instability - PLRI

Lateral Ulnar Collateral Ligament

- Important varus and rotational elbow stabilizer
- Usually torn in elbow dislocations

Morrey et al 1985, O’Driscoll et al 1992
Josefsson et al 1987
PLRI and Dislocation

Dislocations usually starts lateral and moves medially
Humerus internally rotates on fixed forearm

Vid 1

Fix It

- Fractures fixed
- Ligament – Direct Repair/Reconstruction
Elbow Instability Rehab Summary

• First – Limit extension, then ask -What is injured?

• Lateral Side (LUCL) – Pronation
• Medial Side (AMCL) – Supination
• Both Sides – Neutral
• With Coronoid # - Depends
Forearm Position

Vid 2

PLRI

Vid 3
Rehabilitation After PLRI

- Phase 1 – Day 1 to 4 weeks
- Protective splinting in pronation at 90 degrees
- Edema control
- Patient education
- Early protected AROM - in pronation, limit extension (45?)

Rehabilitation After PLRI

- AROM – Depends on Repair, Patient
- Overhead when Unstable
- Maintain Pronation for Flex/Ext
- Limit Extension
- Avoid Varus
Supination?

- Yes – But in Max Flexion

Vid 4

Rehabilitation After PLRI

- Phase 2 – 4 to 6 weeks
- Confirm stability and fracture healing
- Wean from protective splint
- Strengthen wrist extensors
Extension Orthoses?

• Regaining Extension is Difficult! – Threaten your Patients to extend or else…

Rehabilitation After PLRI

• Phase 3 – 6-12 weeks

• Begin PROM Once Stable – Start in Pronation, Move to Supination
• Inline Elbow Strengthening
• Continue Wrist Strengthening
Rehabilitation After PLRI Summary

- Pronation
- Limit Extension
- Active ROM
- Pro-Sup in Flexion

Rehabilitation After Valgus Instability
In the previous photo, is this gentleman

A. Placing a valgus load on the elbow and straining the MCL
B. Placing a varus load on the elbow and straining the MCL
C. Placing a valgus load on the elbow and straining the LUCL
D. Placing a varus load on the elbow and straining the LUCL

MCL Important?
Medial Collateral Ligament

- Important valgus elbow stabilizer
- Can be completely torn in elbow dislocations
- Attritional ruptures frequently occur in baseball pitchers


Forearm Position During Rehabilitation

- What is injured?

- Lateral Side (LUCL) – Pronation
- Medial Side (AMCL) – Supination
- Both Sides – Neutral
- With Coronoid # - Depends
The Medial Collateral Ligament

Vid 5

Rehabilitation After Valgus Instability or MCL Reconstruction

- Phase 1 – 1 to 4 weeks
- Protective splinting in supination
- Either static or hinge brace
- Early protected AROM
- Edema control
- Patient education
- Week 3 – Strengthening wrist flexors, FDS

Davidson : 1995
Udall : 2009
ROM After Valgus Instability

- AROM – Depends on repair, patient
- Maintain supination for flex/ext
- Limit extension to 30-40 degrees – increase 10 degrees per week
- Avoid valgus loading
- Pronation in max flexion

Rehabilitation After Valgus Instability

- Phase 2 – 4 to 6 weeks
- Confirm stability and fracture healing
- Extension orthosis if stiffer than expected
- Wean from protective splint
- Strengthen wrist flexors and FDS
Valgus Instability

- Phase 3 – 6-12 weeks
- Begin PROM Once Stable – Start in Supination, Move to Pronation
- Static Progressive Splinting
- Inline Elbow Strengthening – 10-12 wks
- Continue Wrist Strengthening

Considerations for Athletes

- Start early core strengthening
- Strengthen wrist & finger flexors
- Rotator cuff strengthening prior to throwing
- Review throwing mechanics – video useful
Considerations for Athletes

• Usually takes 1 year to Return to Competition
• Usually Hinge Brace
• Throwers 10 Program (Kevin Wilk, Dr. Andrews) Useful – ASMI.org

Considerations for Athletes

• ASMI Program
• Soft toss at 20 weeks – 30 feet with a “crow hop”
• 75 throws – 3 times/week
• Increase distance to 180 feet by 8 months
• Return to mound at 9 months
• Usually takes 1 year to return to competition
Posteromedial Rotatory Instability (PMRI)
The Ligaments DRIVE Therapy –
One Exception

PMRI

Vid 6
Rehabilitation After PMRI

- Have AM Facet Coronoid Fracture
- Have LUCL Injury

Why is PMRI Different?
Watch the AM Facet with Pronation

Vid 7
Rehabilitation After PMRI

- Primarily depends on fixation of coronoid
- If good, proceed with LUCL off protocol – Ligament injury is most important
- If poor, supination but limit extension to protect LUCL repair

Pollock et al., 2009

Algorithm for Elbow Instability
“Overstability” or Stiffness

- Elbow stiffness is very common after injury

- Up to this point, we have talked about instability – but many elbow injuries do not cause instability

- Even when there is initially instability, the elbow can still get stiff later on

Therapy for Stiffness

- Options for therapists:
  - “In Clinic” – Modalities, Stretching and Mobilizations
  - “Out of Clinic” – Education, Home exercise, Orthoses
  - These are more important
Modalities for Stiffness

- Options for therapists:
  - Superficial Heat
  - Heat plus Stretch
  - Ultrasound?

Stretching & Mobilizations

- My In-Clinic Recipe
  - Pre-condition joint
  - Usually start with distractions
  - Standard physiological passive stretching and mobilizations if indicated – working on stiffest direction first
  - Follow up with AROM
  - Finally into an orthosis
Orthoses

• A great “Out of Clinic” option
• Standard dosage – 3-4 times per day for up to 1 hour
• Based on Ken Flowers work on TERT
• Can be an effective way to maintain tissues at length for long term changes

Systematic Review

• 2004 JHT– Michlovitz - Therapy interventions for improving joint range of motion
• Quality of research is low – more needed
• Total of 9 studies looked at splinting – moderate evidence to support splinting to increase ROM
Extension Orthoses

- Regaining Extension is Difficult! – Threaten your Patients to extend or else…
- When treating the instabilities – use this when patients fail to make improvements in extension on a weekly basis

Considerations for Static Progressive Orthoses

- Only used once clinical healing evident
- Watch for symptoms of ulnar neuritis when using orthoses for flexion
Other Available Orthoses

- Pre fabricated

Static Progressive Elbow Splinting
Future Research

- Effectiveness of orthoses for restoring ROM
- Look at optimal positioning for PMRI
- Radiographic analyses of splinting positions
- Compare overhead rehabilitation to supine with a simulator

Take Home Points

- Understand PLRI, MCL injury, PMRI
- Understand importance of:
  - Bony congruity, ligament status, muscle contraction
  - Forearm position with unstable elbows
- Every patient sits somewhere on the spectrum of instability-stiffness. Recognizing where they are helps you change gears and progress (or delay) therapy to optimize results
Final Thoughts

• Need to Produce Evidence on Rehabilitation
• Consider Biomechanics of Injury
• Communication with Surgeon is Essential

Thank You