

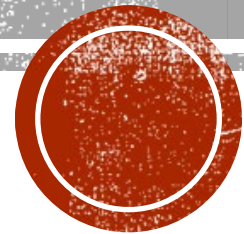
# JOINT DISLOCATIONS:

Reduction, Recovery and Recurrence

**Casey Christy, DAT, ATC, CSCS**

Eastern High School, Voorhees NJ

Adjunct Instructor and Preceptor, Rowan University



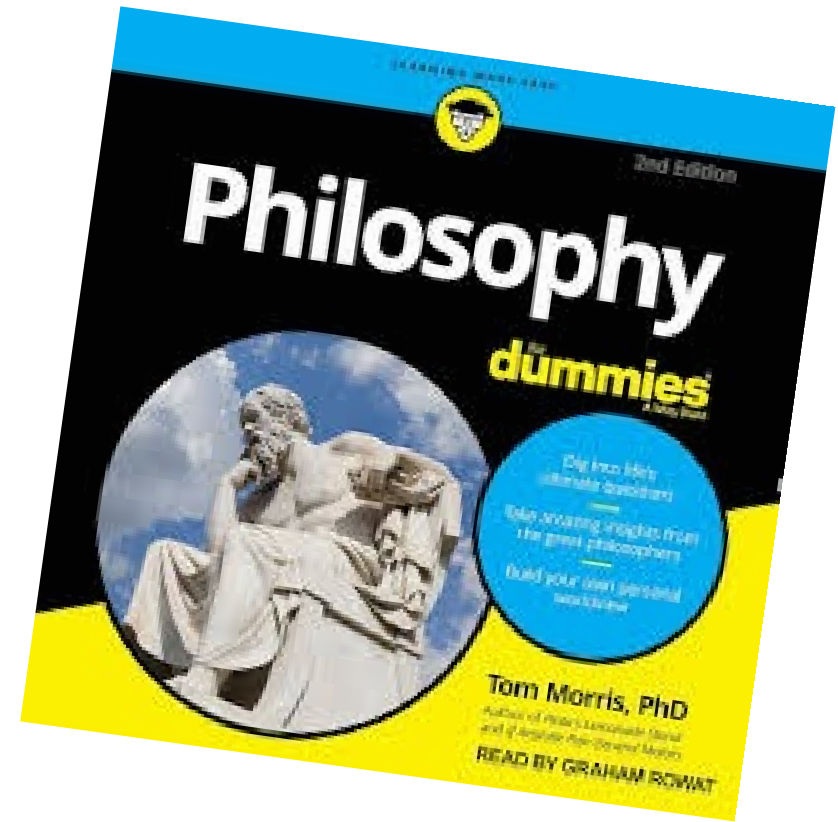
# Disclosure Slide

- None



# The 4 Us of Life

- Useful
- Unique
- Universe
- Unity: Being a part of something larger than yourself



# COURSE OBJECTIVES

- Explain the risk factors for recurrent shoulder and patellar dislocations
- Describe the role of immobilization following a shoulder dislocation
- Apply selected joint reduction techniques into your clinical practice
- Describe the classification system for knee dislocations
- Recognize the risk of neurovascular injury associated with joint dislocations
- Discuss the importance of early motion following a PIP finger dislocation
- Develop a rehabilitation program for an elbow dislocation
- Identify the life-threatening risks associated with a posterior SC joint dislocation



# DISLOCATIONS COVERED TODAY

- Shoulder
- Knee: tibio-femoral
- Sternoclavicular
- Patella
- Elbow
- Finger



# The Glenohumeral Joint



**Ball 4x larger than tee**

**Only 25% of ball contacting glenoid socket at any given position**

**Capable of 16,000 different positions in 1 degree increments**

**Negative pressure vacuum  
Slit or venting increases translation 20-50%**



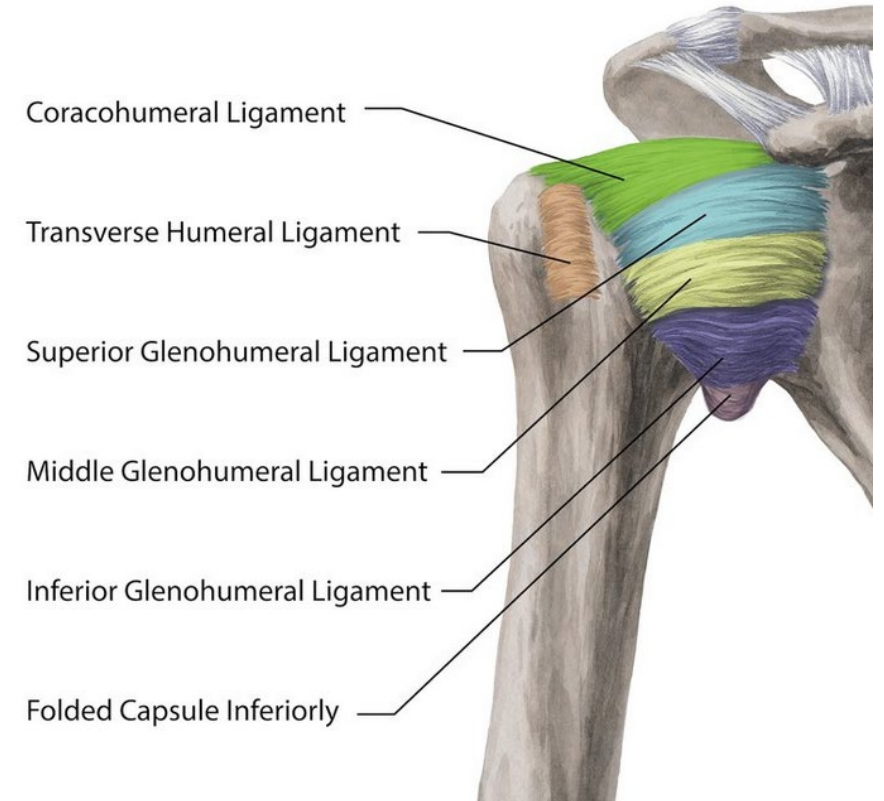
# SHOULDER ANATOMY

## Glenohumeral ligaments

- **Coracohumeral lig**
  - Prevents downward humeral head displacement
  - Limits ER btw 0-60 degrees abduction
- **Superior GHL**
  - Prevents downward humeral head displacement
  - Limits ER btw 0-60 degrees abduction
- **Middle GHL**
  - Limits ER, anterior translation to 90 degrees ABD
- **Inferior GHL**
  - Anterior band: anterior translation during ABD and ER
  - Posterior band: stabilizes posterior translation during abduction and IR

## Glenoid Labrum

- **Deepens socket 50%**



# INCIDENCE

- Highest rates
  - Football, wrestling, ice hockey
- Adults highest incidence
  - Male, 20s or 30s playing contact sports
- **Pediatric highest age incidence**
  - 16 year old males



Owens BD, Agel J, Mountcastle SB, et al. Incidence of glenohumeral instability in collegiate athletics. *Am J Sports Med* 2009;37(9):1750-4.

Cutts S, Premneh M, Drew S. Anterior shoulder dislocation. *Ann R Coll Surg Engl.* 2009;91:2-7.

Leroux T, Ogilvie-Harris D, Veillette C, et al. The epidemiology of primary && anterior shoulder dislocations in patients aged 10 to 16 years. *Am J Sports Med.* 2015; 43:2111-2117.





# RISK FACTORS FOR RECURRENCE

- **Younger patients have a higher re-dislocation rate**
  - 10-20 years old 94% re-dislocation rate
  - 20-30 years old 79% re-dislocation rate
  - 30-39 years old 17-35% re-dislocation rate
  - 40 and older 10-22% re-dislocation rate



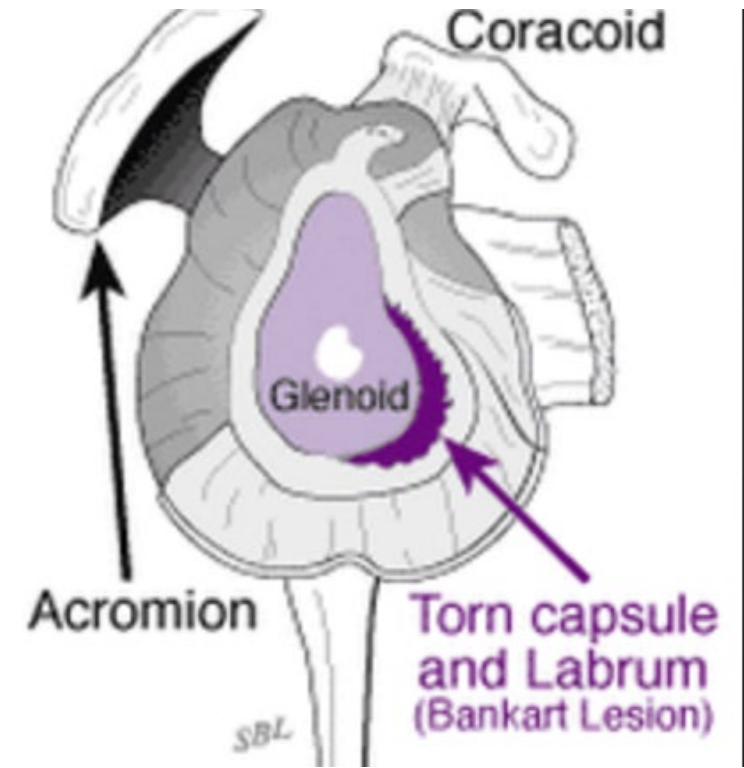
*Rowe C. Acute and recurrent anterior dislocations of the shoulder. Orthop Clin North Am. 1980;11:253-270.*

*Kane P, Bifano S, Dodson C, et al. Approach to the treatment of primary anterior shoulder dislocation: A review. The Physician and Sportsmedicine. 2015;43(1):54-64.*

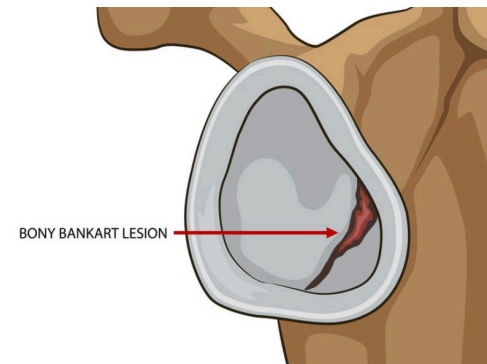


# RISK FACTORS FOR RECURRENCE

- Additional Risk Factors
  - **Male**
    - Recurrence: 3 times more likely
  - **Bankart lesion**
    - Tear of anterior inferior labrum and IGHL
    - 89-100% of shoulder dislocations
  - **Bony Bankart lesion**
    - Bone loss anterior-inferior glenoid
    - 5-56% of traumatic dislocations
    - Recurrence: 3-4 times more likely to dislocate

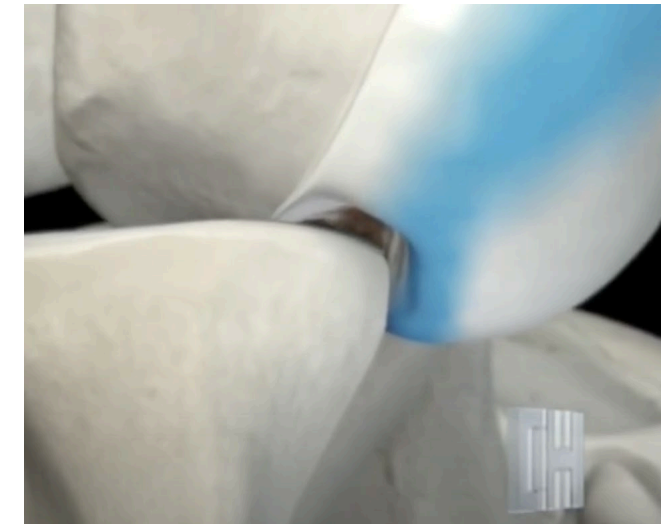
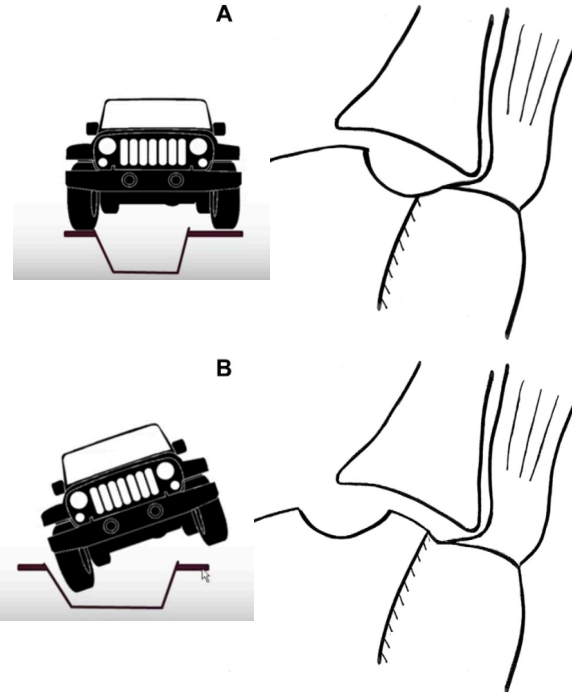
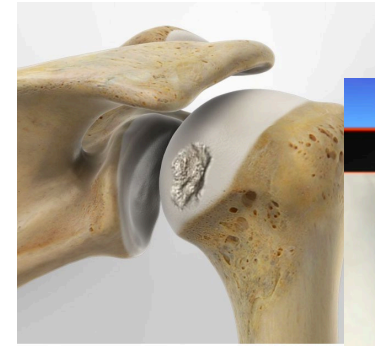


Right shoulder 3 to 6'oclock



# RISK FACTORS FOR RECURRENCE

- **Hill-Sachs lesion**
  - Medial to glenoid track increases chance of engagement
- **Glenoid bone loss** >20-25%
- **Hyperlaxity**
  - 3 times more likely
  - Beighton Score



# THE BEIGHTON SCORING SYSTEM

## Measuring joint hypermobility

### A. 5th FINGER / 'PINKIES'

Test **both sides**: Rest palm of the hand and forearm a **flat surface** with palm side down and fingers out straight.

Can the **fifth finger** be bent/lifted upwards at the knuckle to go back **beyond 90 degrees**?

If yes, add **one point** for each hand.



### B. THUMBS

Test **both sides**: With the arm out straight, the palm facing down, and the wrist then fully bent downward, can the thumb be pushed back to touch the forearm?

If yes, add **one point** for each thumb.



### C. ELBOWS

Test **both sides**: With arms outstretched and palms facing upwards, does the elbow extend (bend too far) upwards **more than an extra 10 degrees** beyond a normal outstretched position?

If yes, add **one point** for each side.



### D. KNEES

Test **both sides**: While standing, with knees locked (bent backwards as far as possible), does the lower part of either leg extend **more than 10 degrees forward**?

If yes, add **one point** for each side.

### E. SPINE

Bend forward, can you place the palms of your hands **flat on the floor in front of your feet** without bending your knees?

If yes, add **one point**.

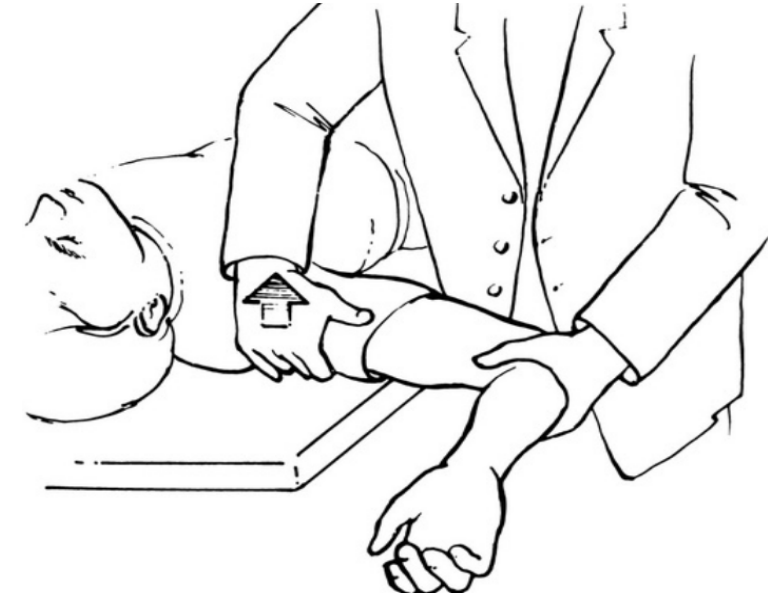


# STATISTICS REVIEW

- **Sensitivity**
  - Correctly identifies if condition is present
- **Specificity**
  - Correctly identifies if condition is not present
- **95% Confidence Interval**
  - Study applicability to real world
  - Tires 30,000 miles (95% CI 28,000-33,000)  
(95% CI 17,000- 40,000)
- **P-Value**
  - Results by chance,  $p < .05$
- **Odds Ratio**
  - Likelihood



# RISK FACTORS FOR RECURRENCE



- **Predictive value of positive apprehension test**
- Combat soldiers
  - Men ages 17-27 years old
    - 4 weeks of immobilization, then rehabilitation
- **Apprehension test performed at 6 weeks post-injury**
  - 71% with positive apprehension test re-dislocated ( $p=.02$ )
  - 37% with negative test re-dislocated
  - Follow-up range 2-4 years



# IMMOBILIZE?

- **Duration of sling use is controversial**, ranges 1-6 weeks
- **1-3 weeks generally recommended for patient comfort**
  - Does not affect recurrence or outcome in young, athletic patients
- **Some immobilization reduced recurrence rate at 1 year f/u**, 16-40 year olds
  - Length of time (1-70 days) did not affect recurrence



Kane P, Bifano S, Dodson C, et al. Approach to the treatment of primary anterior shoulder dislocation: A review. *The Physician and Sportsmedicine*. 2015;43(1):54-64.

Olds M, Ellis R, Donaldson K, et al. Risk factors which predispose first-time traumatic anterior shoulder dislocations to recurrent instability in adults: a systematic review and meta-analysis. *Br J Sports Med*. 2015;49(14):913-922.

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Lin KM, James EW, Spitzer E, et al. Pediatric and adolescent anterior shoulder instability: clinical management of first-time dislocators. *Curr Opin Pediatr*. 2018;30:49-56.



# IMMOBILIZATION LONG-TERM OUTCOMES

- **At 2, 5, 10 and 25-year follow-up**, younger age affected recurrent dislocation rates but not length of immobilization
- In patients <30 years old, **no significant difference** in recurrence occurred between those immobilized for 1 week or less (41%) compared to those immobilized 3 weeks or longer (37%)
  - Those **who refrain from sports** and full activities longer ( $\leq 6$  weeks vs  $\geq 6$  weeks) have greater satisfactory results.

## Nonoperative Treatment of Primary Anterior Shoulder Dislocation in Patients Forty Years of Age and Younger

A Prospective Twenty-five-Year Follow-up

By Lennart Hovelius, MD, PhD, Anders Olofsson, MD, Björn Sandström, MD, Bengt-Göran Augustini, MD, Lars Krantz, MD, Hans Fredin, MD, PhD, Bo Tillander, MD, PhD, Ulf Skoglund, MD, Björn Salomonsson, MD, Jan Nowak, MD, PhD, and Ulf Sennerby, MD

Hovelius L, Eriksson K, Fredin H, et al. Recurrences after initial dislocation of the shoulder. Results of a prospective study of treatment. *J Bone Joint Surg Am.* 1983;65:343-9.

Hovelius L, Augustini BG, Fredin H, Johansson O, Norlin R, Thorling J. Primary anterior dislocation of the shoulder in young patients. A ten-year prospective study. *J Bone Joint Surg Am.* 1996;78:1677-84.

Hovelius L, Olofsson A, Sandstrom B, et al. Nonoperative treatment of primary anterior shoulder dislocation in patients forty years of age and younger. A prospective twenty-five-year follow-up. *J Bone Joint Surg Am.* 2008;90:945-52.

Paterson W, Throckmorton T, Koester M, et al. Position and duration of immobilization after primary anterior shoulder dislocation: a systematic review and meta-analysis of the literature. *J Bone Joint Surg Am.* 2010;92:2924-2933.





# WHAT AFFECTS LOWER RECURRENCE?

- **Open humeral physis**
  - ≤ 13 years old skeletally immature:
    - 33% recurrence
  - 14-17 years old
    - 90% recurrence
- **Greater tuberosity fracture**
  - 7x less likely for recurrence
  - Decreased ER ROM



Owens BD, Agel J, Mountcastle SB, et al. Incidence of glenohumeral instability in collegiate athletics. *Am J Sports Med.* 2009;37(9):1750–4.

Olds M, Ellis R, Donaldson K, et al. Risk factors which predispose first-time traumatic anterior shoulder dislocations to recurrent instability in adults: a systematic review and meta-analysis. *Br J Sports Med.* 2015;49(14):913-922.

Owens BD, Dickens JF, Kilcoyne KG, et al. Management of mid-season traumatic anterior shoulder instability in athletes. *J Am Acad OrthopSurg.* 2012; 20:518 – 526.



# PREDICTIVE CLINICAL EXAM TESTS

- **Apprehension Test**

- Sensitivity 68-88%
- Specificity 95%\*

- **Surprise Test**

- Sensitivity 85-92%\*
- Specificity 87-89%

- **Relocation Test**

- Sensitivity 57-85%
- Specificity 87-100%\*

- **Combining all 3**

- PPV 94%\*
- NPV 72%



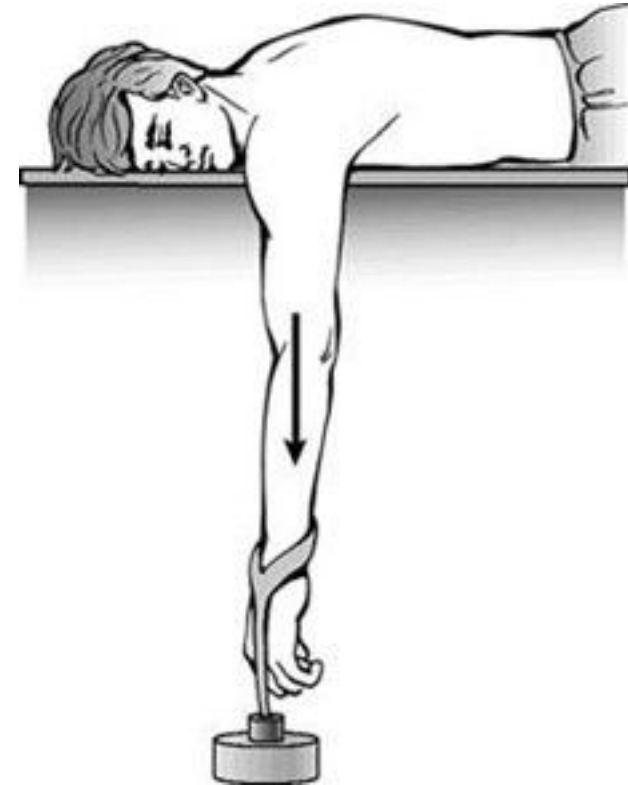
# THE CUNNINGHAM TECHNIQUE

- Patient must sit up straight
- Hand on clinician's shoulder, elbow bent relaxed
- Clinician applies gentle traction at elbow
- **Massage trapezius, deltoid, biceps 3 seconds each**



# STIMSON TECHNIQUE

- Hanging in forward flexion
- 10 lbs
  - Or downward manual traction



# TO REDUCE or NOT?



- Comply with state practice act
- Plan of Care
- Priorities
  - Avoid neurovascular complications
  - Reduce the joint as atraumatically as possible
- **Caution: Do not try to reduce if...**
  - A fracture or posterior dislocation is suspected
  - Older patient (greater risk of fracture)
  - Children (growth plates)
- Instead...
  - Splint in comfortable position and refer
  - Multiple attempts not recommended

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doi: 10.4085/1062-6050-97-12  
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**Position Statement**

## National Athletic Trainers' Association Position Statement: Immediate Management of Appendicular Joint Dislocations

**Susan L. Rozzi, PhD, ATC, SCAT (Chair)\*; Jeffrey M. Anderson, MD†; Scott T. Doberstein, MS, ATC, LAT‡; Joseph J. Godek, MS, ATC§; Langdon A. Hartsock, MD, FACS||; Edward G. McFarland, MD¶**



\*Department of Health and Human Performance, College of Charleston, SC; †Student Health, University of Connecticut Health, Storrs, and Major League Baseball's Joint Drug Prevention and Treatment Program, Deceased; ‡University of Wisconsin-La Crosse; §Department of Sports Medicine, West Chester University, PA; ||Department of Orthopaedic Surgery, Medical University of South Carolina, Charleston; ¶Department of Orthopaedic Surgery, The Johns Hopkins University, Baltimore, MD

**Objective:** To provide certified athletic trainers (ATs) with recommendations and guidelines for the immediate management of patients with joint dislocations.

**Background:** One of the primary responsibilities of ATs is to provide immediate injury care for active individuals. Although ATs are confronted with managing patients who have many kinds of injuries, the onsite management of a joint dislocation presents challenges in evaluation and immediate treatment. The critical concern in managing a dislocation is deciding when a joint can be reduced onsite and when the patient should be splinted and transported for reduction to be performed in the hospital or medical setting. Factors that influence the decision-making process include the following: whether the AT possesses a documented protocol that is supported by his or her supervising physician(s), employer documents, and respective state regulations; the AT's qualifications and experience; the dislocated joint; whether the dislocation is first time or recurrent; the patient's age and general health; and whether associated injuries are present.

**Recommendations:** These guidelines are intended to provide considerations for the initial care of specific joint dislocations. They are not intended to represent the standard of care and should not be interpreted as a standard of care for therapeutic or legal discussion.

**Key Words:** injury care, joint luxation, joint subluxation, emergency management

**C**ertified athletic trainers (ATs) care for a variety of musculoskeletal injuries, but one area of persistent controversy is the immediate management of patients with joint dislocations, both acute and recurrent. Therefore, the goal of this position statement is to provide ATs with recommendations for the immediate management of patients with joint dislocations. When establishing their policy for the immediate management of patients with joint dislocations, ATs must comply with their state practice regulations and take into account the predetermined protocols of their supervising physician and institution and their own training and experience in reducing the specific joint dislocation.

The decision to reduce a dislocated joint depends on a number of variables. One such variable is the amount of time the joint has been dislocated, as the longer a joint has been disarticulated, the more urgent or difficult the subsequent onsite reduction may be.<sup>1-7</sup> Other variables are the ease of the joint reduction,<sup>8-13</sup> the patient's age and general health,<sup>2,14-19</sup> and the presence of any concomitant injury (including fracture).<sup>20-25</sup> Especially important factors are any neurovascular compromise,<sup>1,3,20,22,23,26-31</sup> and whether the injury represents a recurrent dislocation.<sup>26,28</sup>

In discussing this topic, it is necessary to understand the terminology of joint dislocations. For this paper, the following nomenclature, as adopted from *Taber's Medical Dictionary*,<sup>32</sup> applies. The term *dislocation* refers to the complete displacement of a bone from its normal joint position. A *subluxation* is the partial or transient displace-

Journal of Athletic Training 1117



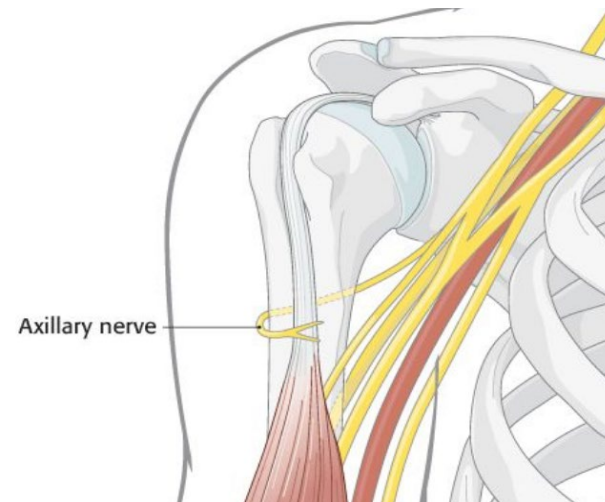
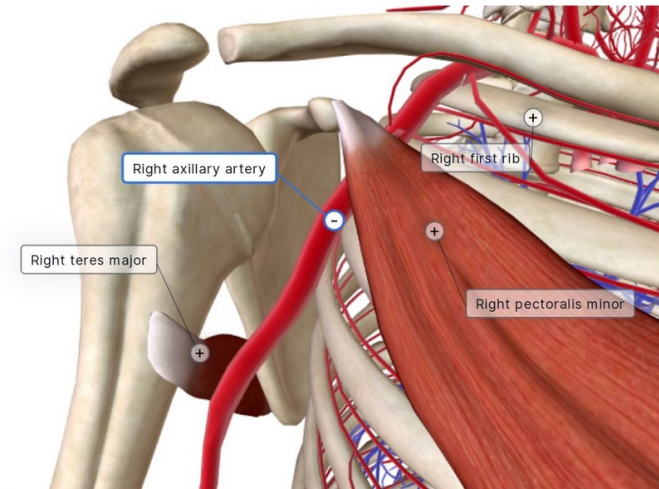
# RARE COMPLICATIONS

- **Axillary artery laceration**

- 1-2% of cases
- Most ages 50 and older
- Hypotension
- Absent distal pulses, cool limb, capillary refill

- **Axillary nerve injury**

- Wide range of frequency in literature
- 5-48%
- Risk factors:
  - Delay in reduction >2 hours
  - Associated fracture - humerus or scapula
    - Fracture rate with dislocation is 18%
    - **Fracture doubles risk**
  - Age
    - >40 one study showed 65% incidence



# NON-OPERATIVE MANAGEMENT

## Current Clinical Concepts: Nonoperative Management of Shoulder Instability

Margie Olds, PhD, PT\*; Timothy L. Uhl, PhD, PT, ATC†

\*Flawless Motion, Auckland, New Zealand; †Department of Physical Therapy, College of Health Sciences, University of Kentucky, Lexington

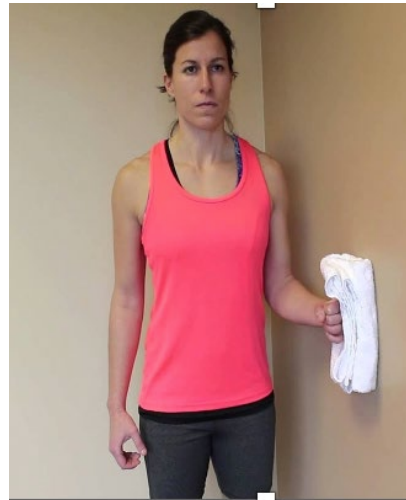


- **Risk Factors for Recurrence**
  - Bony Bankart lesion
  - Age 16-25
  - Dominant shoulder
  - Elevated Tampa Scale of Kinesiophobia score
  - Elevated Shoulder and Disability Index score (SPADI)
- Scoring criteria (PRIS)
  - [www.margieolds.com](http://www.margieolds.com)
  - Tampa Scale of Kinesiophobia score
    - <https://orthotoolkit.com/tampa-scale/>
  - SPADI
    - <https://orthotoolkit.com/spadi/>

*Olds M, Ellis R, Kersten P. Predicting Recurrent Instability of the Shoulder (PRIS): a valid tool to predict which patients will not have repeat shoulder instability after first-time traumatic anterior dislocation. J Orthop Sports Phys Ther. 2020;50(8):431–437.*



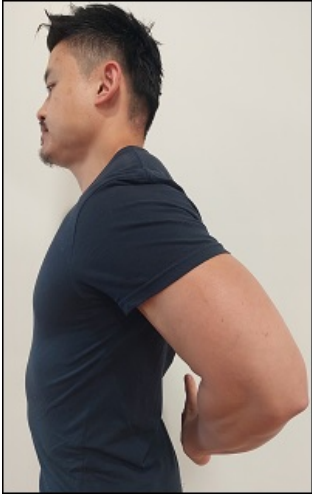
# RECOVERY



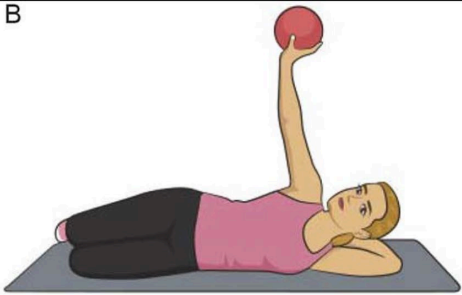
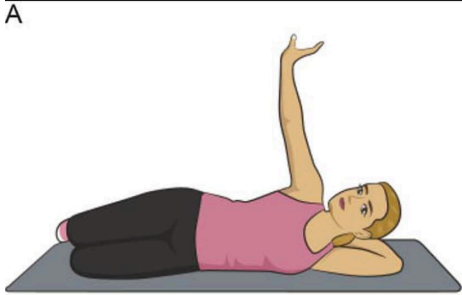


# RECOVERY

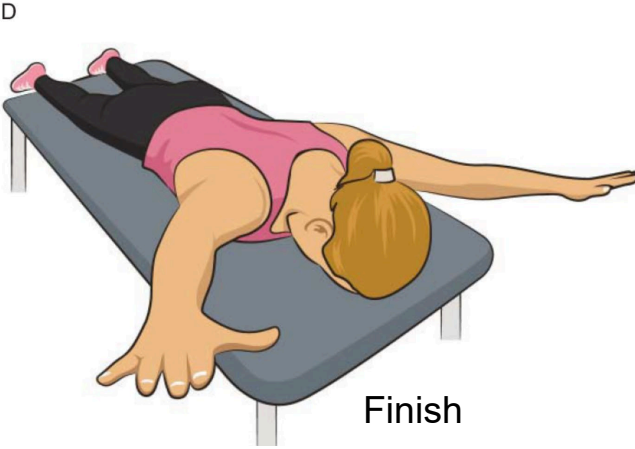
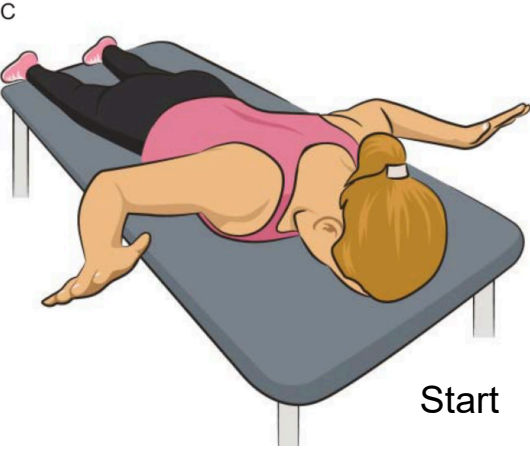
Lift-off:  
10 second  
isometric hold,  
3-5 reps



Metronome,  
begin 30 bpm,  
progress to 70



Side hold, 10 second isometric holds 10 reps, circles



W to Y lower trapezius exercise



Belly Press  
isometric hold

Olds M, Uhl TL. Current Clinical Concepts: Nonoperative Management of Shoulder Instability. J Athl Train. 2024 Mar 1;59(3):243-254.



# RETURN THE SAME SEASON?

- 45 US Military, Naval, Air Force D1 athletes
- Instability event
- **No patient was immobilized**
  - Rehab began first day after injury
- **73% returned same season**
  - Sublux median 3 days, dislocation median 7 days
- 27% successfully completed season without recurrence, 27% unable to return
  - Subluxations 60% recurrence
  - Dislocation 70% recurrence



- **Quick summary**

3 out of 4 returned the same season

3 out of 4 had recurrence

70% finished the season

*Dickens JF, Owens BD, Cameron KL, Kilcoyne K, Allred CD, Svoboda SJ, Sullivan R, Tokish JM, Peck KY, Rue JP. Return to play and recurrent instability after in-season anterior shoulder instability: a prospective multicenter study. Am J Sports Med.*



# RETURN THE SAME SEASON?

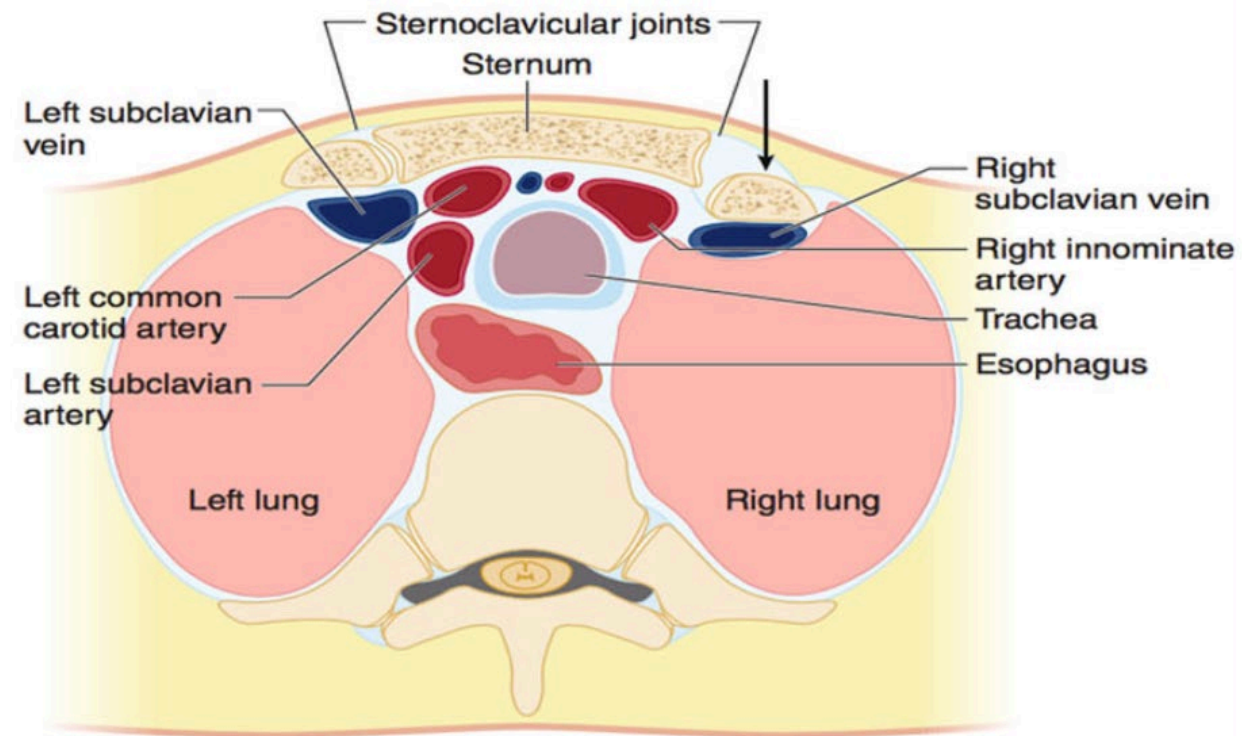
- **Contraindications**

- Dominant arm in overhead or throwing athlete
- Failure of non-operative treatment/brace wear
- Recurrent dislocator
- Large or engaging Hill-Sachs lesion
- Humeral avulsion of GH ligament lesion (HAGL)
- Large capsular tear

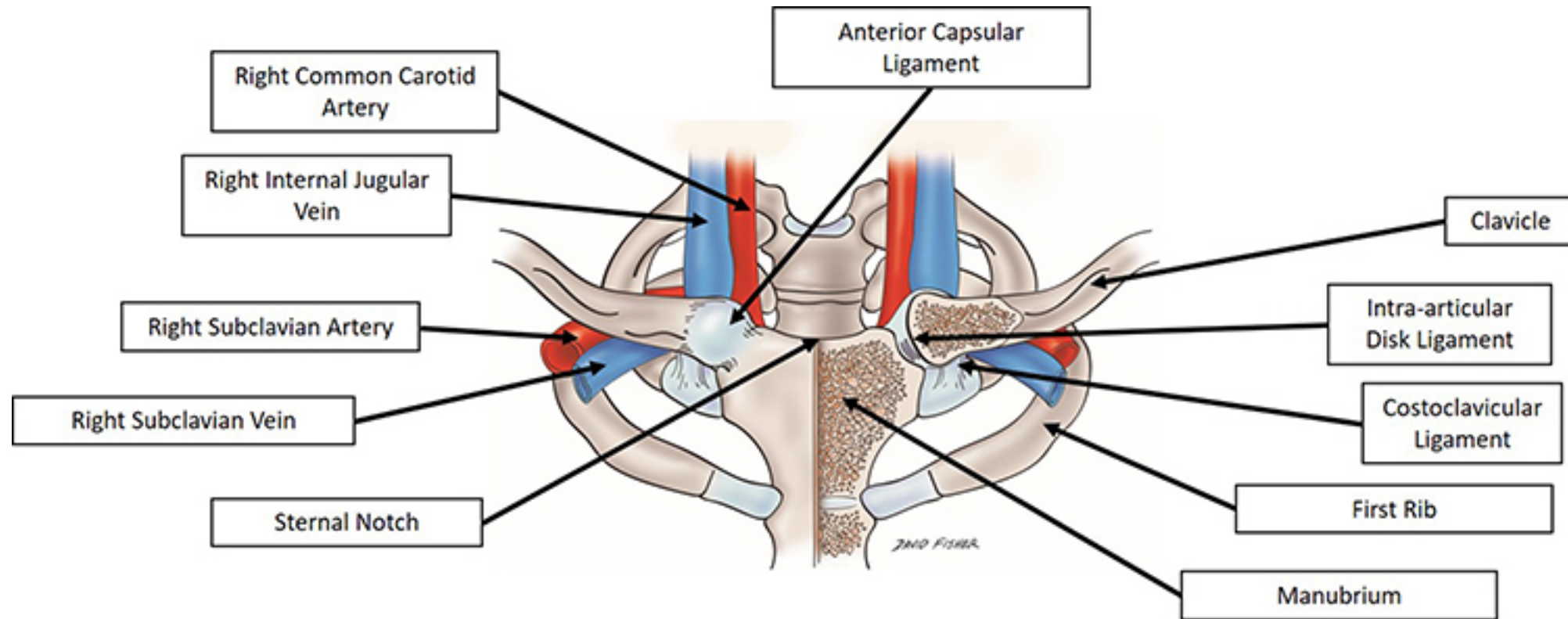


# STERNOCLAVICULAR DISLOCATION

- Medial clavicle physes last to close 20.
- Anterior 9x more common, males
- **Posterior life-threatening**
  - Airway, vascular, mediastinal structures
    - Carotid artery, trachea, subclavian vein, superior vena cava, brachiocephalic v
    - Some 1mm away
- Medical emergency
- **Transport seated**
- CT scan

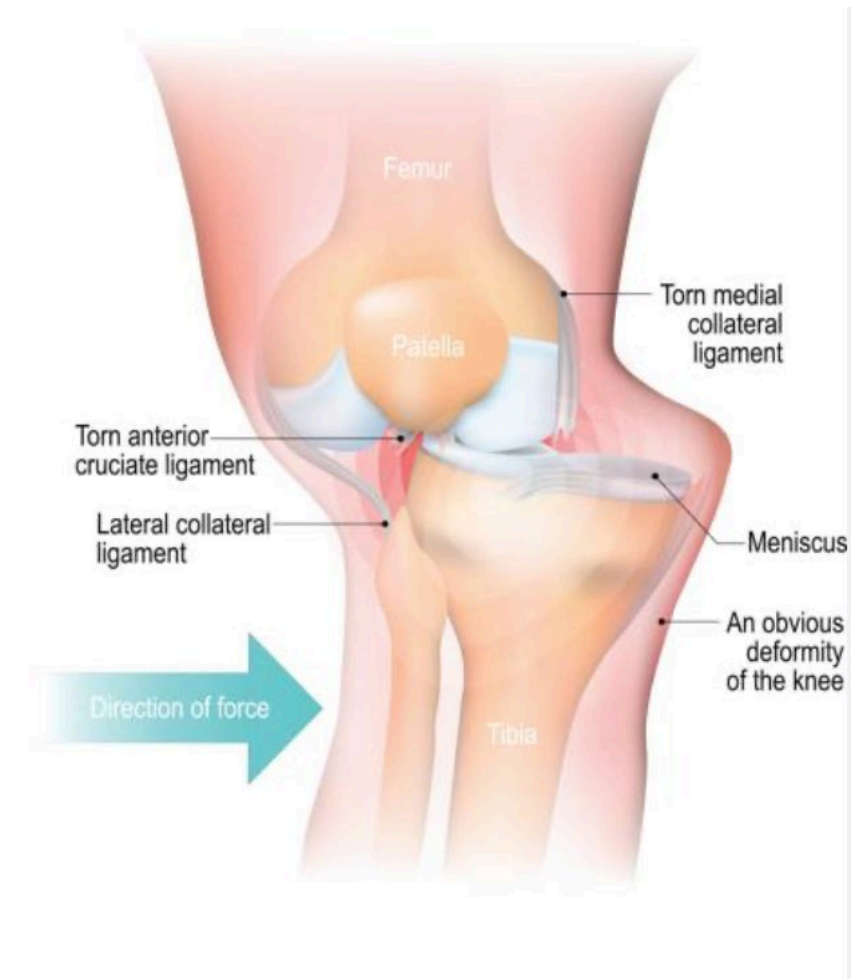


# STERNOCLAVICULAR DISLOCATION



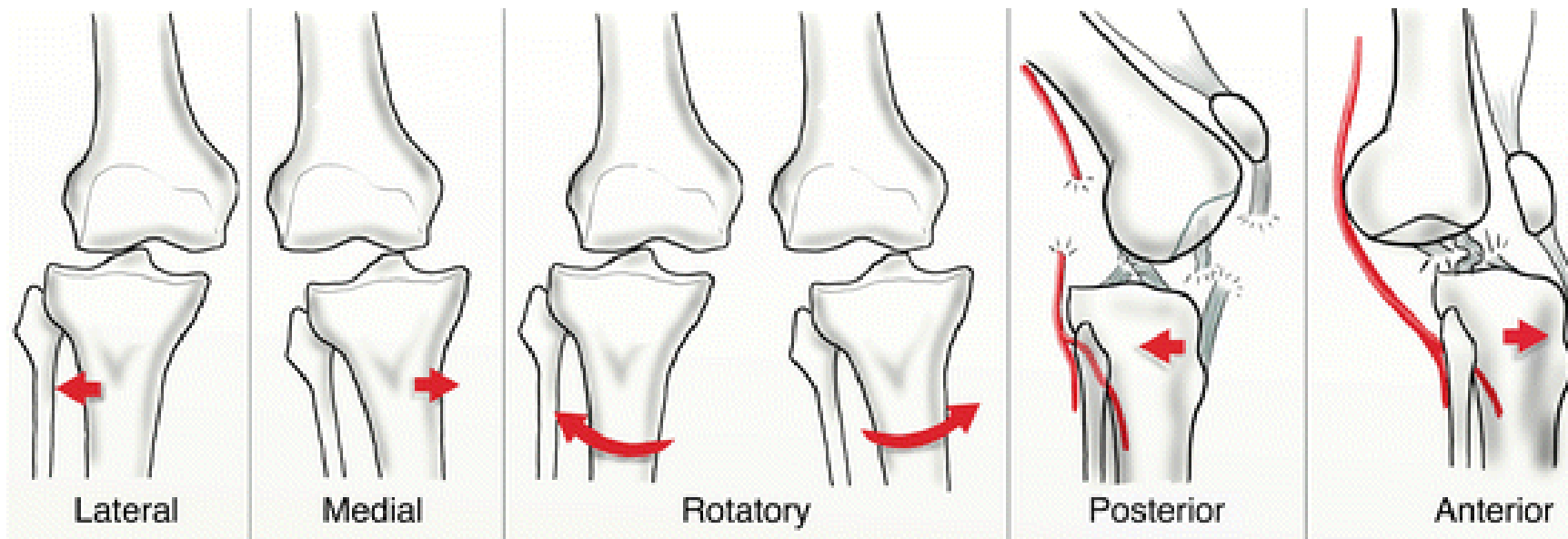
# KNEE DISLOCATION

- Multi-ligament injury
- Both cruciates and a collateral most common
  - 60-80% of cases
- **Beware the spontaneously reduced dislocation**
- Risk of neurovascular injury
  - Popliteal artery
    - Unrecognized ischemia 8+ hours, 86% amputation rate
  - Peroneal nerve



# KENNEDY CLASSIFICATION

- Named for position of tibia relative to the femur



**\*highest rate of  
vascular injury**



# KENNEDY CLASSIFICATION

Direction	Mechanism	Injury Pattern
Anterior <sup>a</sup>	Hyperextension	Posterior capsule, PCL, ACL tears
Posterior <sup>b</sup>	“Dashboard”	PCL torn
Medial	Varus/rotation	Collaterals, cruciate
Lateral	Valgus, flexion/adduction	Collaterals, cruciate
Rotatory <sup>c</sup>	Rotation around PLC	MCL, ACL, PCL tears

ACL = anterior cruciate ligament, MCL = medial collateral ligament, PCL = posterior cruciate ligament, PLC = posterolateral corner

<sup>a</sup> Most common.

<sup>b</sup> Second most common.

<sup>c</sup> Posterolateral most common.





# SCHENCK CLASSIFICATION

- Based on number of ligaments ruptured



Table. Anatomically Based Knee Dislocation Classification System	
KD-I	Single cruciate + collateral injury
KD-II	ACL and PCL injury
KD-III M	ACL, PCL, and MCL injury
KD-III L	ACL, PCL, and LCL + PLC injury
KD-IV	ACL, PCL, MCL, and LCL + PLC injury
KD-V	Dislocation + fracture

*Abbreviations: ACL, anterior cruciate ligament; LCL, lateral collateral ligament; MCL, medial collateral ligament; PCL, posterior cruciate ligament; PLC, posterolateral corner.*

← highest rates of vascular injury



# VASCULAR AND NERVE INJURY

- Study: 862 patients with knee dislocations
- **18% vascular injury** 95% CI 13-22%
  - 12% of those required amputation
    - Prolonged ischemia, infection, failed repair, complete NV injury
- **Normal pulses do not rule out vascular injury**
  - Can later develop thrombosis
  - Angiography, ABI, duplex ultrasound
- **Highest rates of vascular injury**
  - Combined ACL, PCL, MCL (32%)
  - Posterior dislocations (25%)
- **25% peroneal nerve injury**

SYMPOSIUM: MANAGEMENT OF THE DISLOCATED KNEE

## Vascular and Nerve Injury After Knee Dislocation

A Systematic Review

Omar Medina BS, Gabriel A. Arom BS,  
Michael G. Yerosian MD, Frank A. Petrigliano MD,  
David R. McAllister MD

Clinical Orthopaedics  
and Related Research®

A Publication of The Association of Bone and Joint Surgeons®



# VASCULAR INJURY

- Ankle Brachial Index (ABI)
- Normal 1.0-1.4
- 80 to 95% sensitive, 80 to 90% specific
  - **For vascular injuries requiring surgery**

*The Journal of TRAUMA® Injury, Infection, and Critical Care*

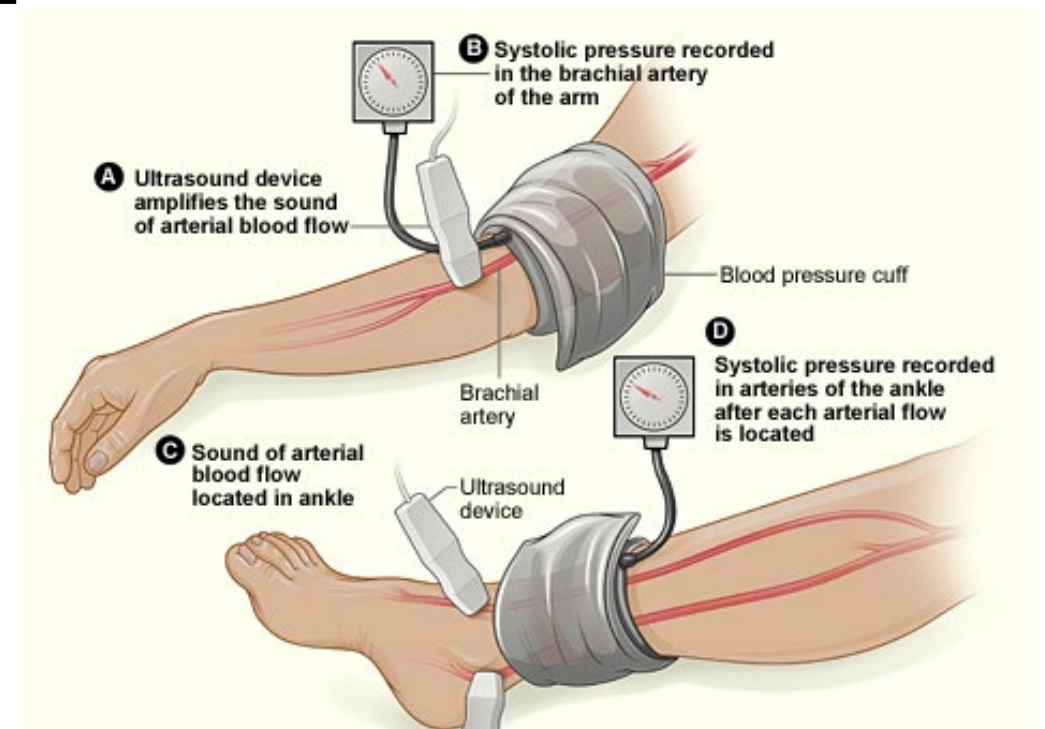
## The Value of the Ankle–Brachial Index for Diagnosing Arterial Injury After Knee Dislocation: A Prospective Study

*William J. Mills, MD, David P. Barei, MD, FRCS(C), and Patrick McNair, MD*

**38 patients with knee dislocation**

**11 ABI <.9, underwent arteriography, all 11 had popliteal artery injury**

**Example: Ankle BP 90, arm BP 120 = .75**



$$\text{Right ABI} = \frac{\text{Highest Pressure in Right Foot}}{\text{Highest Pressure in Both Arms}}$$

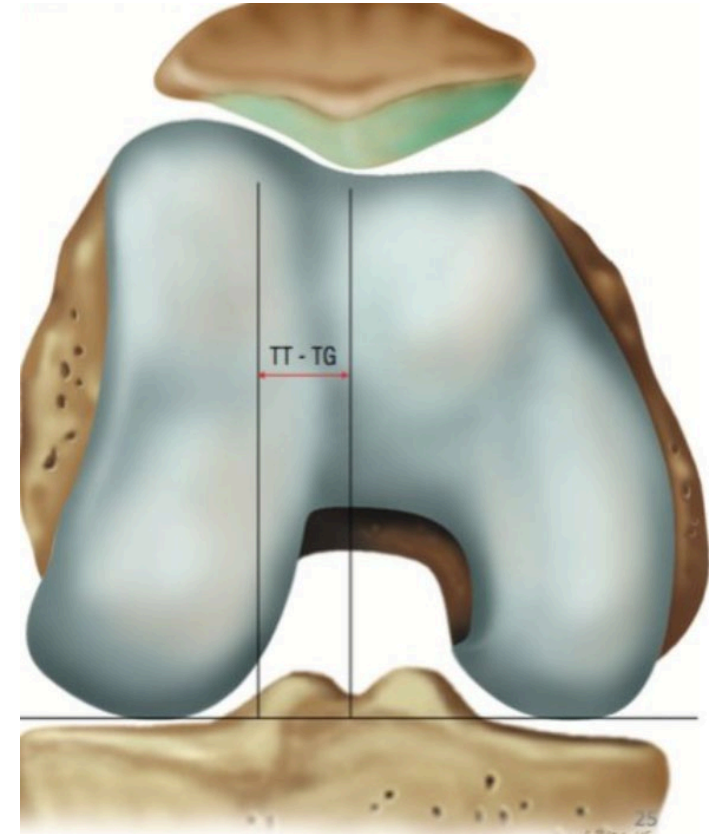


# PATELLA DISLOCATION

- **Risk factors**
  - TT-TG distance  $>20$  mm
  - Patella alta
  - Trochlear dysplasia
  - Female
- **Reduction**
  - Passive knee extension
  - Medially-directed pressure on patella
- **Recurrence**
  - 10-90%
  - 7x more likely
  - Age

**Beware the spontaneously reduced patella**

Check for effusion the next day



# A Diagnosis of Vitamin D Deficiency Is Associated With Increased Rates of Primary Patellar Instability and Need for Recurrent Surgical Stabilization

Kenny Chang, BS,\* J. Alex Albright, BS, Matthew Quinn, MD, Surya Khatri, Rory A. Byrne, BA, Alan H. Daniels, MD, and Brett D. Owens, MD 

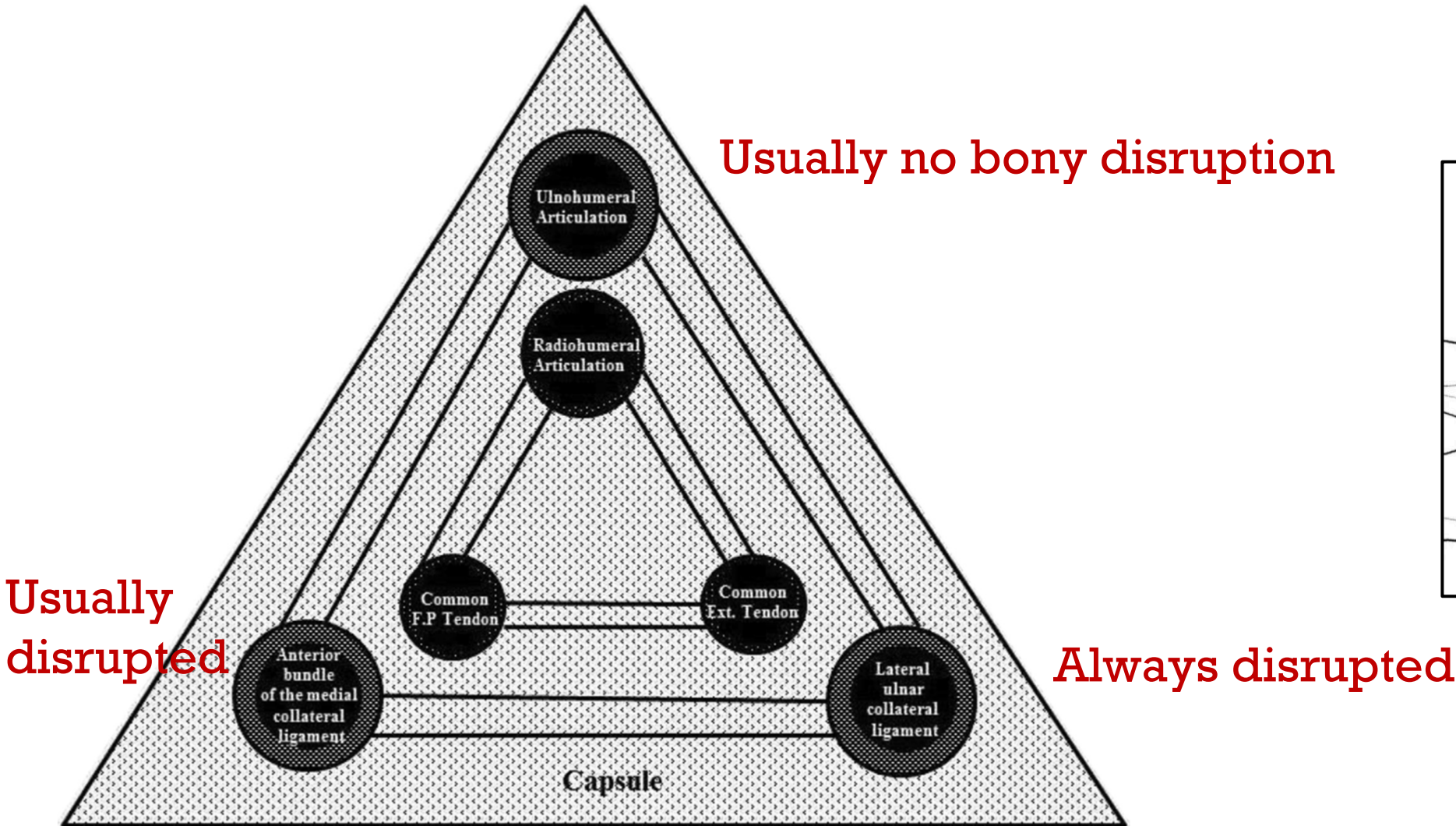
- Vitamin D Roles
  - Muscle development
  - MPFL collagen health
- Vitamin D deficiency females 10-25 yo
  - **40% increase in patella instability**
- Other associated poorer outcomes
  - Rotator cuff, hip, knee surgeries



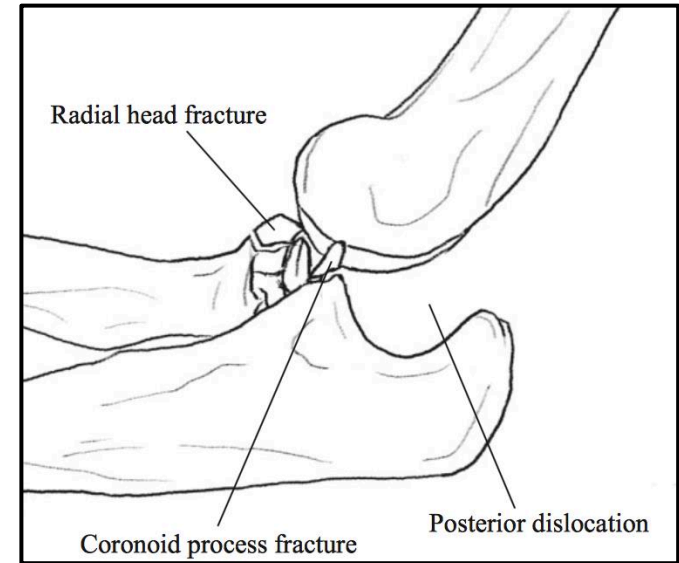
May/June 2024 Issue



# SIMPLE ELBOW DISLOCATION



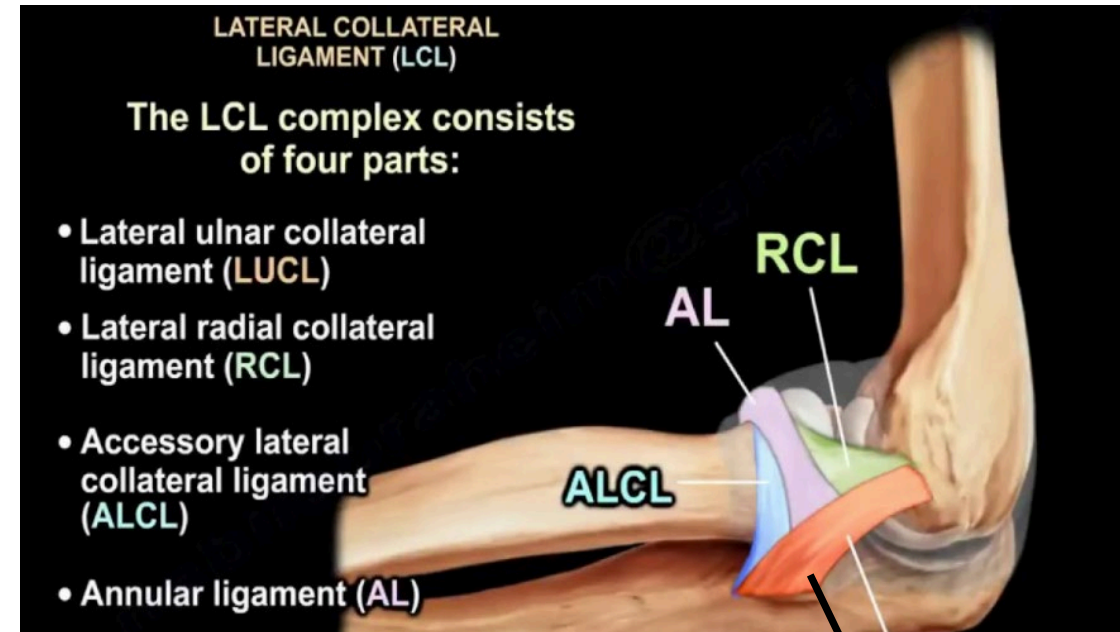
Terrible Triad Injury



# SIMPLE ELBOW DISLOCATION

## ORTHO BULLETS

- LUCL is the primary stabilizer to varus & ER stress ? △ △
  - origin
    - lateral humeral epicondyle
  - insertion
    - the tubercle of the supinator crest of the ulna

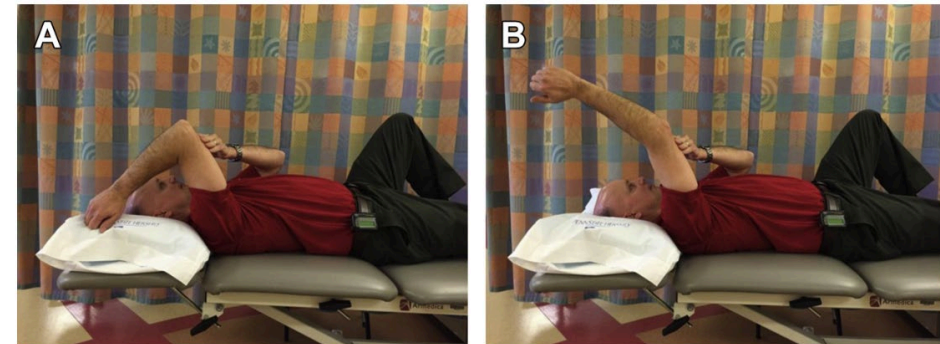


Lateral Ulnar Collateral Ligament

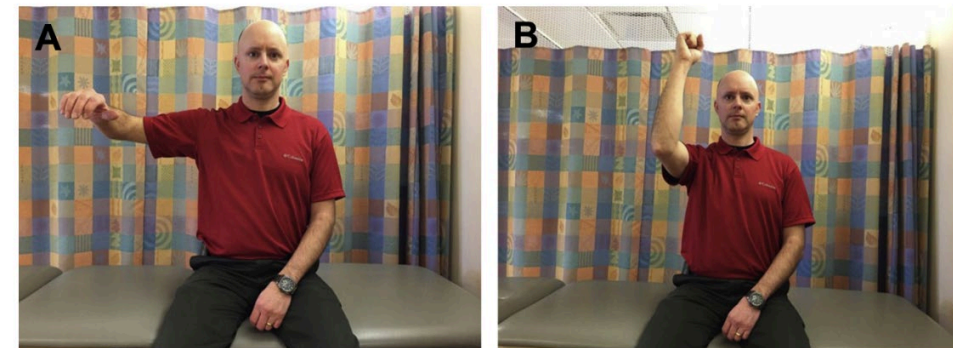


# SIMPLE ELBOW DISLOCATION

- 5-7 days immobilization at 90 degrees
  - Begin overhead AROM if stable and radiographically congruent
  - **Overhead: gravity compression improves stability and tracking**
- Then removable splint
  - Possible extension block if apprehensive for 3-4 weeks
- **Goal full ROM 6-8 weeks**
  - Avoid varus load
  - Avoid flexion contracture
- Begin strengthening 6-8 weeks
  - Avoid posterior forces



Initial gravity-loaded ROM



Avoid varus first 4-6 weeks

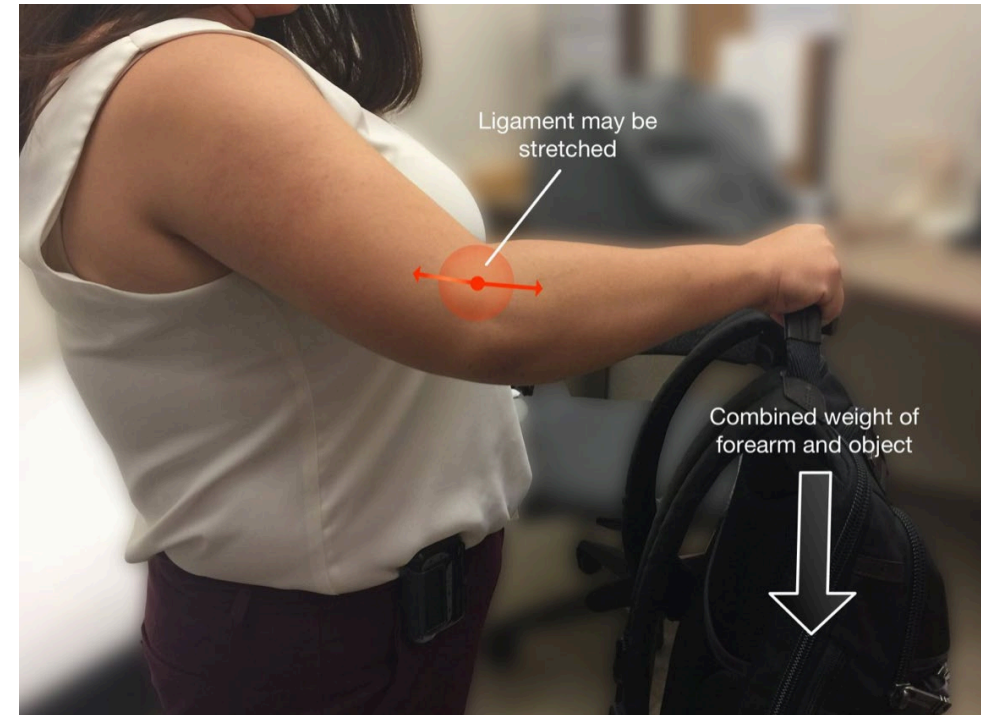
*Armstrong A. Simple elbow dislocation. Hand Clin. 2015;521-531.*

*Pipicelli JG, King GJW. Rehabilitation of Elbow Instability. Hand Clin. 2020 Nov;36(4):511-522.*



# SIMPLE ELBOW DISLOCATION

- Supine overhead flexion, extension AROM 10-15 reps every 2 hours initially
- **Begin gentle passive flexion & extension ROM at 3-4 weeks**
  - Safe arc zone
  - Hold 5-10 seconds each direction
  - Passive rotations at >90 flexion at 4-6 weeks
- Isometrics
  - 5 reps, 5-10 second hold, 5 times a day
- Joint mobs
  - Grade I at 2 weeks
  - Grades II and III at 4 weeks
  - Grade III and IV at 6-8 weeks



# SIMPLE ELBOW DISLOCATION

Phase II: 6-12 wks	Minimal Protection Phase
<b>Goals</b>	<ul style="list-style-type: none"> <li>• 5/5 strength with elbow flexion and extension</li> <li>• Elbow flexion goal: 135 degrees</li> <li>• Elbow extension: 0 degrees extension</li> </ul>
<b>Brace</b>	<ul style="list-style-type: none"> <li>• Discontinue based on provider restrictions</li> </ul>
<b>ROM</b>	<ul style="list-style-type: none"> <li>• AROM/PROM: no restrictions</li> </ul>
<b>Precautions</b>	<ul style="list-style-type: none"> <li>• Lifting restriction may be lifted or increased as directed by referring medical provider</li> </ul>
<b>Strengthening</b>	<ul style="list-style-type: none"> <li>• Elbow flexion isotonic strengthening</li> <li>• Triceps extension isotonic strengthening</li> <li>• Pronation/Supination isotonic strengthening</li> </ul> <p>As Needed</p> <ul style="list-style-type: none"> <li>• Scapulothoracic strengthening</li> <li>• Rotator cuff strengthening</li> </ul>
<b>Treatment interventions</b>	<ul style="list-style-type: none"> <li>• Wrist/Hand exercises</li> <li>• Gripping exercises</li> <li>• Wall pushups progressing to standard push up</li> <li>• Bicep curls</li> <li>• Triceps extensions</li> <li>• Pushing, pulling, and functional lifting based on job and home requirements</li> </ul>
<b>Phase 12 wks +</b>	<ul style="list-style-type: none"> <li>• Functional strengthening</li> </ul>



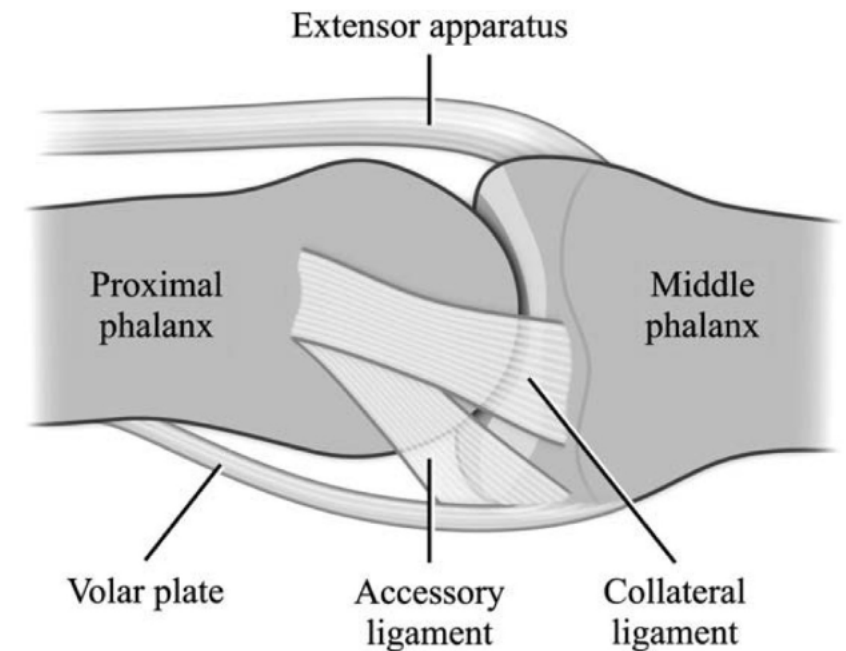
Radiographic Drop Sign > 4mm

... joint and enhances joint tracking during flexion and extension of the elbow (Wolfe & Hotchkins, 2006)



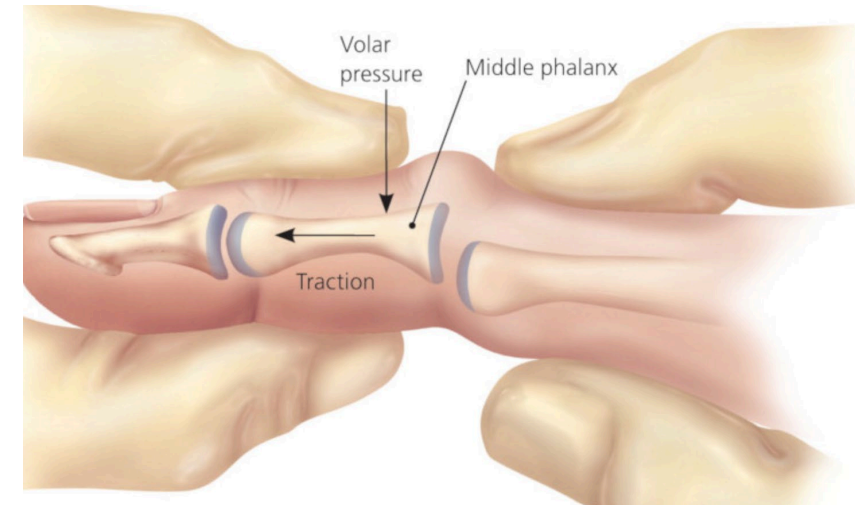
# PIP JOINT ANATOMY

- Proper collateral ligaments
  - **Medial, lateral stability in flexion**
- Accessory collateral ligaments
  - **Medial, lateral stability in extension**
- Volar plate
  - **Resistance to hyperextension, dislocation**
- Central slip extensor tendon
  - Weaker than volar plate
  - **Why dorsal dislocations more common**



# PIP FINGER DISLOCATIONS

- Range from benign to disabling
  - **Most are dorsal**
- Simple dislocations reduced, buddy tape, RTP
- Volar PIP dislocations special concern
  - **Potential central slip injury**
  - Splint in extension to avoid boutonniere deformity
- PIP fracture-dislocations
  - Possible ORIF



# JOINT REDUCTION TECHNIQUES



<b>Dislocation</b>	<b>Reduction Maneuver</b>	<b>Additional Tips</b>	<b>After Reduction</b>
Dorsal DIP	Volarly applied pressure on P3 base + axial traction	If irreducible, consider entrapped volar plate	Recommend splinting 2-3 wk in extension
Volar DIP	DIP flexion + axial traction	Least likely to need reduction	Needs assessment for bony mallet (fracture-dislocation)



# PIP DISLOCATIONS



**Most common**



**Possible extensor tendon injury**

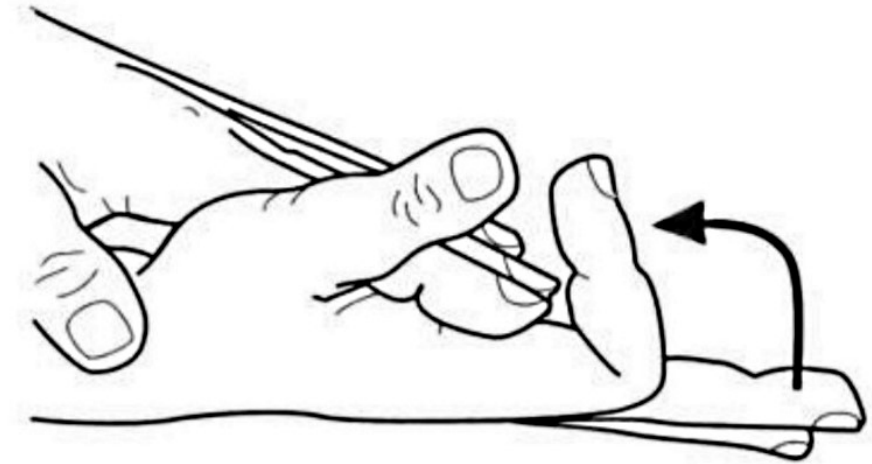


**Assess collateral stability post-reduction**

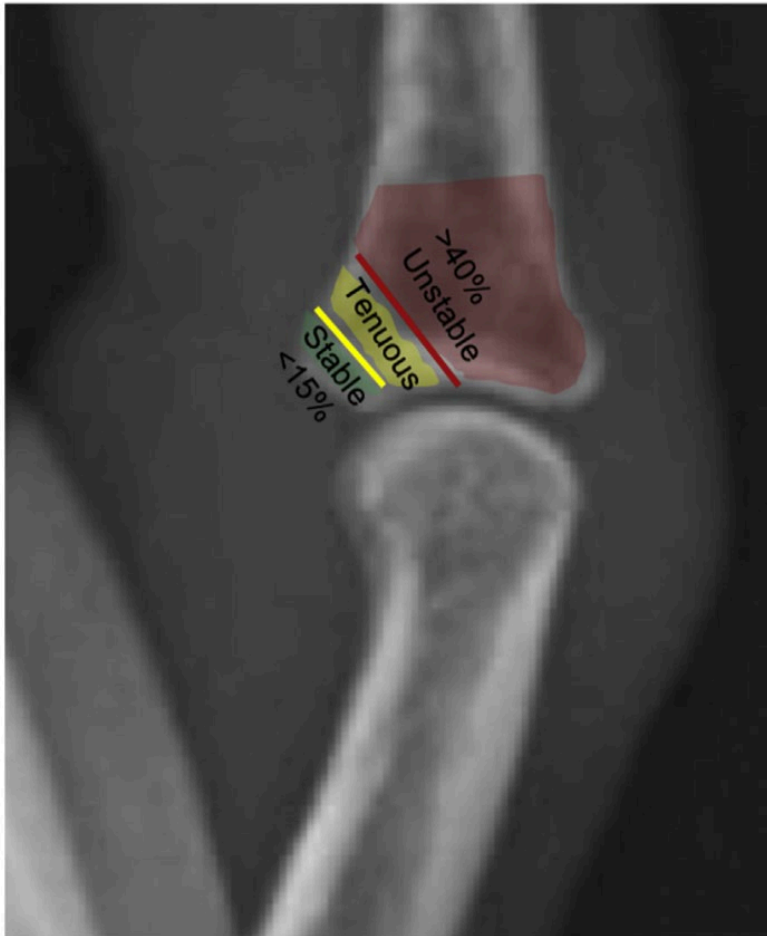


# TREATMENT

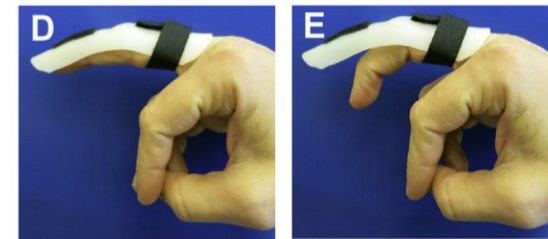
- Early motion
  - Stiffness common
  - **Begin 2-3 days post-injury**
  - Study: early motion vs 4 weeks immobilization
    - **92% vs 36% regained full motion**
- Buddy taping
- Imaging



# PIP FRACTURE-DISLOCATION



- Stability: percentage of joint surface involved
- **Stable**
  - Buddy taping
  - Early motion, RTP as pain permits
  - Immediate active ROM
    - Avoid aggressive PROM initial post-injury period
  - 3-4 weeks: passive ROM, wean from tape
- **Tenuous**
  - Dorsal blocking splint
- **Unstable**
  - Operative treatment





# A WORD ABOUT MCP JOINT DISLOCATIONS

- Hyperextension of index finger most common, dorsal
- Avoid traction, apply volar pressure for dorsal dislocation
- Chinese finger trap
- **May not be reducible**
  - Entrapped volar plate, sesamoid



*O'Neill ES, Qin MM, Chen KJ, Hansdorfer MA, Doscher ME. Dislocation of the metacarpophalangeal joint of the index finger requiring open reduction due to the presence of an intra-articular sesamoid bone. SAGE Open Med Case Rep. 2021 Jun 3;9.*



# SUMMARY

- **Younger, male patients and those with a Bankart lesion, large Hill-Sachs lesion, glenoid bone loss, joint laxity or a positive apprehension sign have a higher shoulder re-dislocation rate.**
- **Immobilization length of time or method does not affect shoulder re-dislocation recurrence, chronic instability or patient outcomes.**
- **Beware the posterior SC joint dislocation, transport seated.**
- **Knee dislocations carry 18% vascular injury rate, 25% peroneal nerve injury rate. Consider a spontaneously reduced knee dislocation when 2 or more ligaments injured.**
- **Most PIP finger dislocations occur dorsally, use Tufskin when reducing.**
- **Patients with shoulder dislocations may return to play the same season after rehabilitation and bracing if no contraindications, however 40% will have a recurrence.**
- **Goal for simple elbow dislocations full ROM 6-8 weeks, avoid flexion contracture.**





**Thank you!**

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