Simplified Musculoskeletal Exams

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Saint Alphonus Ski & Mountain Trauma Conference

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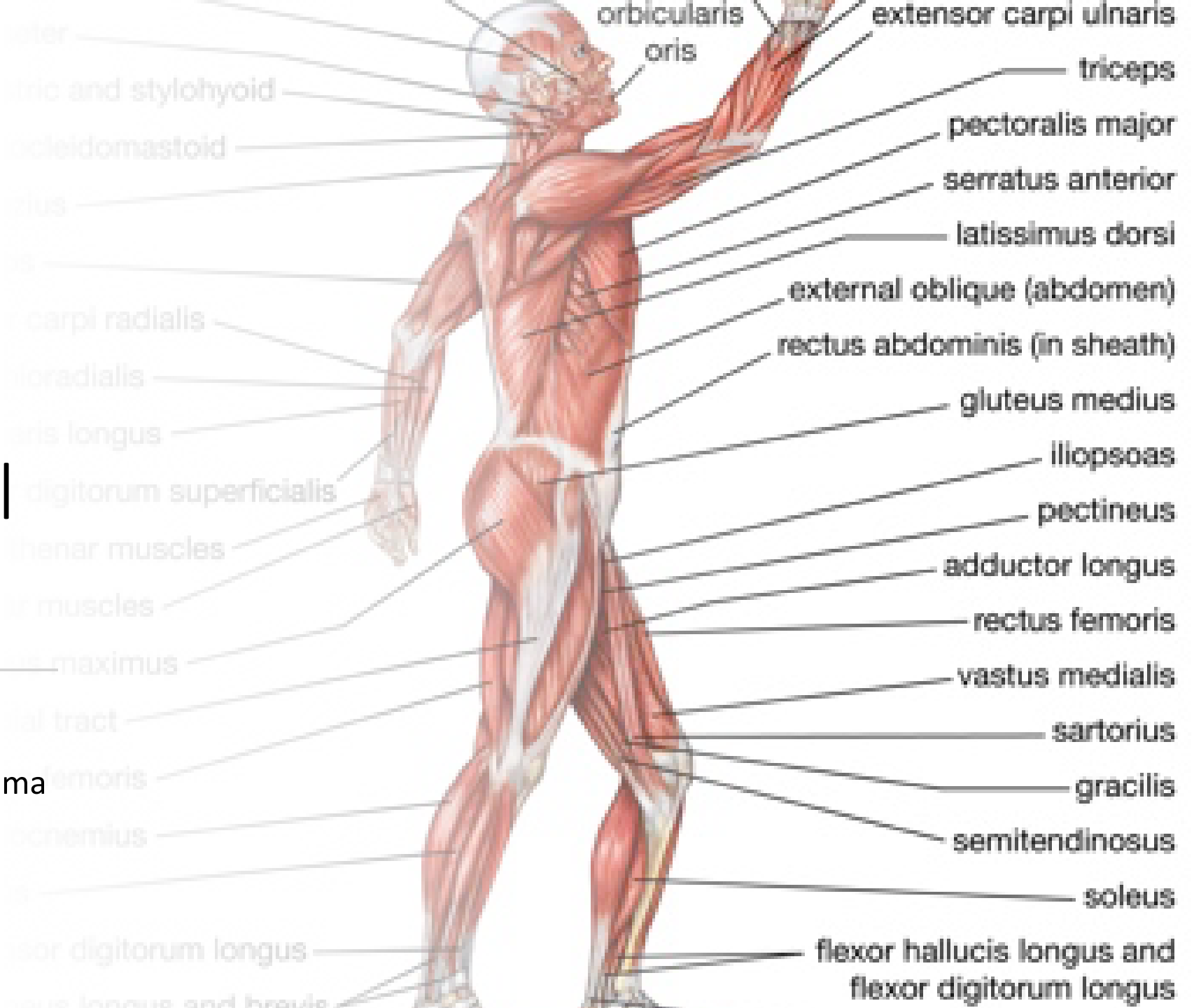

Disclosures

No financial disclosures

Credentials

- Lifetime member of the Wilderness Medicine Society (WMS)
- Fellow of Academy of Wilderness Medicine (FAWM)
- Diplomat in Mountain Medicine (DiMM)
- Have completed 2 Denali National Park Service Ranger backcountry patrols
  - Denali
  - Mooses Tooth
- Current active board member and section editor for Wilderness and Environmental Medicine (WEMJ)
- Sports medicine physician, active in sideline and event coverage

Background

- Musculoskeletal (MSK) injuries occur in any wilderness environment
- Uncertainty to extent of injury is common
  - Ends trips early
  - Escalates rescue or self extrication processes
  - Adds risk to trip/expedition plans
- Questions of how to manage MSK injuries are common
  - Stay or go home?
  - Call for help?
  - Immobilize, make non-weight bearing?
  - Carry out, or walk out?
- Modern rescue concepts involve less packaging and more self extrication by patients with SAR teams

Rationale for this talk & Learning Objectives

- Understand the basic principles of a MSK exam
- Many structures can be involved in injury
- Isolate a lesion
- Create and narrow a Differential Diagnosis (DDx)
- Use clinical judgement to determine the most appropriate patient management for the conditions
- Improve field management
- Better determine disposition
- Ideally, mitigate risk of trip, life, or limb issues

Will NOT Discuss

- Specifics of anatomy and physiology
- Specifics of definitive injury management
- Specifics of fracture management
- Spine fractures/immobilization/extrication
- Splinting techniques
- Bleeding or dismemberment
- Teeth
- Concussion
- Extrication methods
- Cervical spine issues

Wilderness Medical Society
Clinical Practice Guidelines- Spinal Cord Protection 2024

WMS CPG Spinal Cord Protection -2024

Wilderness & Environmental Medicine

Wilderness Medical Society

Impact Factor: 1.4 | Journal Homepage | Submit Paper

Free access | Research article | First published online February 11, 2024

Wilderness Medical Society Clinical Practice Guidelines for Spinal Cord Protection: 2024 Update

Seth C. Hawkins, MD, NREMT, Jason Williams, BS, NRP, [...], and Robert Quinn, MD +2 View all authors and affiliations

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Abstract

The Wilderness Medical Society reconvened an expert panel to update best practice guidelines for spinal cord protection during trauma management. This panel, with membership updated in 2023, was charged with the development of evidence-based guidelines for management of the injured or potentially injured spine in wilderness environments. Recommendations are made regarding several parameters related to spinal cord protection. These recommendations are graded based on the quality of supporting evidence and balance the benefits and risks/burdens for each parameter according to American College of Chest Physicians methodology. Key recommendations include the concept that interventions should be goal-oriented (spinal cord/column protection in the context of overall patient and provider safety) rather than technique-oriented (immobilization). An evidence-based, goal-oriented approach excludes the immobilization of suspected spinal injuries via rigid collars or backboards.

Articles In the Same Collection(s):

Collection: Wilderness Medicine Clinical Practice Guidelines

Questions Guide the Exam

- Brief description of the mechanism, what hurts and where
  - Have patient point to where it hurts
  - Global pain is less helpful
  - Single finger for point of max tenderness
  - Consider associated benign soft tissue injuries
- Ask about neurologic function, strength and ROM
  - What structures/injuries can lead to those deficits?
  - Are they dangerous or life/limb threatening, or just uncomfortable?
- Examine areas that pertain to the injury and function
- Use multiple exams to triangulate a problem
- Compare one side to the other if possible
- Check stability of joints
- Evaluate joints above and below
- Use special tests to support differential diagnosis

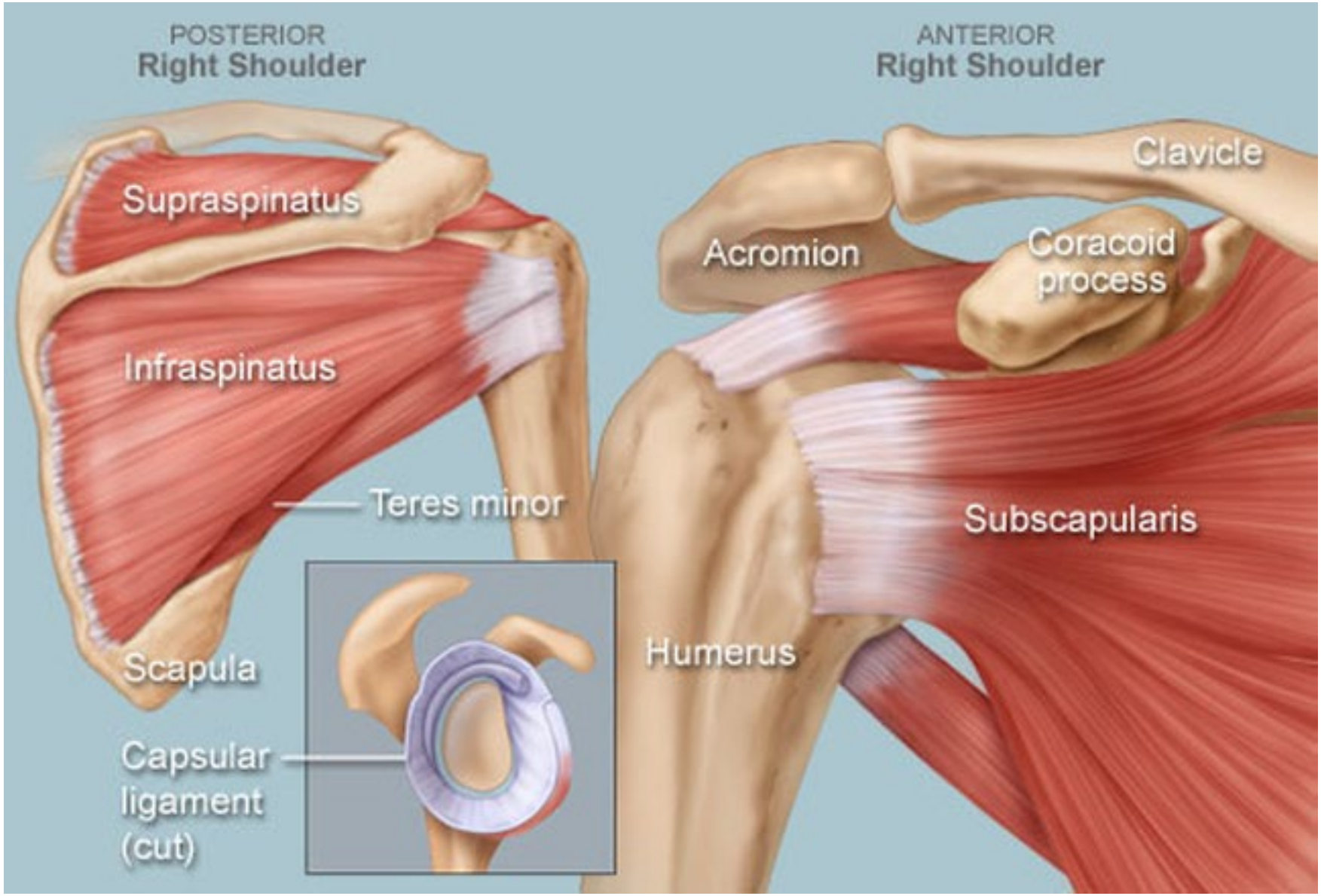
Exam Overview

- **Appearance**
  - Deformity
  - Skin changes
- **Range of motion**
  - Gait, stance, transfers
  - Active vs passive
  - Painful or loss of function
- **Point tenderness**
  - Press on structures
  - Body landmarks
- **Strength**
  - Against resistance
- **Neurovascular structures**
  - DTR’s
  - Pulses
  - Provocation
- **Special tests**
  - Joint specific
  - Stability
  - Provocation

Isolating the Lesion

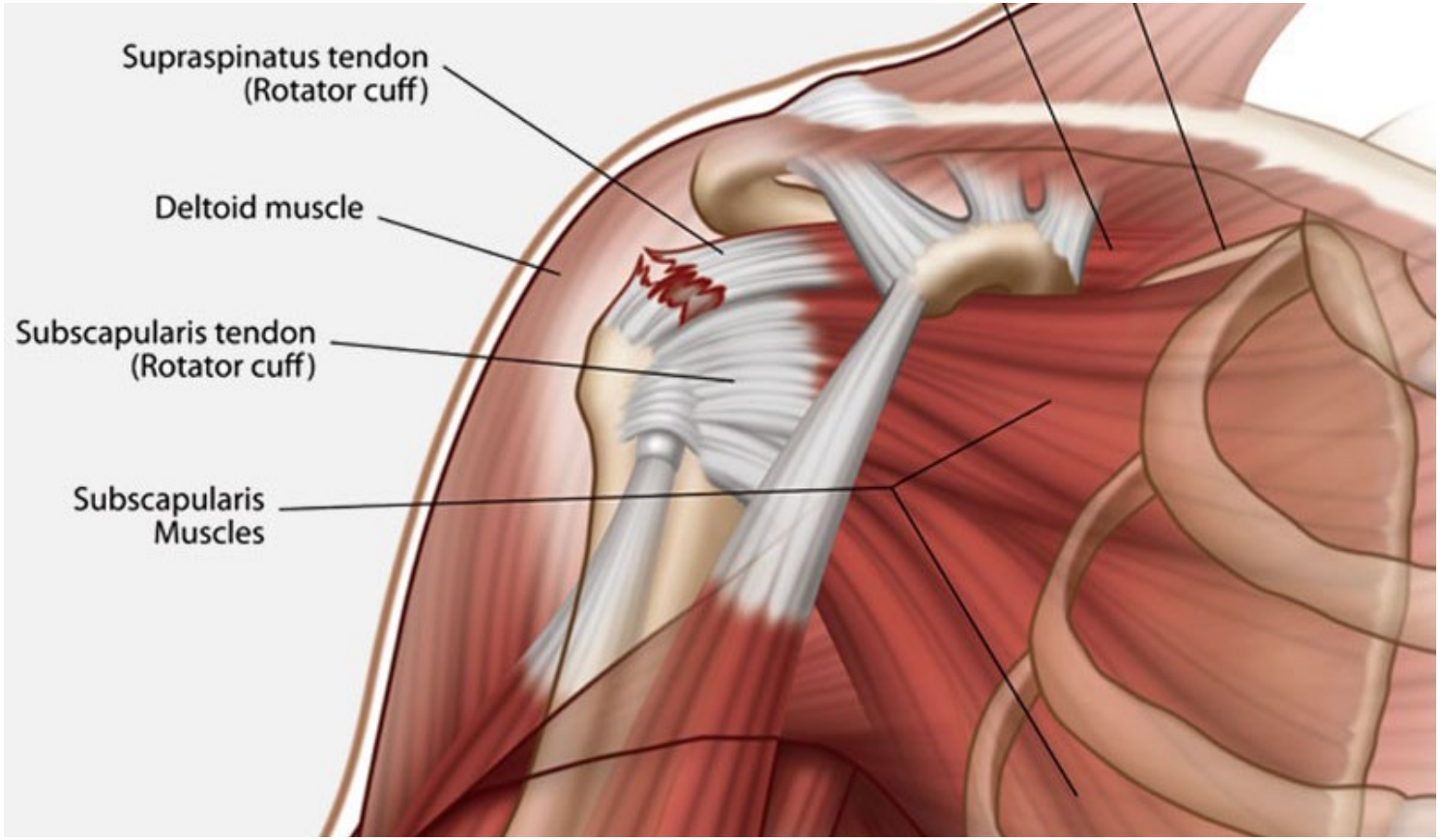
- Bone
- Ligament
  - Origin/Insertion
- Tendon
  - Origin/Insertion
- Muscle
- Bursa
- Neurologic
- Vascular

Shoulder


POSTERIOR
Right Shoulder
ANTERIOR
Right Shoulder
Supraspinatus
Infraspinatus
Teres minor
Scapula
Capsular ligament (cut)
Humerus
Clavicle
Acromion
Coracoid process
Subscapularis

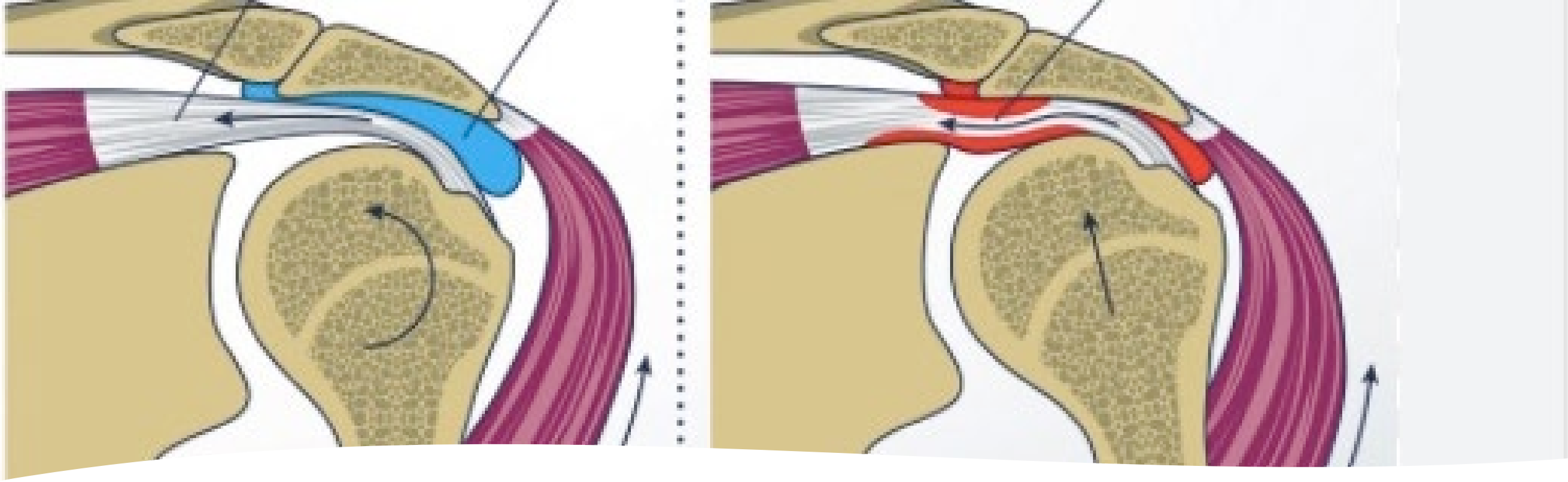
Shoulder Common Issues

- Fracture
  - Clavicle
  - Humeral head
  - Proximal humerus
- Tendon strain
- Tendon rupture- more typical than muscle body tear
  - Rotator cuff
    - Partial vs complete
- Impingement
- Sprain
  - AC joint



Considerations

- Weakness
  - Suggests tendon tear
- Pain
  - Suggests strain
- Both
  - May be painful and weak
  - May be weak due to pain



Shoulder Impingement

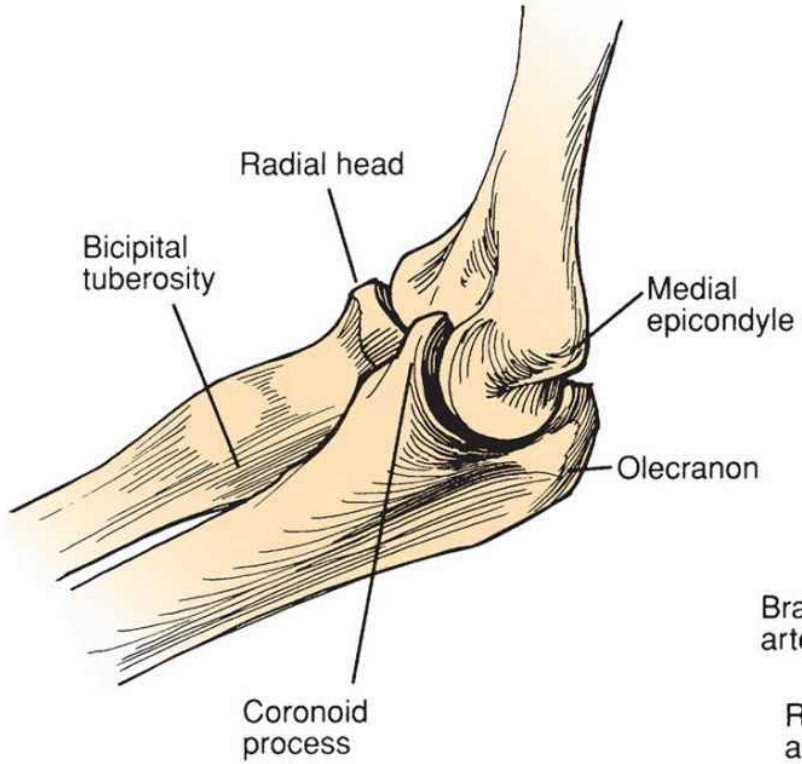
- Compression of soft tissue structures between humeral head and acromion
- Unstable musculature
- Two types of impingement
    1. Bursa Tissue
    2. Tendinopathy
- Painful range of motion
    - Overhead (forward flexion)
    - Abduction “painful arc”
    - Posterior reach (behind back)

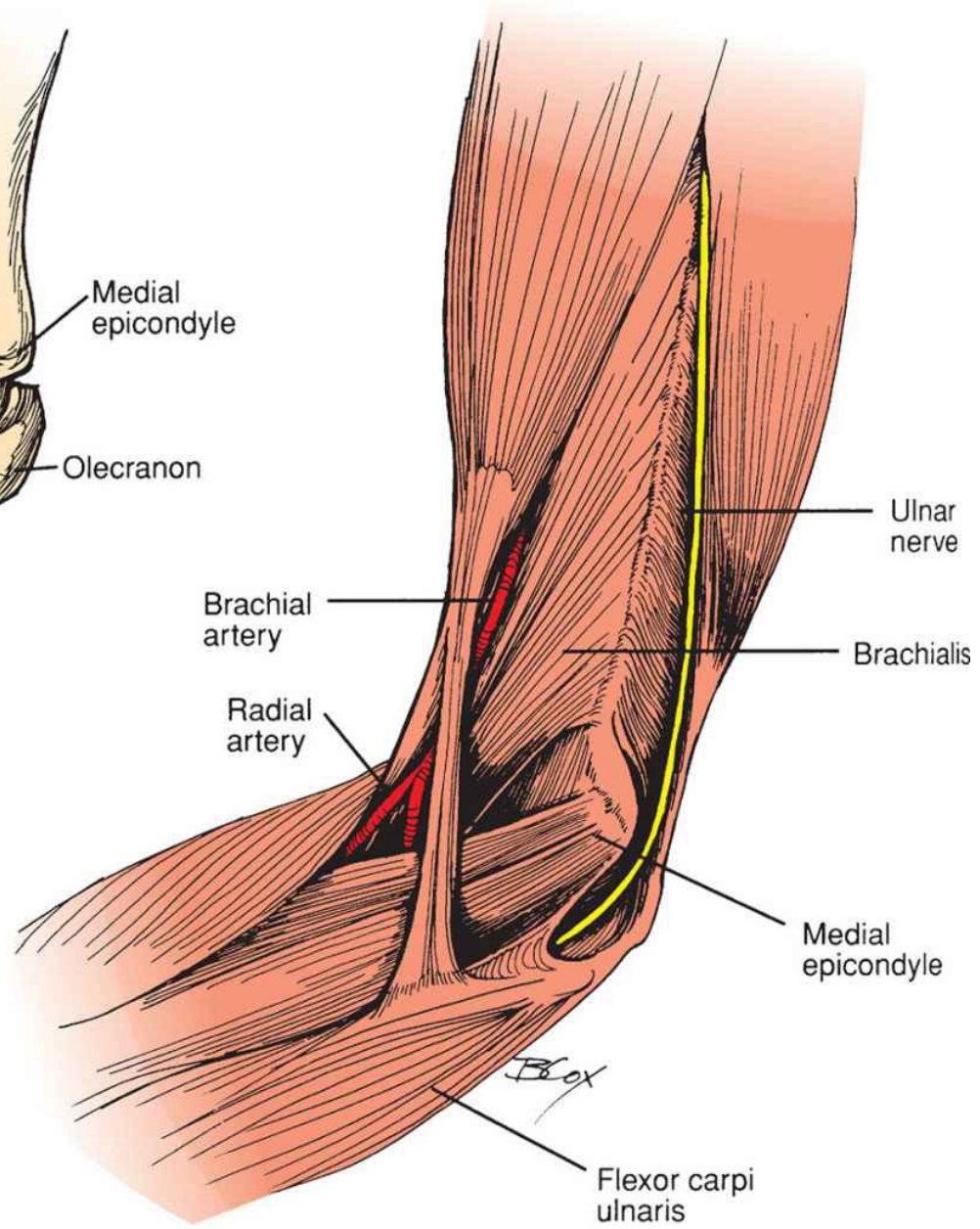
Impingement Provocative Tests

Neer’s

Hawkin’s

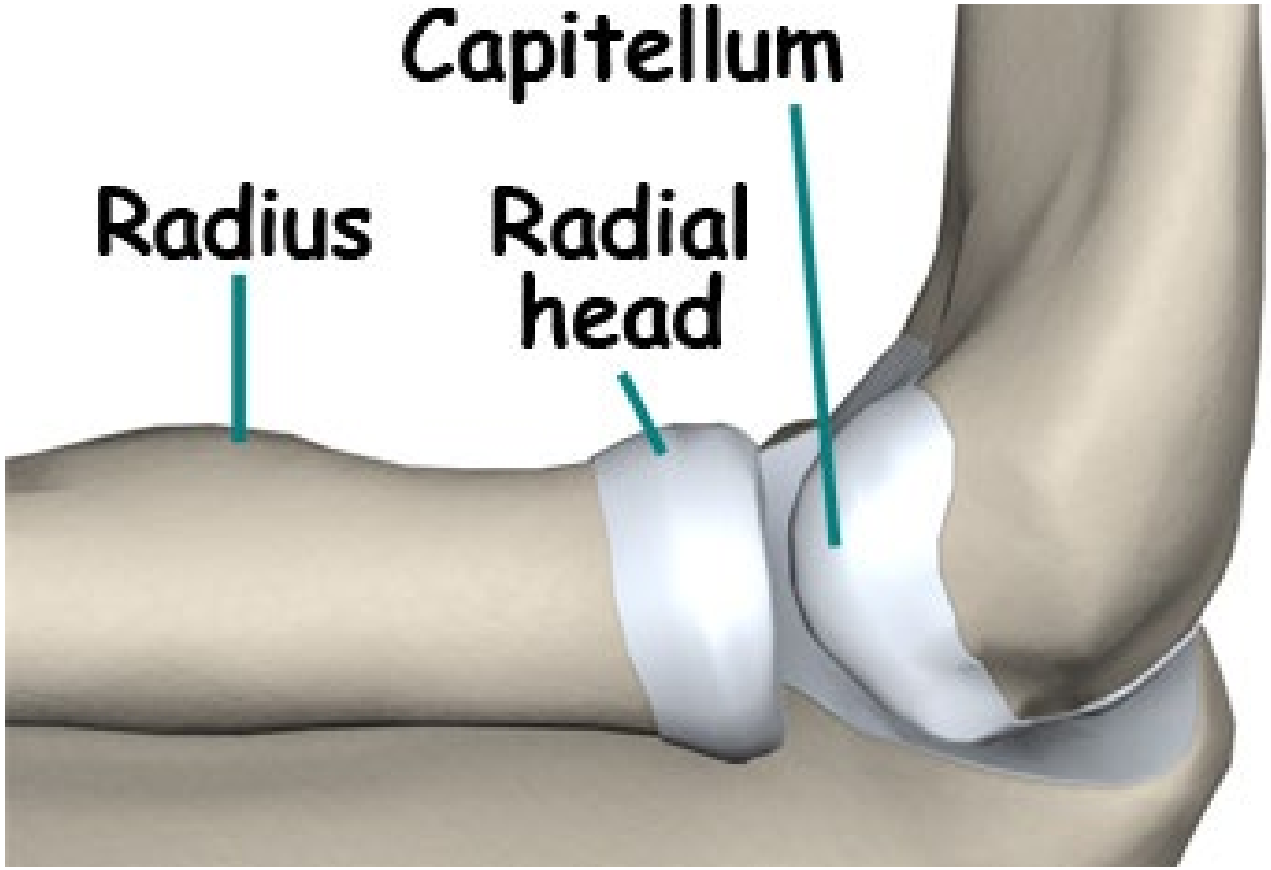
Elbow


Radial head
Bicipital tuberosity
Medial epicondyle
Olecranon
Coronoid process


Ulnar nerve
Brachial artery
Brachialis
Radial artery
Medial epicondyle
Flexor carpi ulnaris

Elbow Common Issues

- Fracture
  - Radial head
  - Supracondylar
  - Rarely olecranon
- Sprain
  - Ulnar collateral ligament
- Strain/Overuse
  - Medial/Lateral epicondylitis
- Bursitis
  - Olecranon bursitis
- Peripheral nerve entrapment
  - Ulnar neuropathy



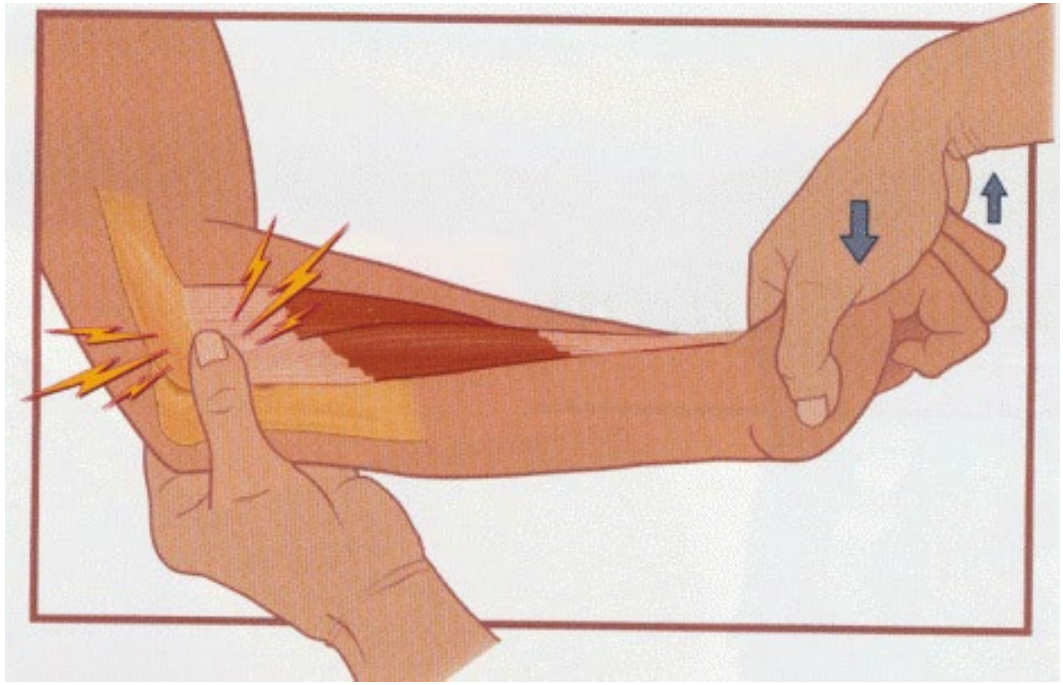
Special Tests & Considerations

- Palpate
  - Radial head
  - Medial & lateral epicondyles
- Flexion
- Extension
  - Look for extension lag-
    - Suggests fluid in the joint
    - Possible occult fx
- Valgus stress to UCL
  - May demonstrate acute vs chronic issue

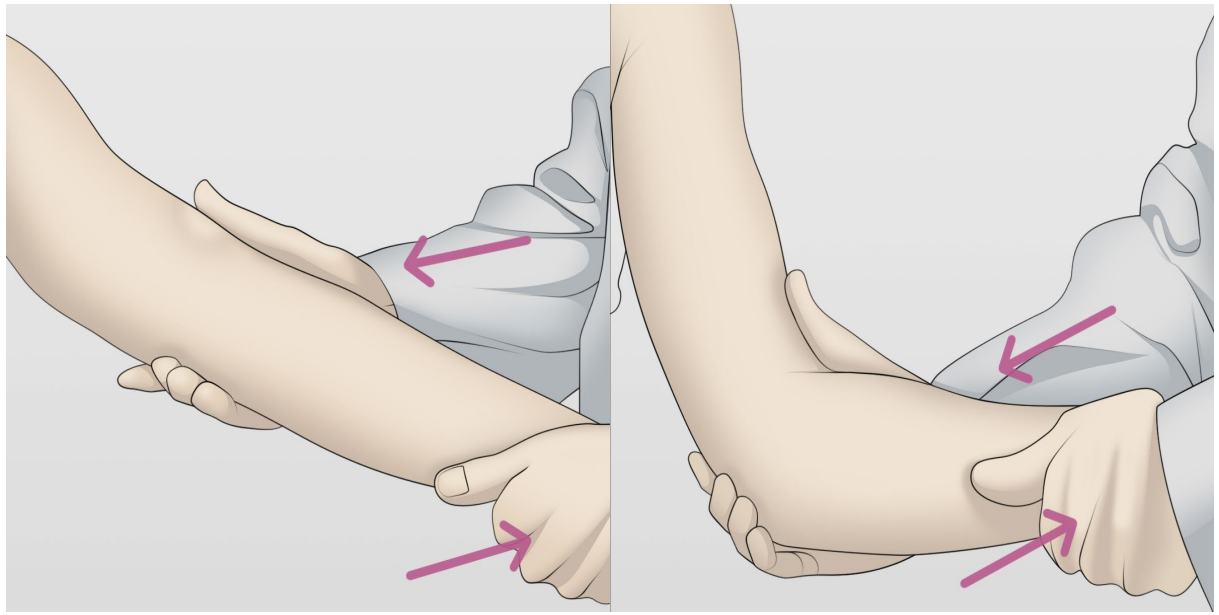
Elbow Tendon Provocative Tests

Lateral epicondylitis

”Cozen’s test” – thumb on lateral epicondylitis with resisted wrist extension yields pain



Medial or lateral epicondylitis

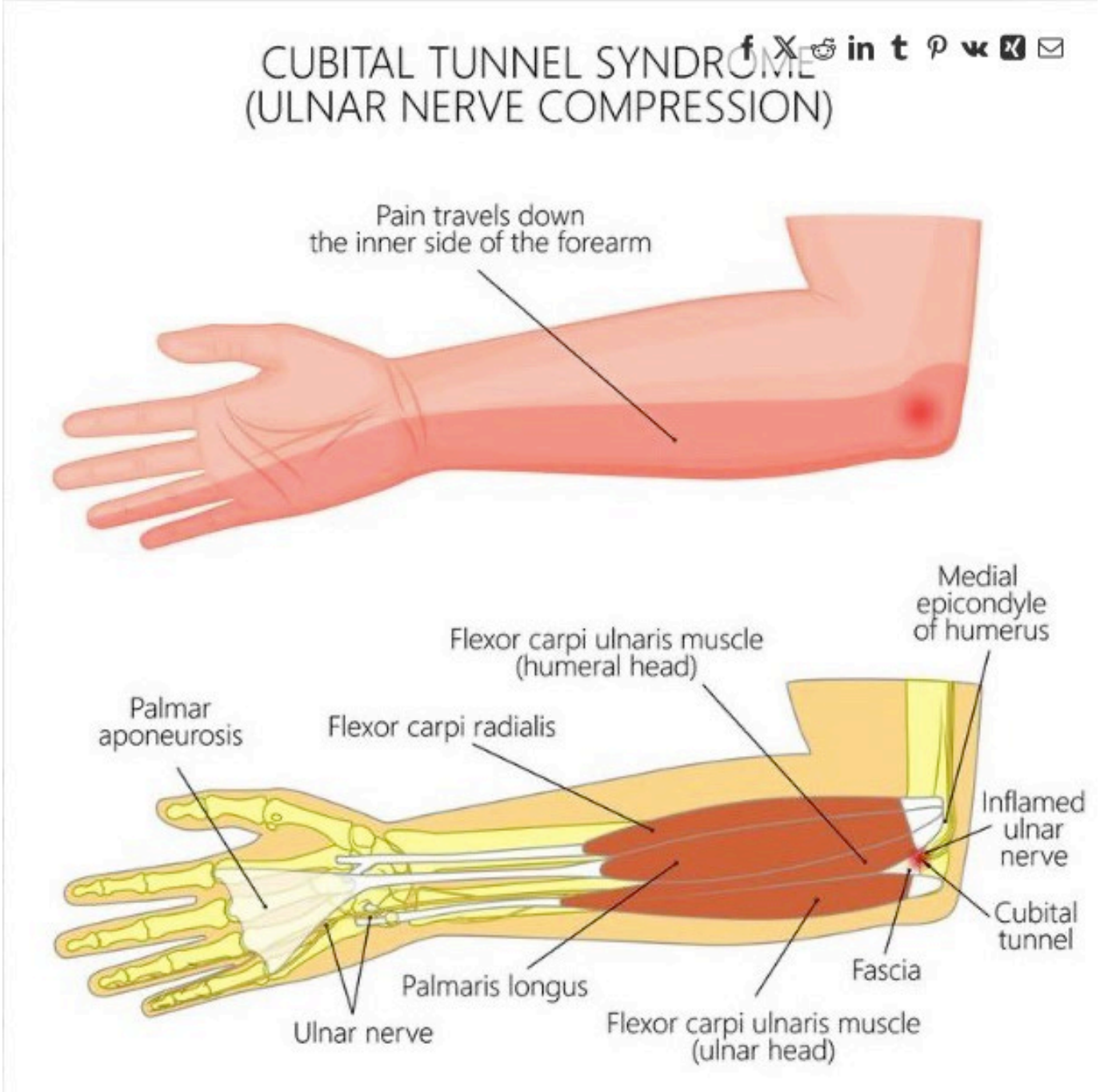


Resisted pronation

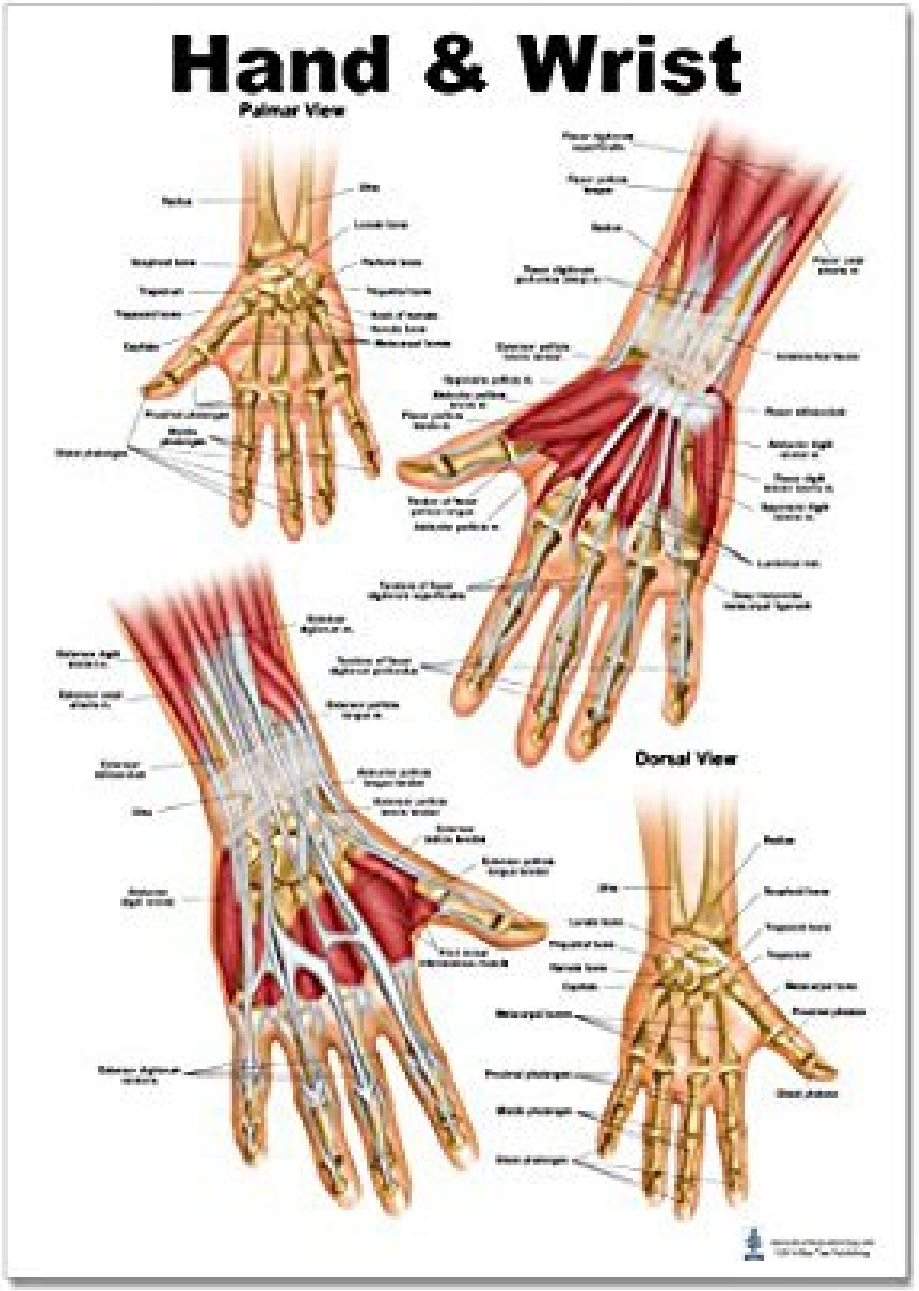
Resisted supination

Ulnar Neuropathy

Peripheral nerve entrapment at medial elbow



Wrist/Hand/Finger



Common Issues

Wrist
Hand
Finger

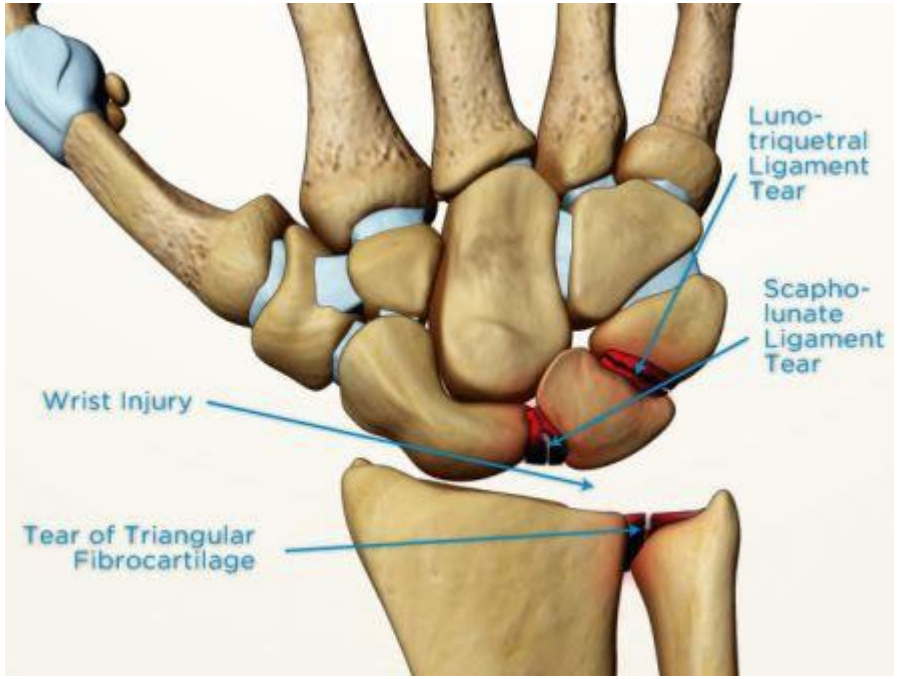
- Fracture
  - Scaphoid
  - Other wrist bone
  - Metacarpal
  - Volar plate
- Sprain
  - Scapholunate ligament

- Strain
  - Forearm musculature
  - Tendon rupture
    - Jersey vs Mallet
- Peripheral Nerve entrapment
  - Carpal tunnel
- Tenosynovitis
  - Radial styloid

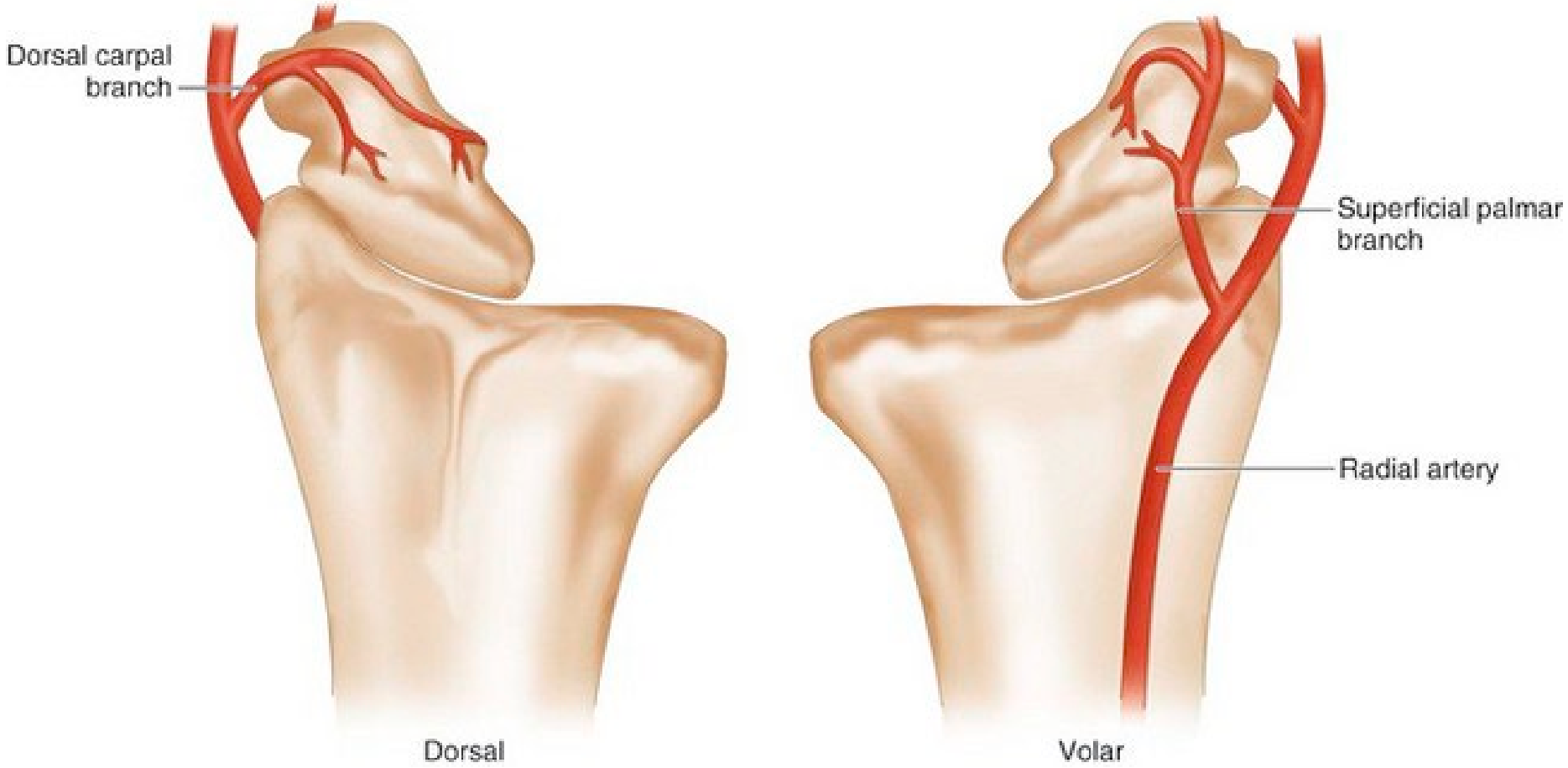
Wrist Injuries

Scaphoid fracture

Ligament injuries



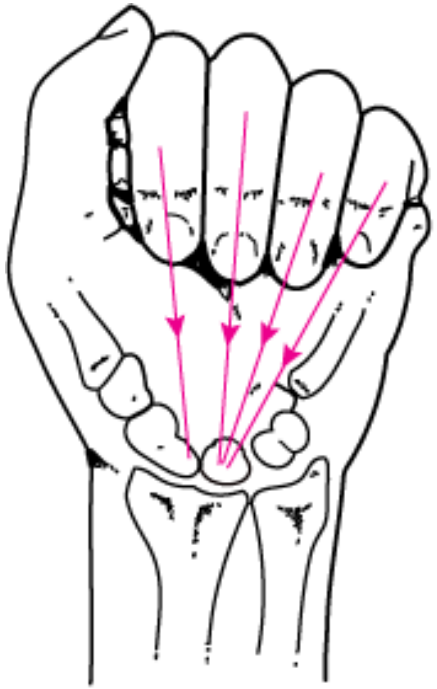
Scaphoid Blood Supply is poor
Distal to proximal watershed based on 3rds - distal, middle, proximal 3rd



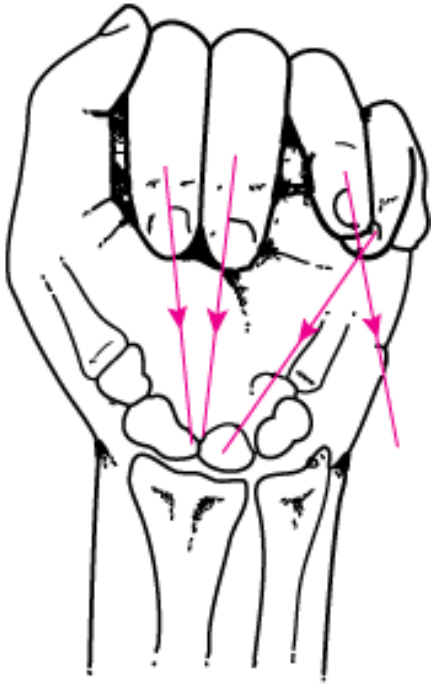
Metacarpal Fractures

Malrotation deformity

Noted by comparing both hands in finger flexion



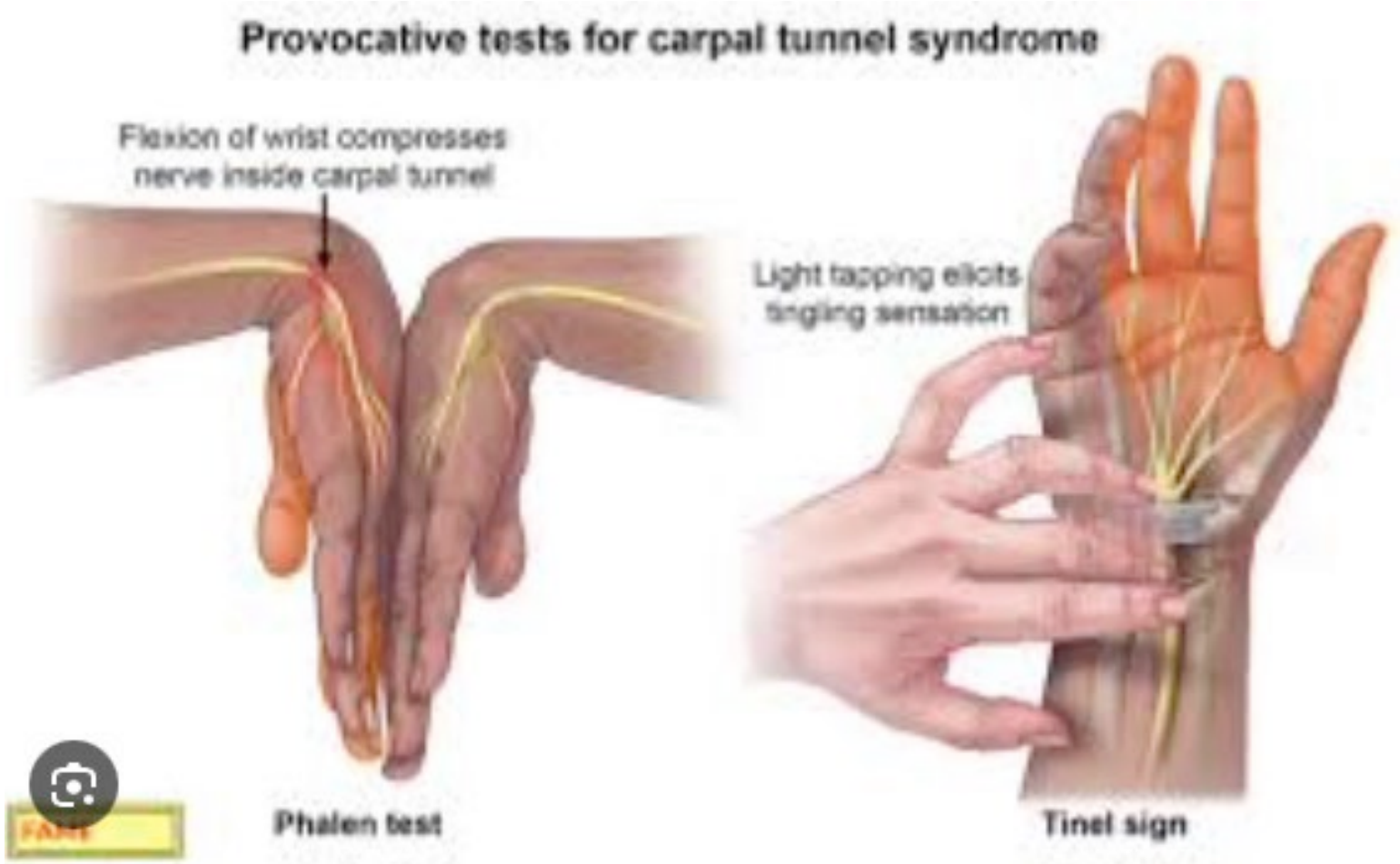
Normal



Rotational Deformity

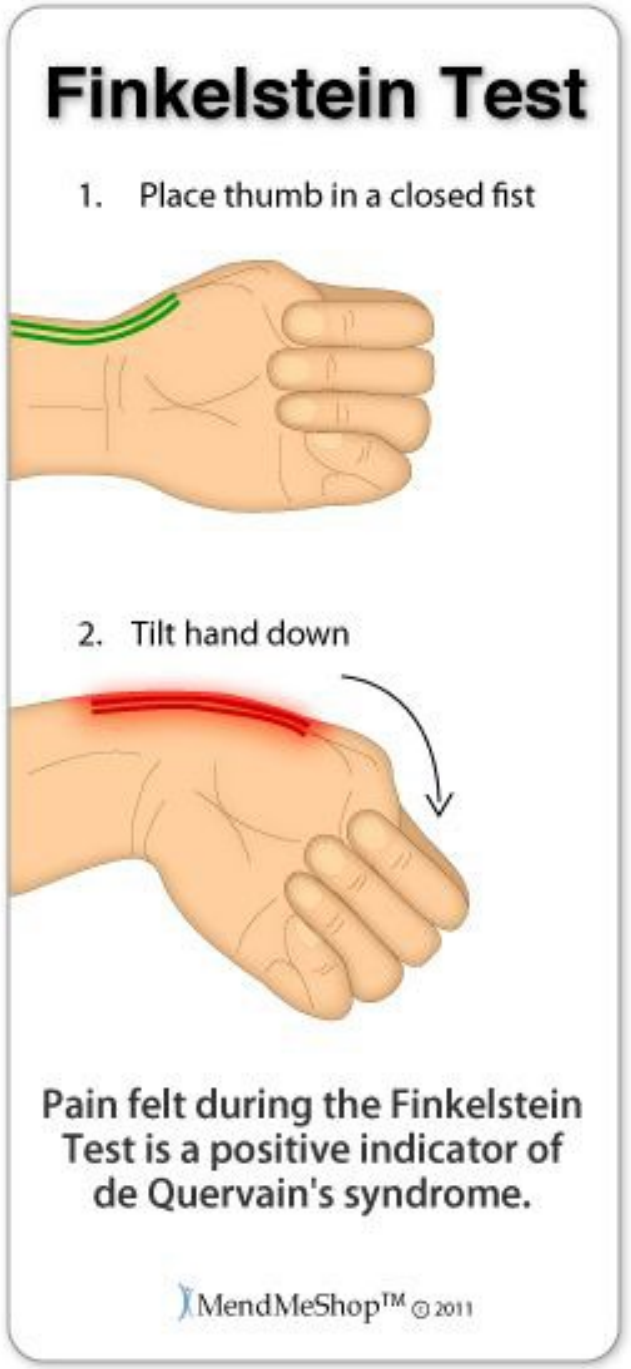
Carpel Tunnel Syndrome

Peripheral nerve entrapment at wrist (volar)

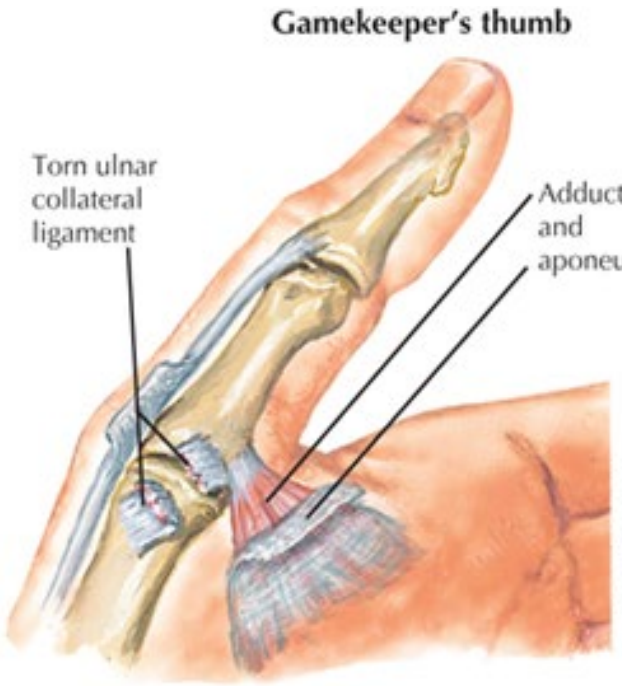


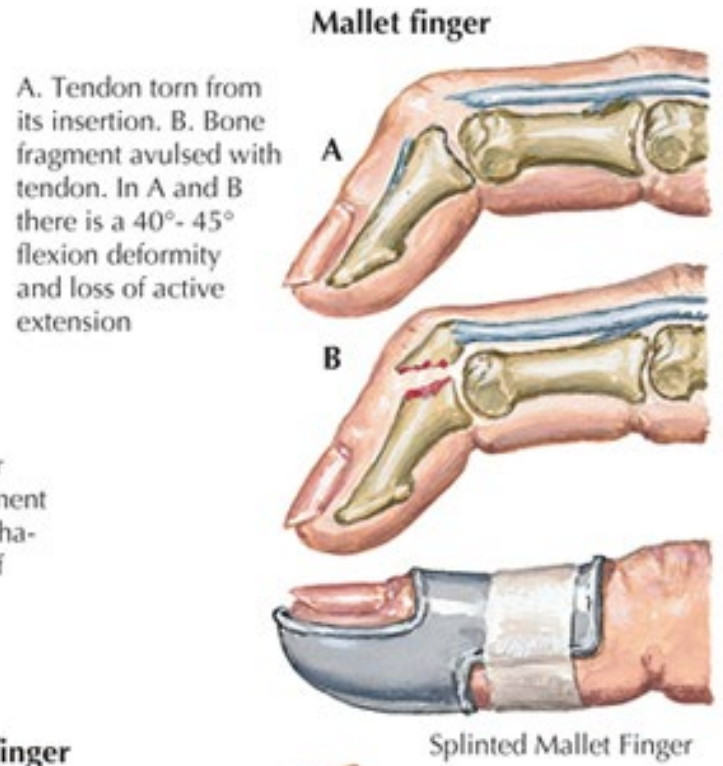
Tenosynovitis (Tendon Sheath)

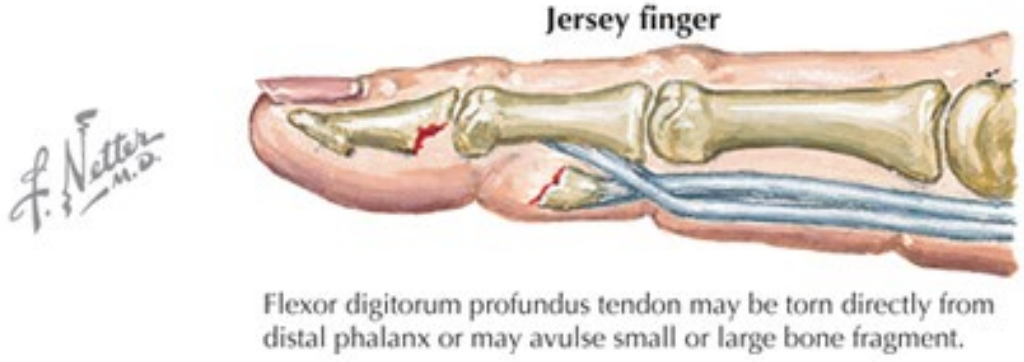
- DeQuervain's tenosynovitis
- Radial styloid tenosynovitis
- Overuse or acute traumatic
- Hurts over the radial styloid with compression of the tendon sheath
- Finkelstein's is highly suggestive.
  - Thumb inside fist with ulnar deviation yields pain over the radial wrist



Finger Injuries

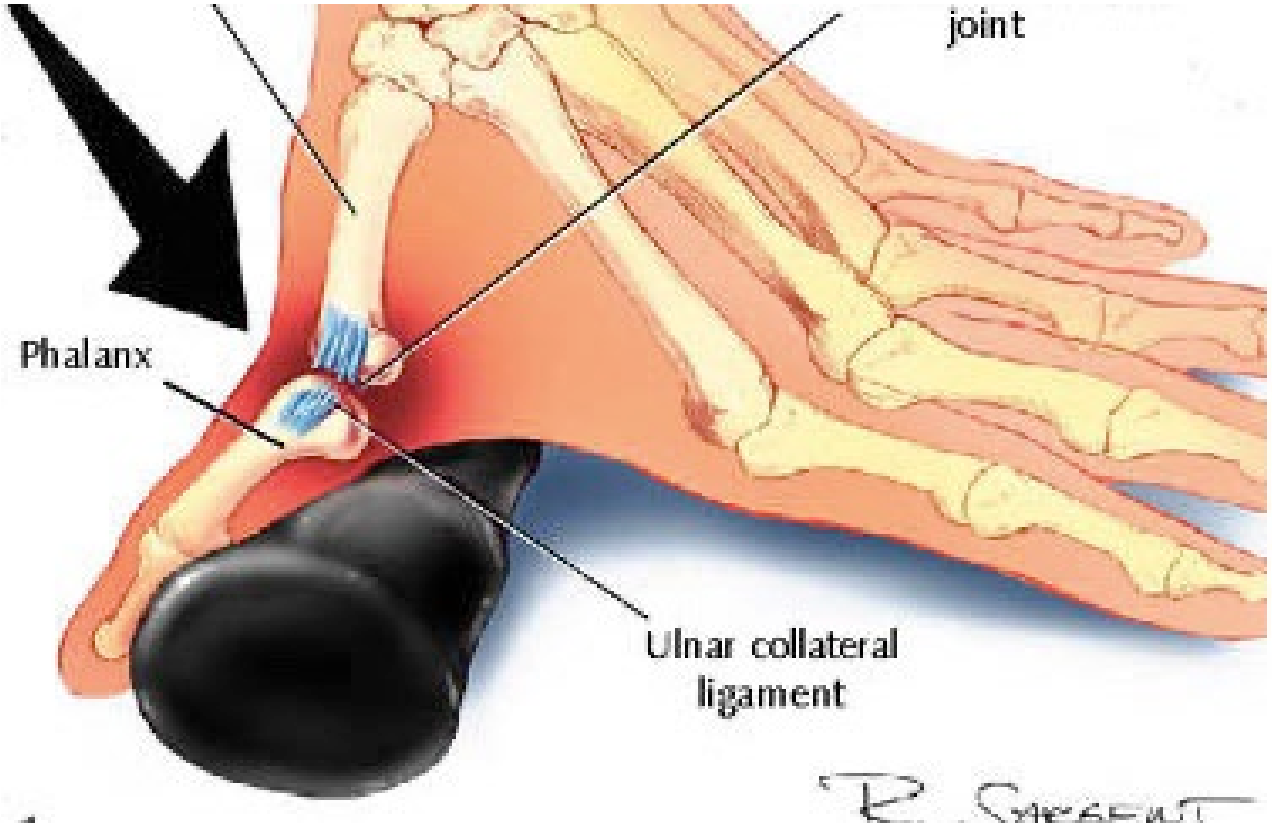




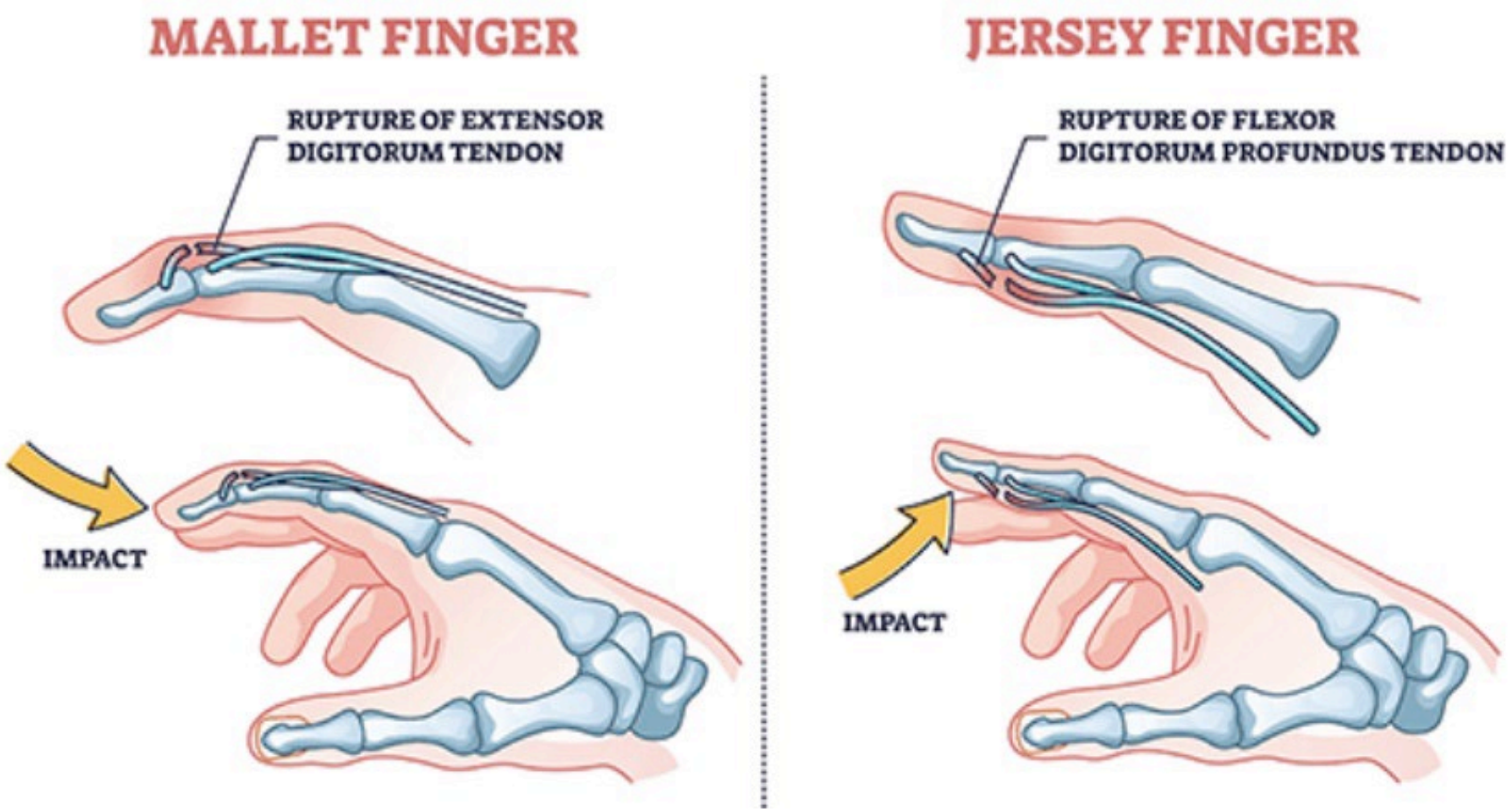


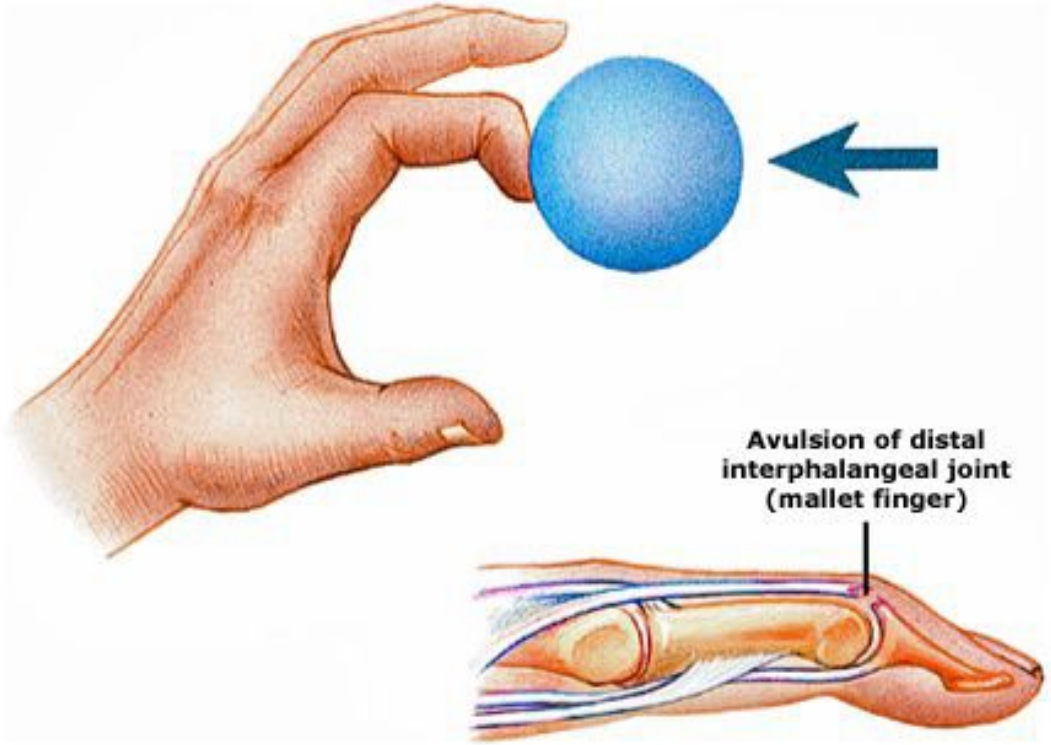
Skier's Thumb (Gamekeeper's Thumb) Injury (rupture) of the UCL

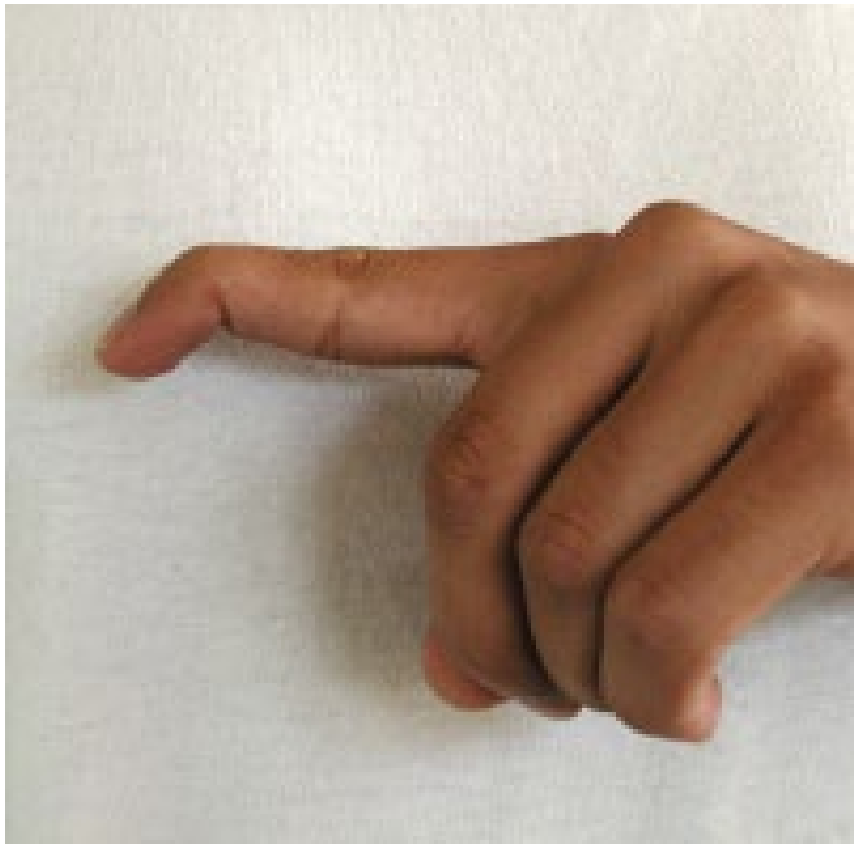
Test with gentle valgus stress
Looking for pain and laxity
Similar to testing MCL of the knee



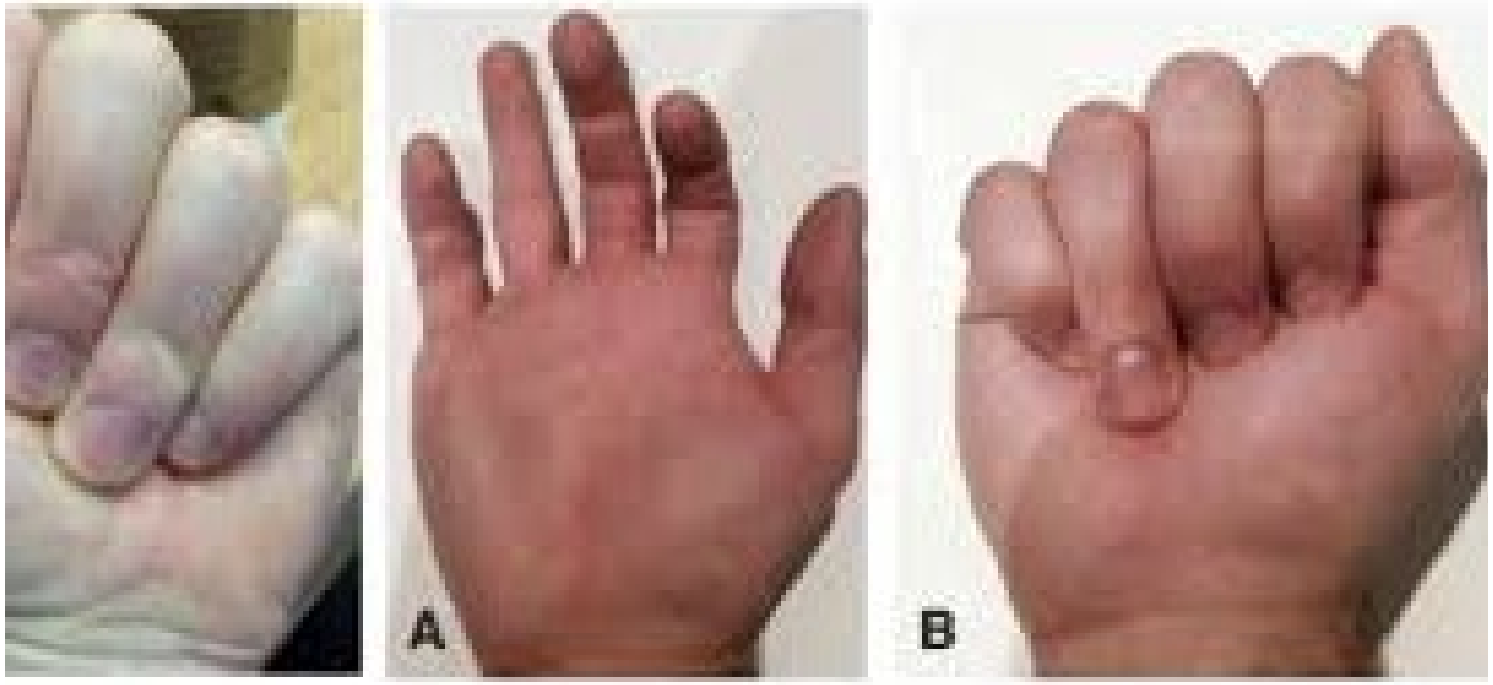
Finger Tendon Rupture







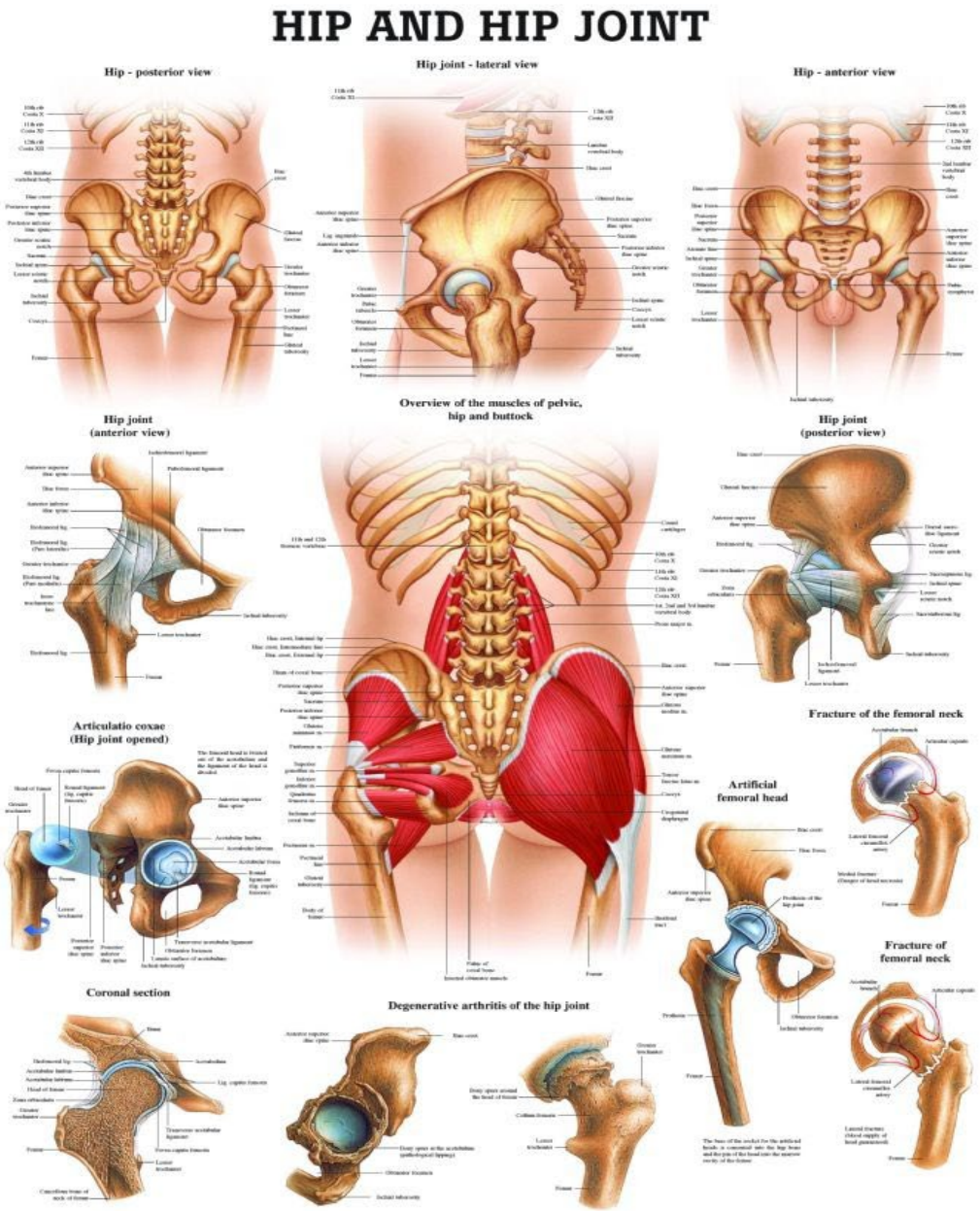
Mallet Finger



Jersey Finger

- May look similar in resting position to mallet finger
- Unable to flex finger due to tendon rupture
- Evaluate active motion ability
- Assess strength, or loss of strength against resistance

Hip


HIP AND HIP JOINT
Hip - posterior view
Hip joint - lateral view
Hip - anterior view
Overview of the muscles of pelvic, hip and buttock
Hip joint (anterior view)
Hip joint (posterior view)
Articulatio coxae (Hip joint opened)
Fracture of the femoral neck
Artificial femoral head
Coronal section
Degenerative arthritis of the hip joint
Fracture of femoral neck

Hip Common Issues

- Intra-articular vs extra-articular
- Fracture
- Impingement
- Strain
- Sprain
- “Bursitis”
  - Greater trochanter pain syndrome
  - Iliopsoas bursitis

Posterior vs Anterior Hip

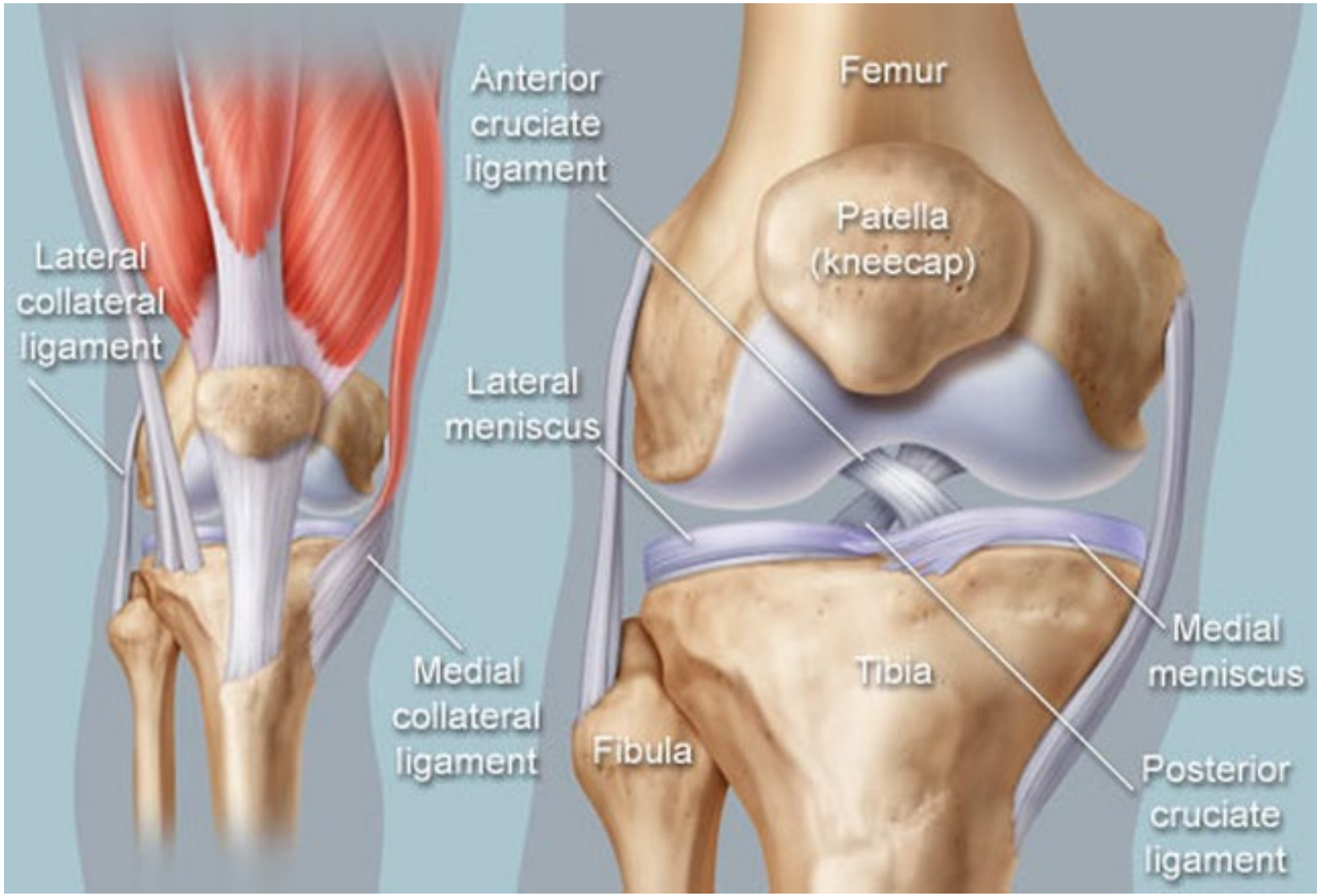
FABER – butt pain

Flexed abduction with internal rotation for posterior hip (SI joint)

FADIR – anterior hip pain

Flexed adduction with internal rotation for impingement (hip joint)

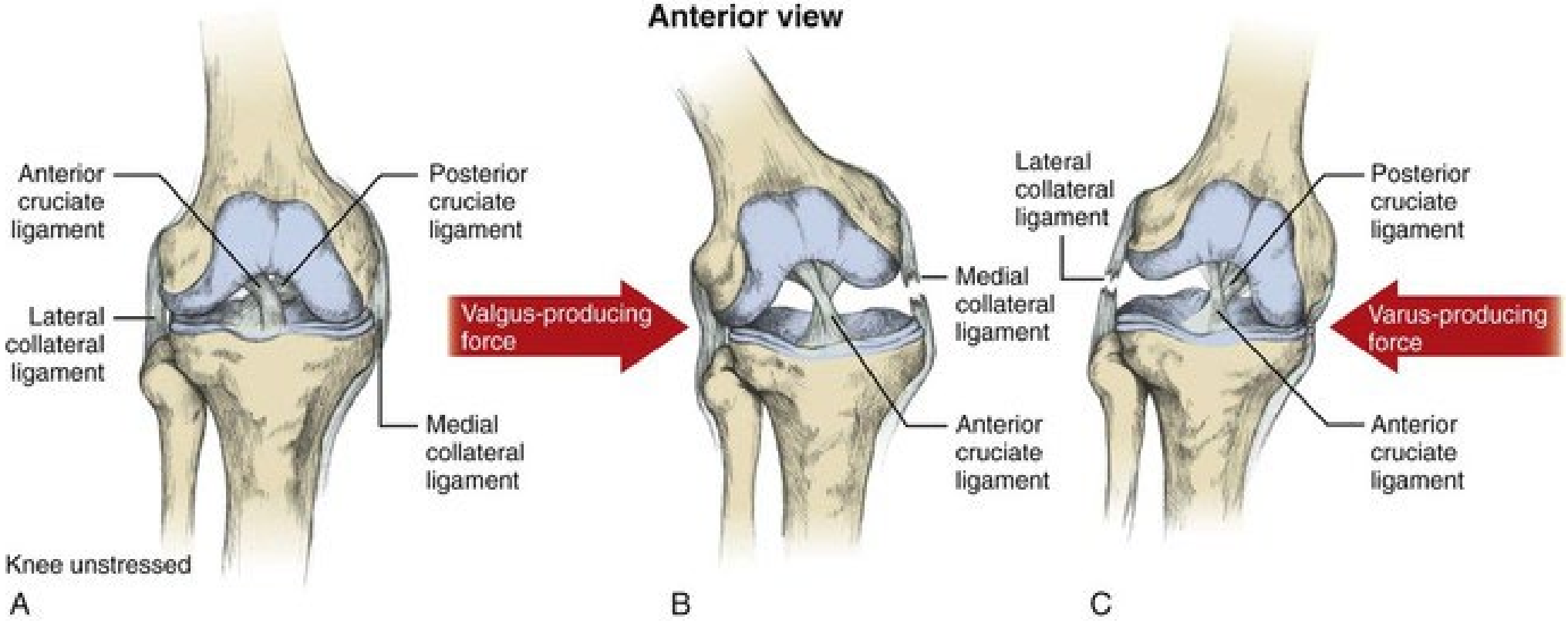
Knee


Anterior cruciate ligament
Femur
Patella (kneecap)
Lateral collateral ligament
Lateral meniscus
Medial collateral ligament
Tibia
Medial meniscus
Fibula
Posterior cruciate ligament

Knee Common Issues

- Fracture
- Meniscus
  - Tear
  - Sprain
- Ligamentous
  - ACL
  - PCL
  - LCL
  - MCL

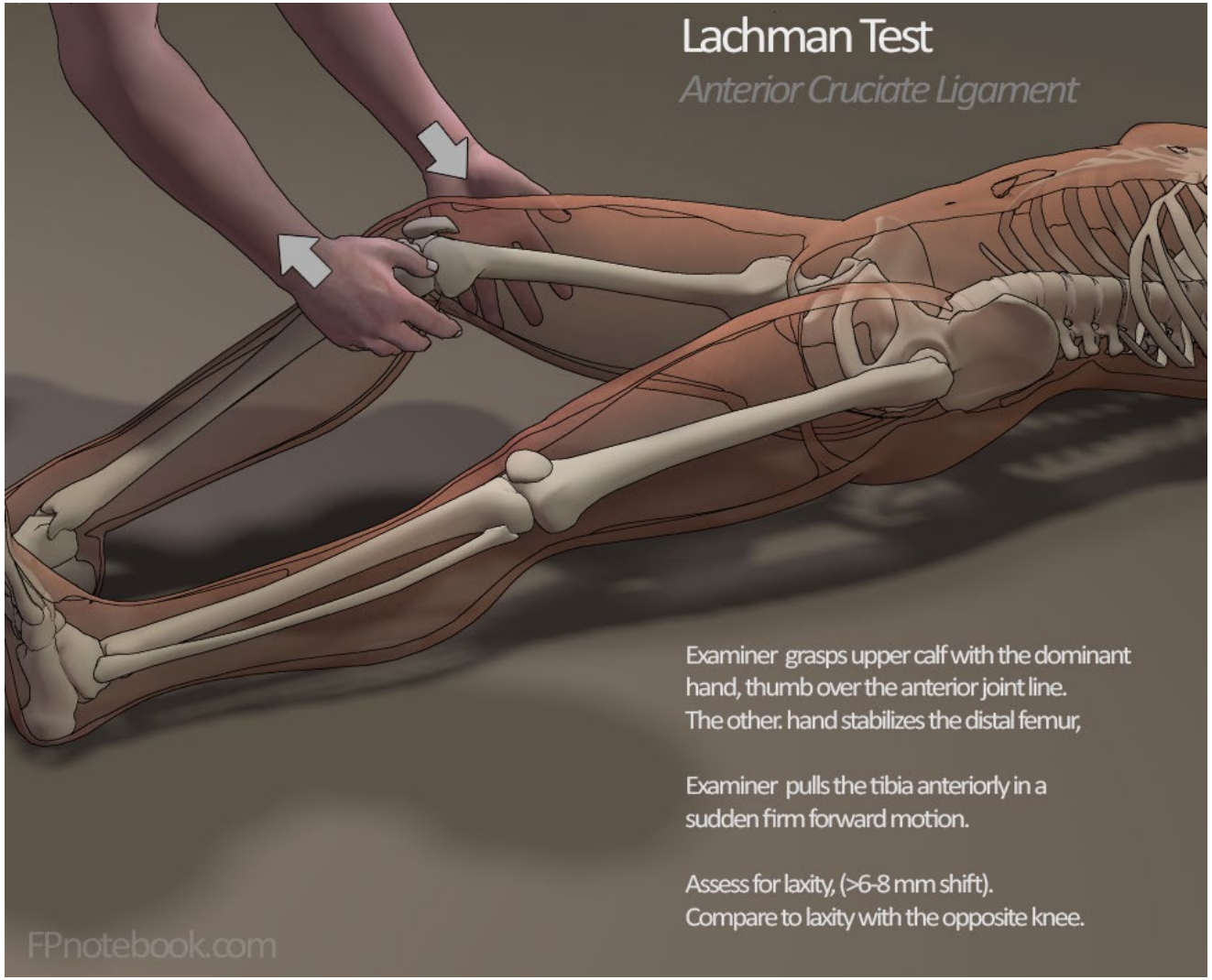
- Tendinopathy
  - Patellar tendon
  - Quadriceps
- Patellofemoral
  - Anterior/Inferior



Knee Valgus and Varus Stress

ACL Stability

- Additional clues
- Swelling
- Feels unstable
- Loaded, planted, twisting MOI



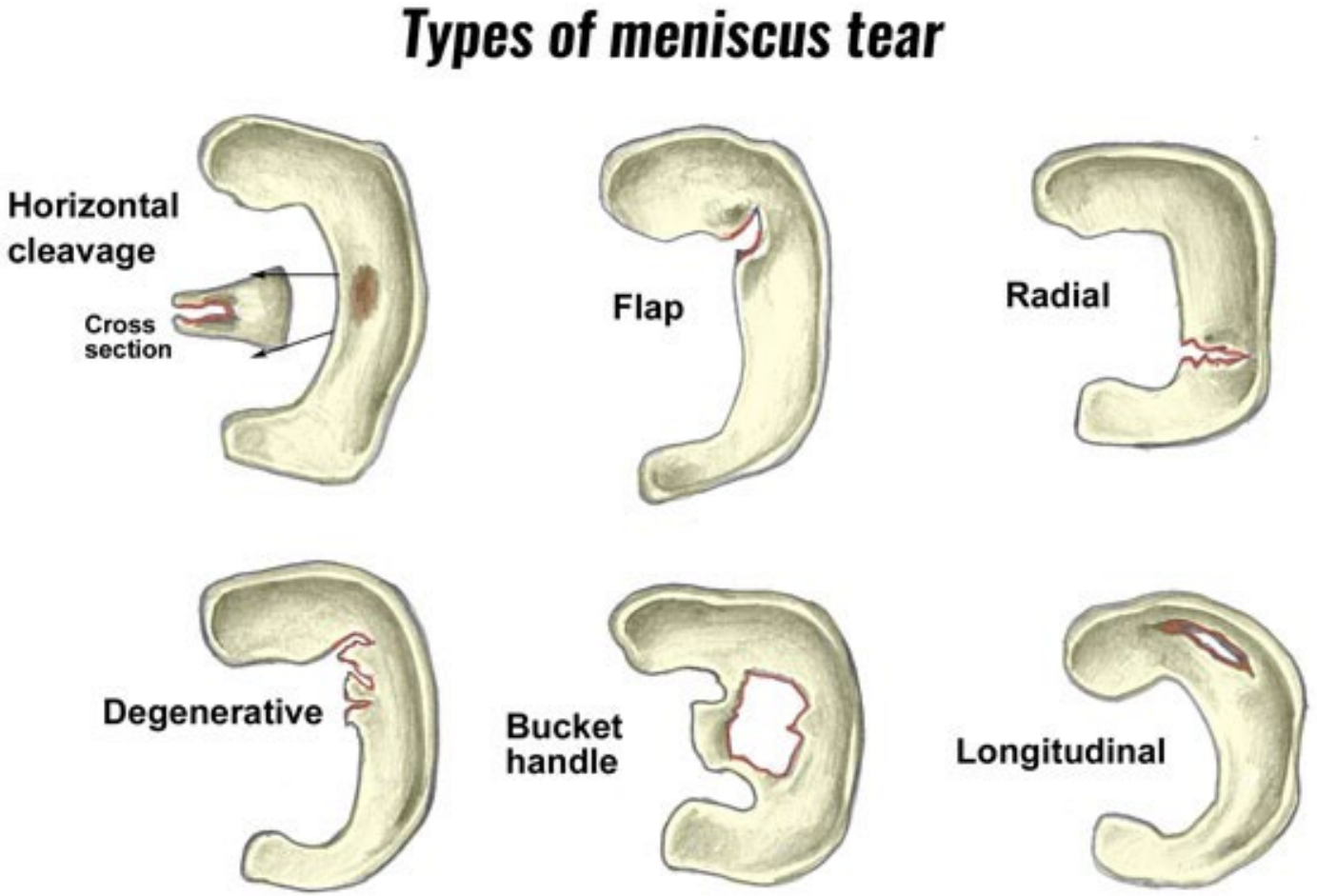
Meniscus Provocative Tests

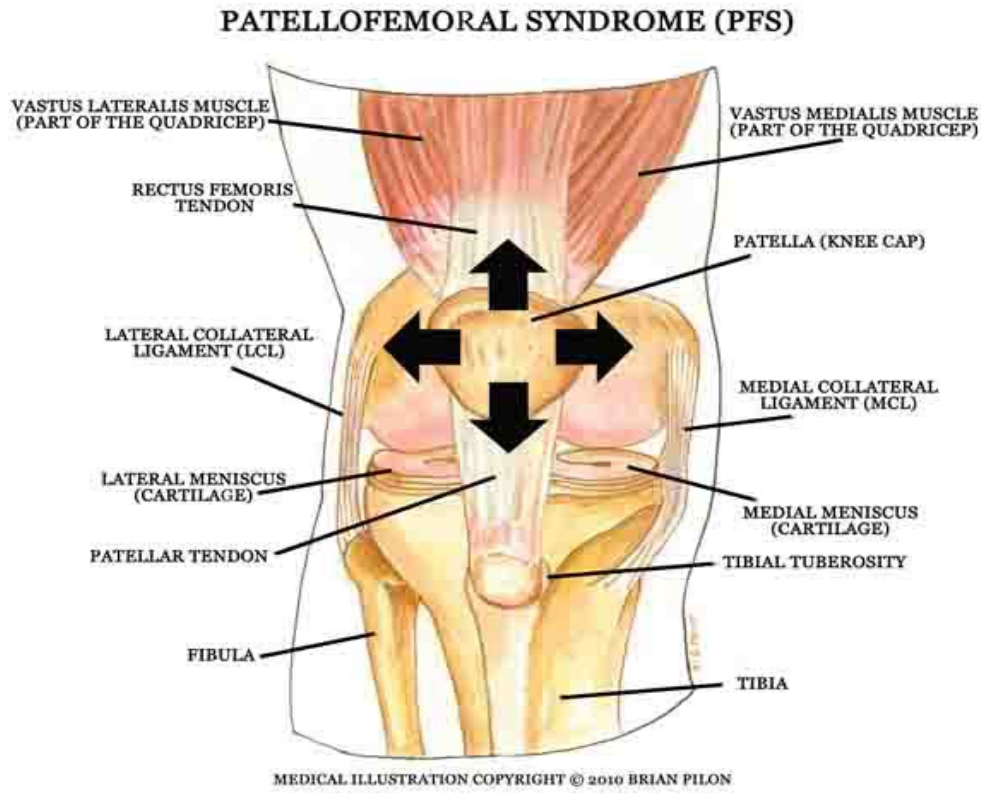
"McMurray's Test"

Types of Meniscus Tears

Patient complains of mechanical symptoms & common pain patterns

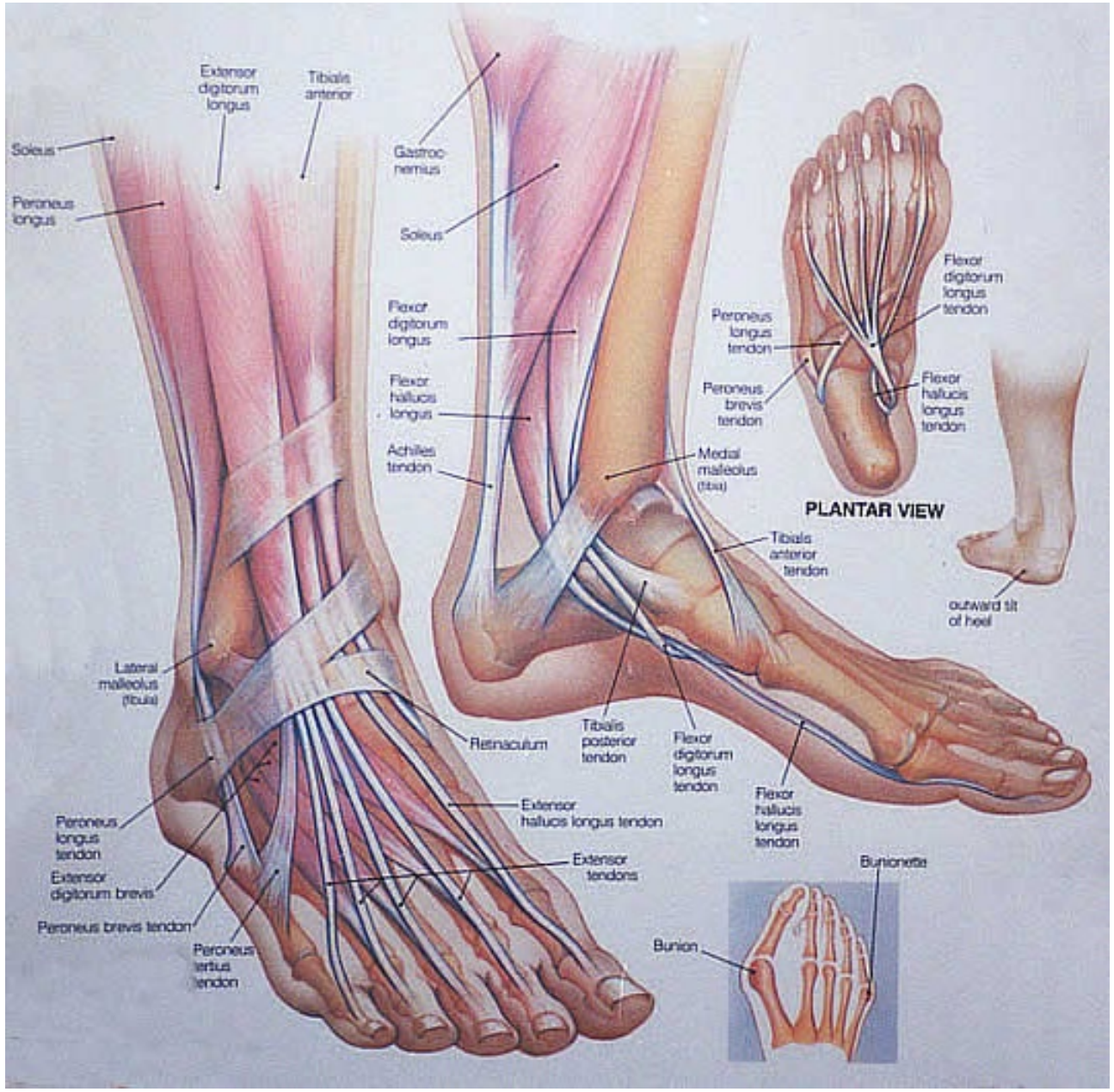
- Catching
- Locking
- Recurrent swelling
- Giving out
- Feels unstable
- Joint line pain

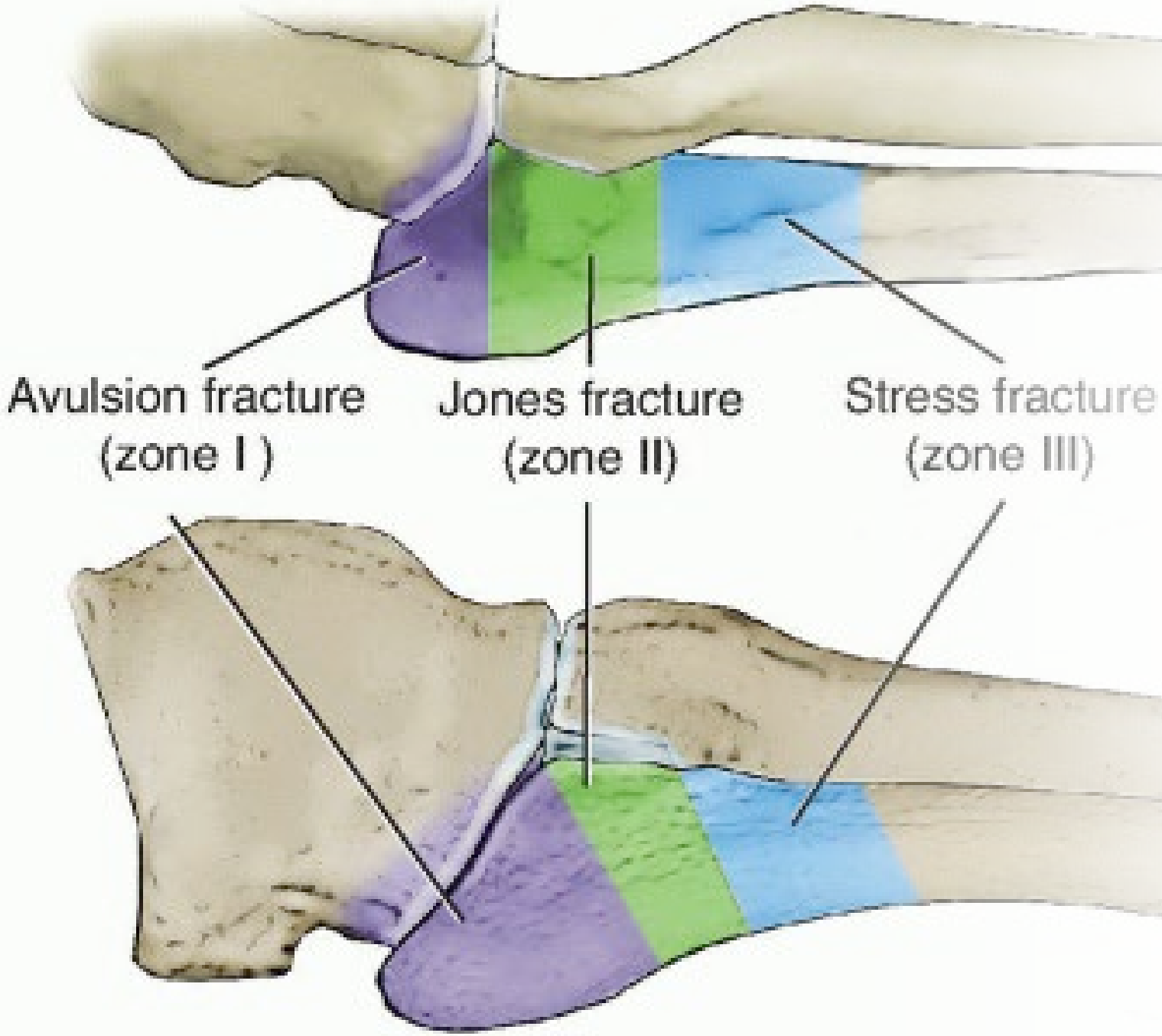




Patellofemoral

Leg/Ankle/Foot





Leg/Ankle/Foot Common Issues

- Fracture
  - Stress
  - Avulsion
  - Metatarsal
- Sprain
  - Usually lateral ankle (ATFL)
- Strain
- Tendinopathy

Ankle Stability

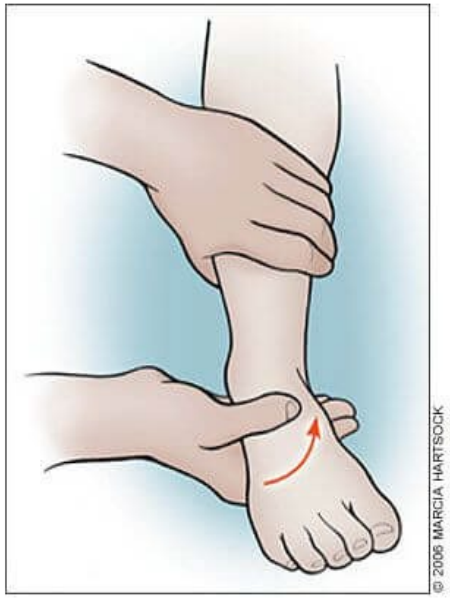
- Usually the lateral ankle
  - Weakest
- Don’t be surprised if medial ankle hurts as well
  - Inversion pinches the deltoid ligament
- Consider the ligamentous track of the ATFL
- Positive anterior drawer suggests torn ATFL
- Avulsion fractures can co-occur
  - Managed similarly

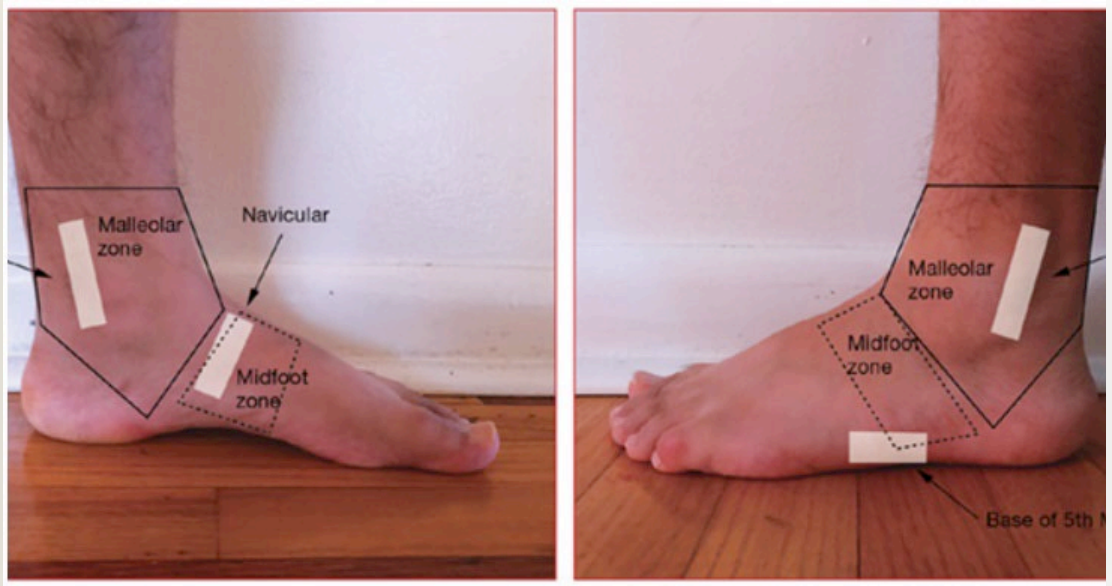
Anterior Drawer

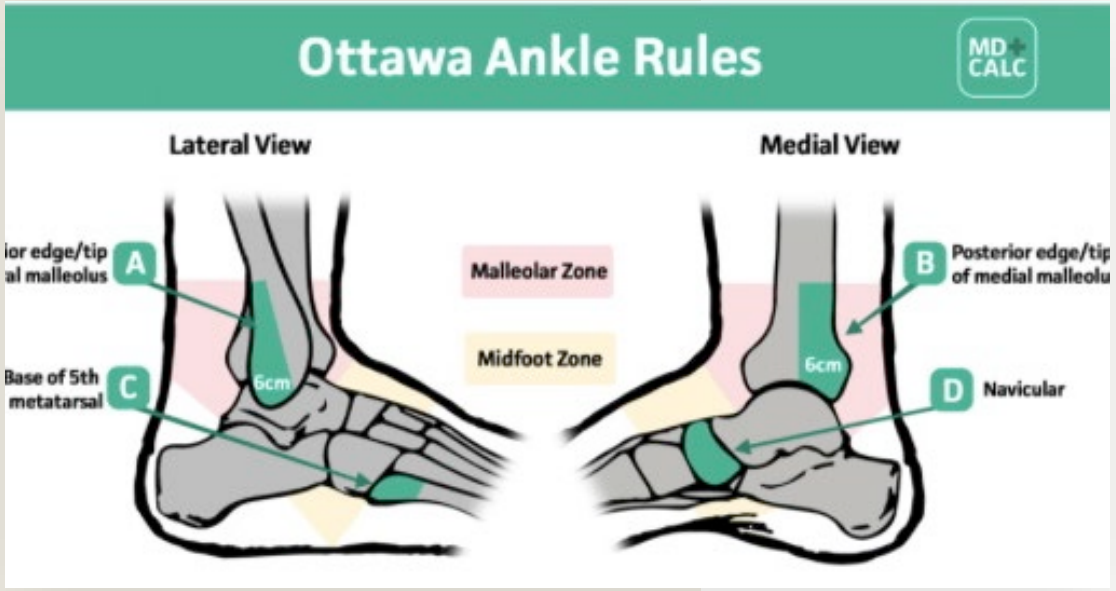
- Tests integrity of anterior talofibular ligament

Talar Tilt

- Tests integrity of calcaneofibular ligament



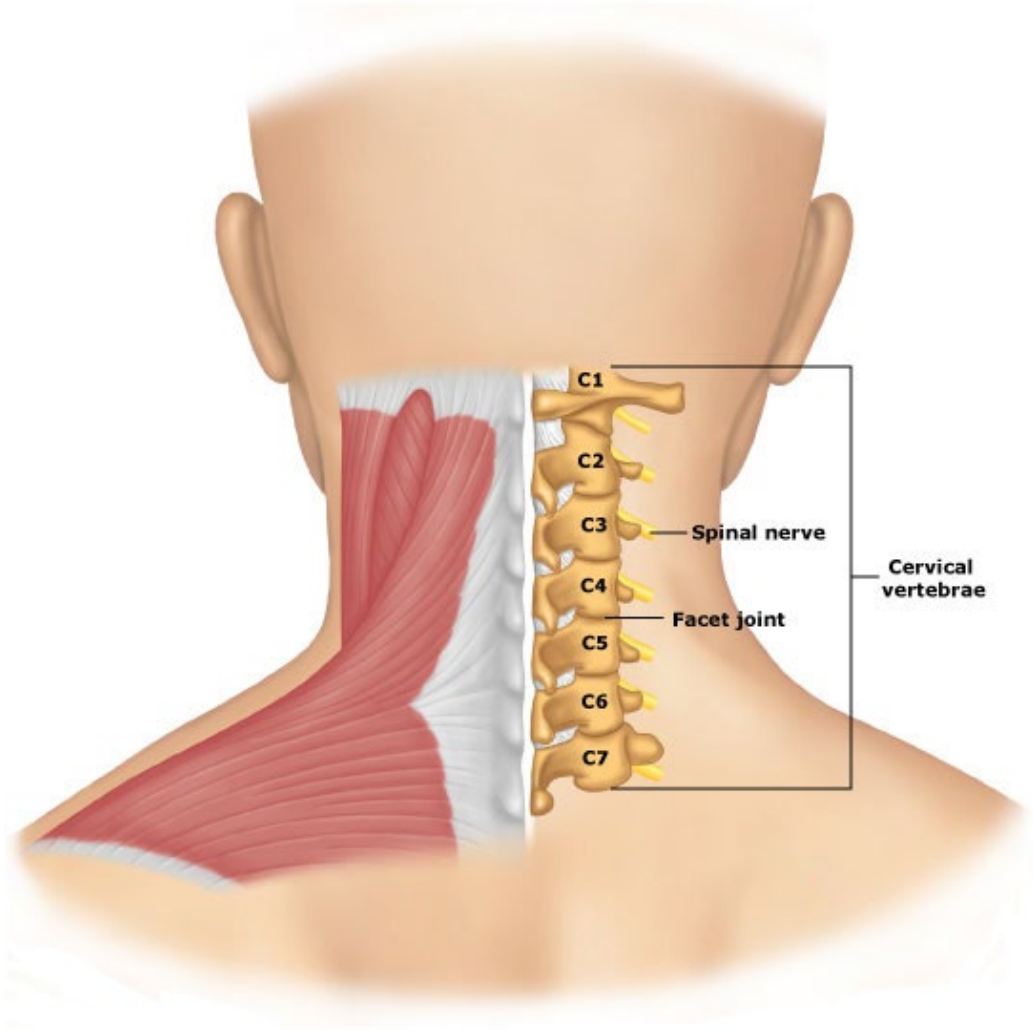




Ottawa Rules

- Fracture prediction model
- Point tenderness at boney landmarks are suspicious for fracture
- XR typically indicated in such cases
- Creative splints can provide support and decrease pain and instability during extrication

Neck

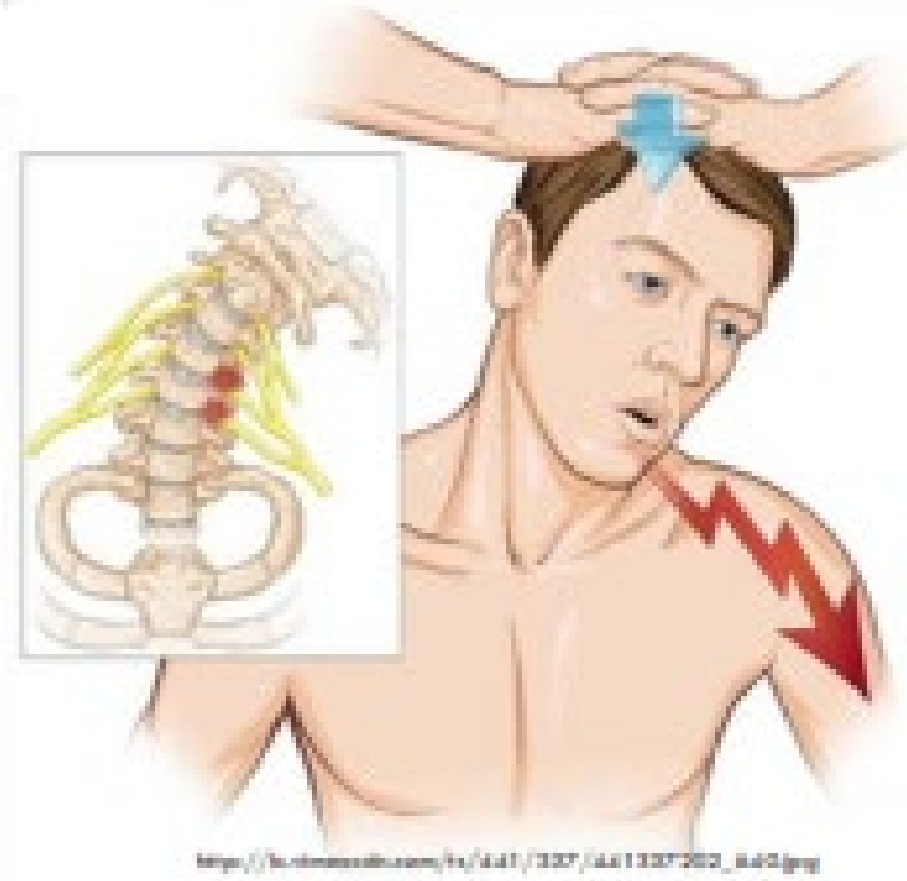

C1
C2
C3
C4
C5
C6
C7
Spinal nerve
Facet joint
Cervical vertebrae

Neck Common Issues

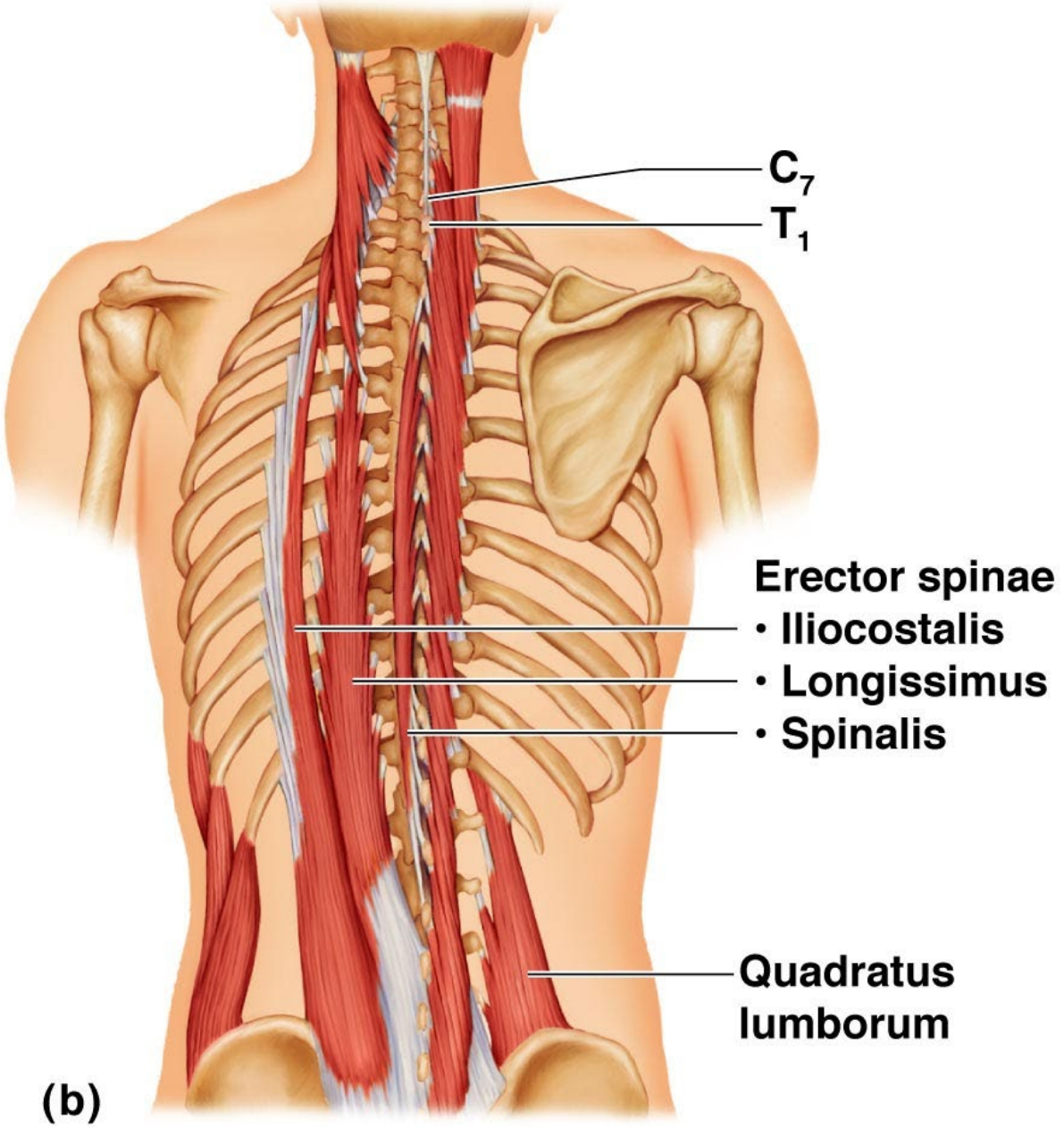
- Strain
  - Ligamentous instability
- Sprain
  - Usually supporting musculature
    - Upper trapezius
    - Levator Scapulae
    - Paraspinous musculature
- Fracture
  - Benign
    - Spinous or lateral processes
    - Pars reticularis
    - Vertebral body
- Discogenic
  - Herniated disc

Cervical Spine Disc/Nerve Root Compression Tests

“Spurling’s Test”



Back



Back Common Issues

Strain

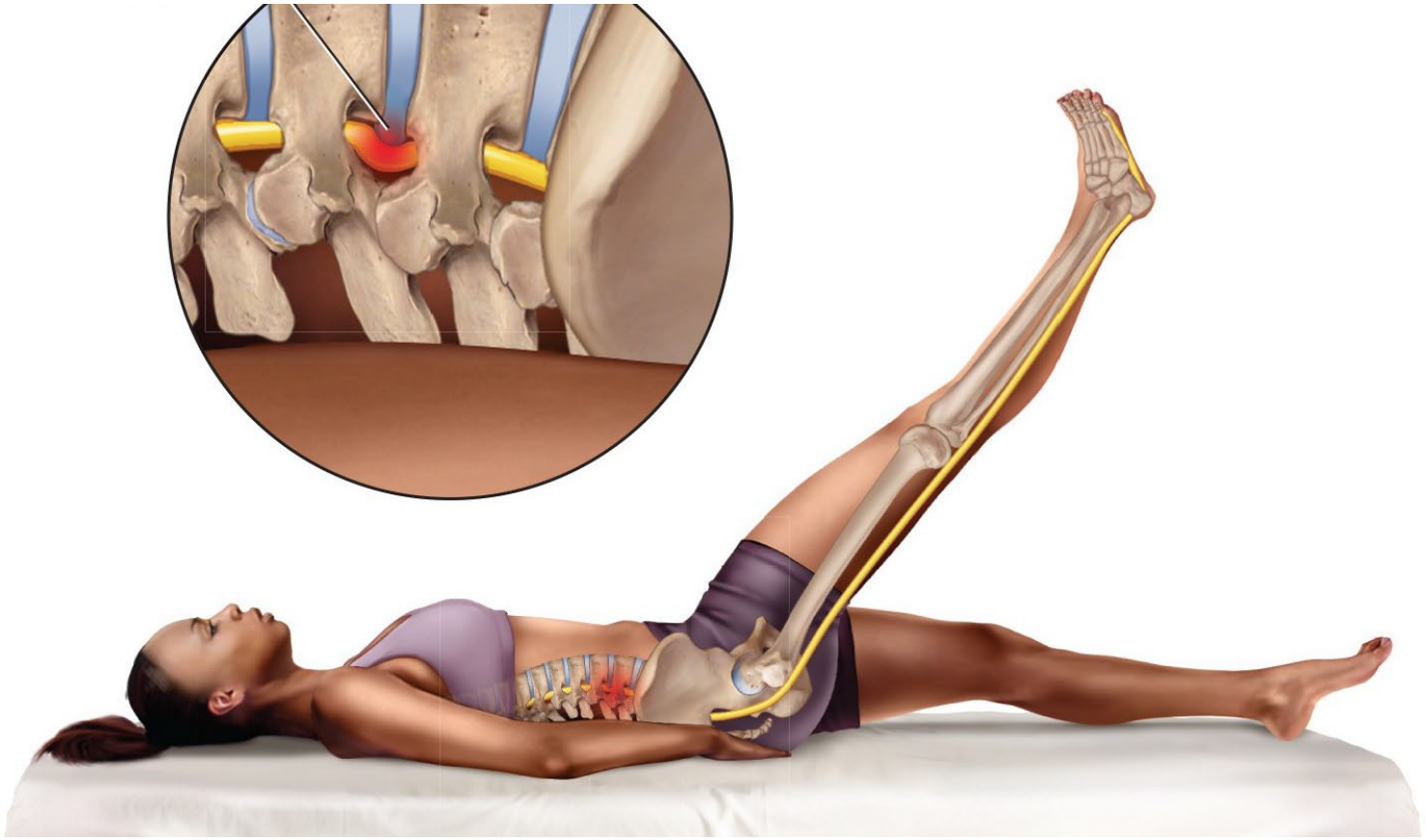
- Lower lumbar musculature
  - Erector spinae group
  - Quadratus lumborum
  - Multifidus

Discogenic

- Radiculopathy
- Nerve root compression
- Usually unilateral
- Consider cauda equina syndrome

Fracture

- Spinous or lateral process
- Pars reticularis
- Vertebral body

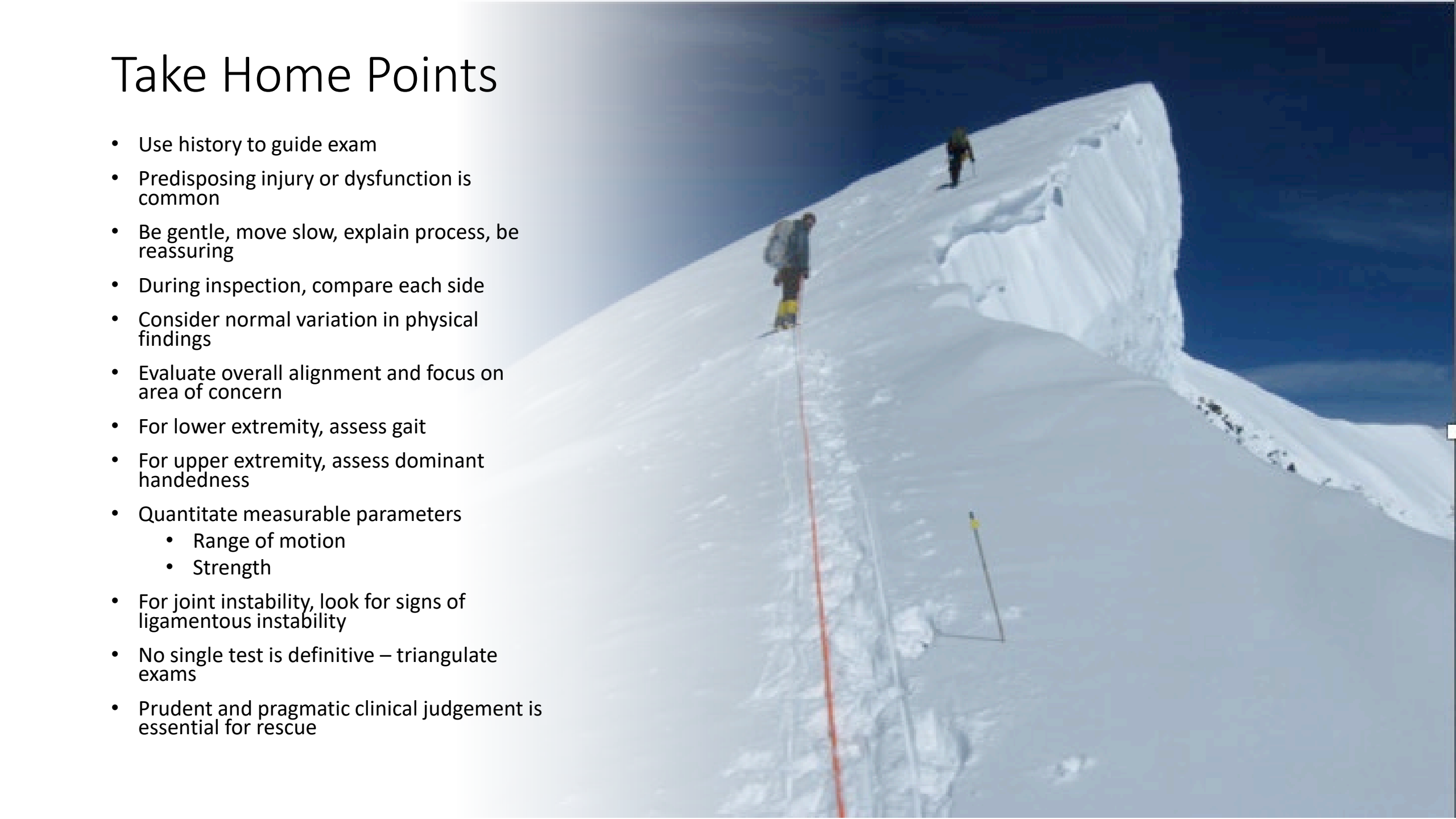


Lumbar Spine Disc Test

- “Straight leg test”
- Supine is best
- Puts tension on the spinal cord
- Where bulging discs hit the spinal root, elicits pain in that distribution
- Differentiate leg pain from back or buttock pain
- Differentiate tight hamstrings from radiculopathy

Take Home Points

- Use history to guide exam
- Predisposing injury or dysfunction is common
- Be gentle, move slow, explain process, be reassuring
- During inspection, compare each side
- Consider normal variation in physical findings
- Evaluate overall alignment and focus on area of concern
- For lower extremity, assess gait
- For upper extremity, assess dominant handedness
- Quantitate measurable parameters
  - Range of motion
  - Strength
- For joint instability, look for signs of ligamentous instability
- No single test is definitive – triangulate exams
- Prudent and pragmatic clinical judgement is essential for rescue



Questions?