Evidence-Based Management of Multi-Ligament Knee Injuries and Knee Dislocations

Patrick S. Buckley, MD

University Orthopaedic Associates
Rutgers- Robert Wood Johnson University Medical School

ATSNJ Annual Meeting
March 2, 2026

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US SKI & SNOWBOARD SPORTS MEDICINE

Disclosures

- Smith and Nephew: Consultant

- Nothing relevant to this talk

We will be using an audience Response System
- Poll Everywhere
*Please join to respond

Join by Web

PollEv.com/uoa

Join by Text

Send **uoa** and your message to **37607**

Join by QR code
Scan with your camera app

Incidence of Muscle Cramps in High School Football Players

- Purpose – To describe the incidence of muscle cramps in the high school football population to better understand those at risk of suffering from muscle cramps and help guide preventative measures.
- Methods – 10 varsity high school football programs followed over the past 2 seasons
- Results – 58 cramps observed across 82 games; Most cramps occurred in the 3rd quarter (53%) and primarily affected offensive skill position players such RBs and WRs (47%)
- Next steps – enrolling additional sites for our 3rd season. Participation includes completing a site agreement form for enrollment and 2 short forms during games for data collection. Those who take part in our study will be acknowledged by name in the publication.

- **STUDY TEAM**

- Evan Lobato, ATC - El750@rwjms.rutgers.edu
- Charles J. Gatt, Jr., MD – Primary Investigator
- Kenneth G. Swan, Jr., MD – Co-PI
- Eric Nussbaum, ATC, MEd - ericn@uognj.com

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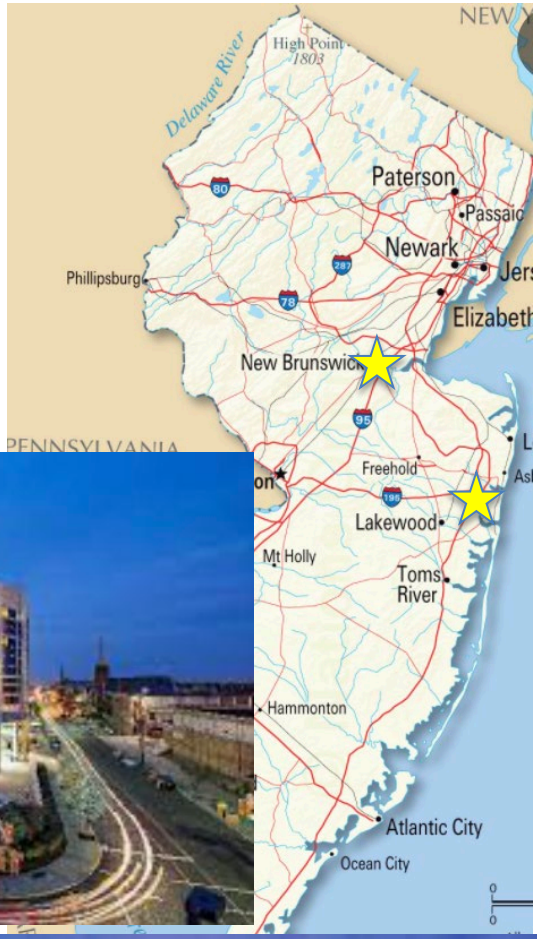
US SKI & SNOWBOARD SPORTS MEDICINE

Who Are We?

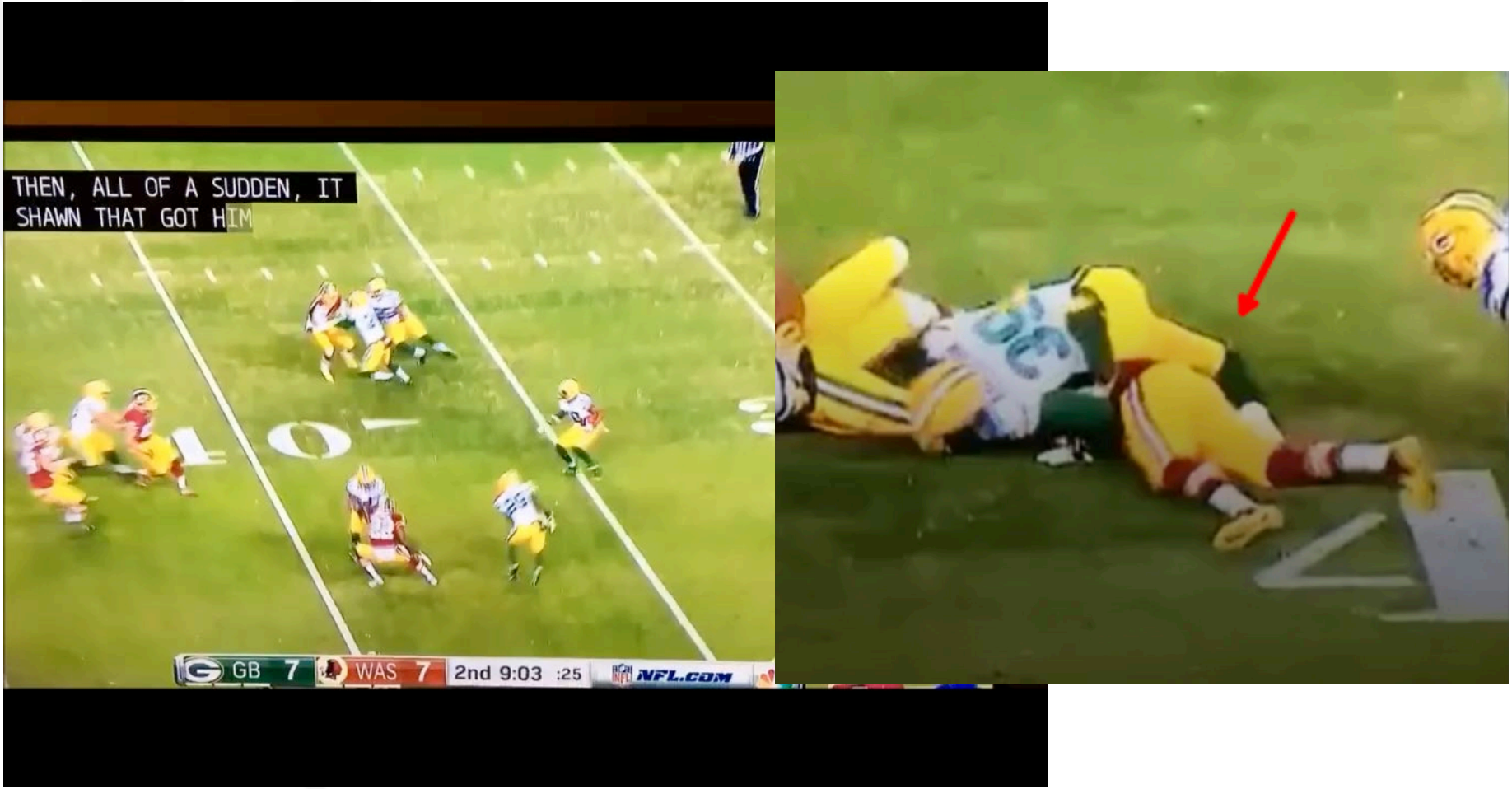
Sports Medicine Orthopaedic Surgeons

- Work with ATCs every day
  - Level 1 trauma x 2

- High school (6), college, and Olympic coverage



Imagine you are on the sideline…



You are approaching this patient with an obvious deformity and are the sole medical provider at the game.

Splint in situ and send to hospital

Attempt reduction, spint, send to hospital

Call Dr. Swan or Buckley!

You are approaching this patient with an obvious deformity and are the sole medical provider at the game.

Splint in situ and send to hospital

0%

Attempt reduction, spint, send to hospital

0%

Call Dr. Swan or Buckley!

0%

You are approaching this patient with an obvious deformity and are the sole medical provider at the game.

Splint in situ and send to hospital

0%

Attempt reduction, spint, send to hospital

0%

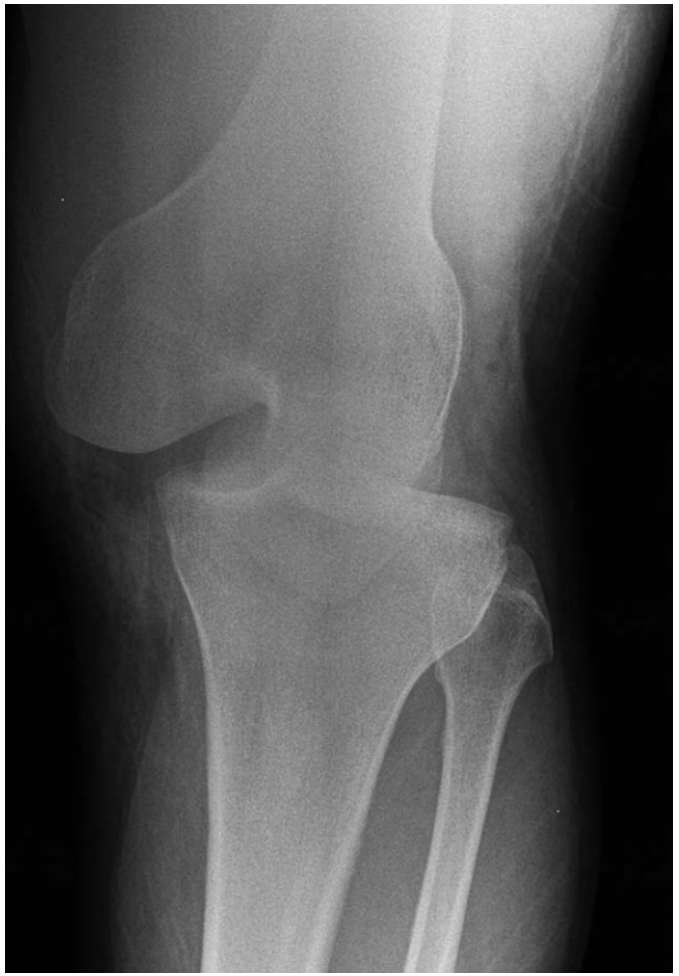
Call Dr. Swan or Buckley!

0%

Why this talk matters...

Multi Ligament Knee Injury (MLKI) Definition

- Acute, traumatic knee injury involving at least 2 ligaments
- Incidence likely under reported
  - Propensity to self reduce (50%!!)
  - Often leads to Misdiagnosis
- Thorough and timely evaluation paramount to successful outcome



MLKI Classification

Anatomic Knee Dislocation Classification System

Classification	Description
KD I	KD with PCL intact. Collateral ligaments may be injured.
KD II	KD with both PCL and ACL injured and collateral ligaments intact.
KD III[a]	KD with both PCL and ACL injured and one collateral ligament injured, either medial or lateral.
KD IV	KD with ACL, PCL, and both collateral ligament injury.
KD V	KD with a periarticular fracture

Schenk ICL 1999

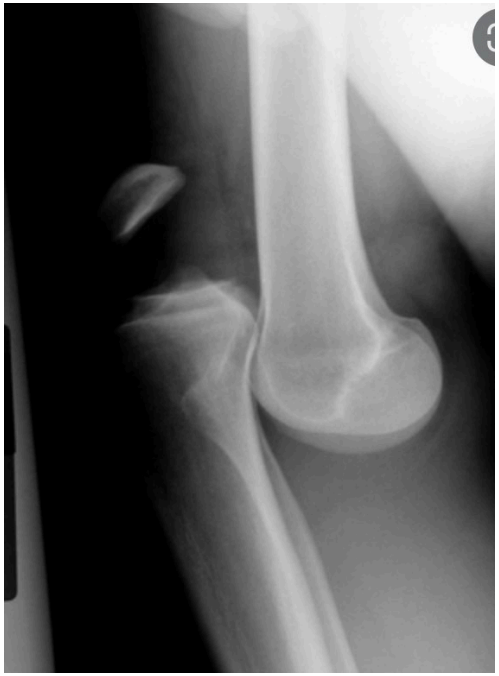
Clinical and Functional Outcomes of Documented Knee Dislocation Versus Multiligamentous Knee Injury

A Comparison of KD3 Injuries at Mean 6.5 Years Follow-up

- Documented knee dislocation had:
  - Worse outcome scores (Lyschom, tegner, IKDC)
  - Same pain rates
  - Higher vascular injury rate (45.0% vs 13.6%; P = .040).
  - PLC involvement worse outcomes than medial side
    - (KD3-L worse than KD3-M)

Mechanism

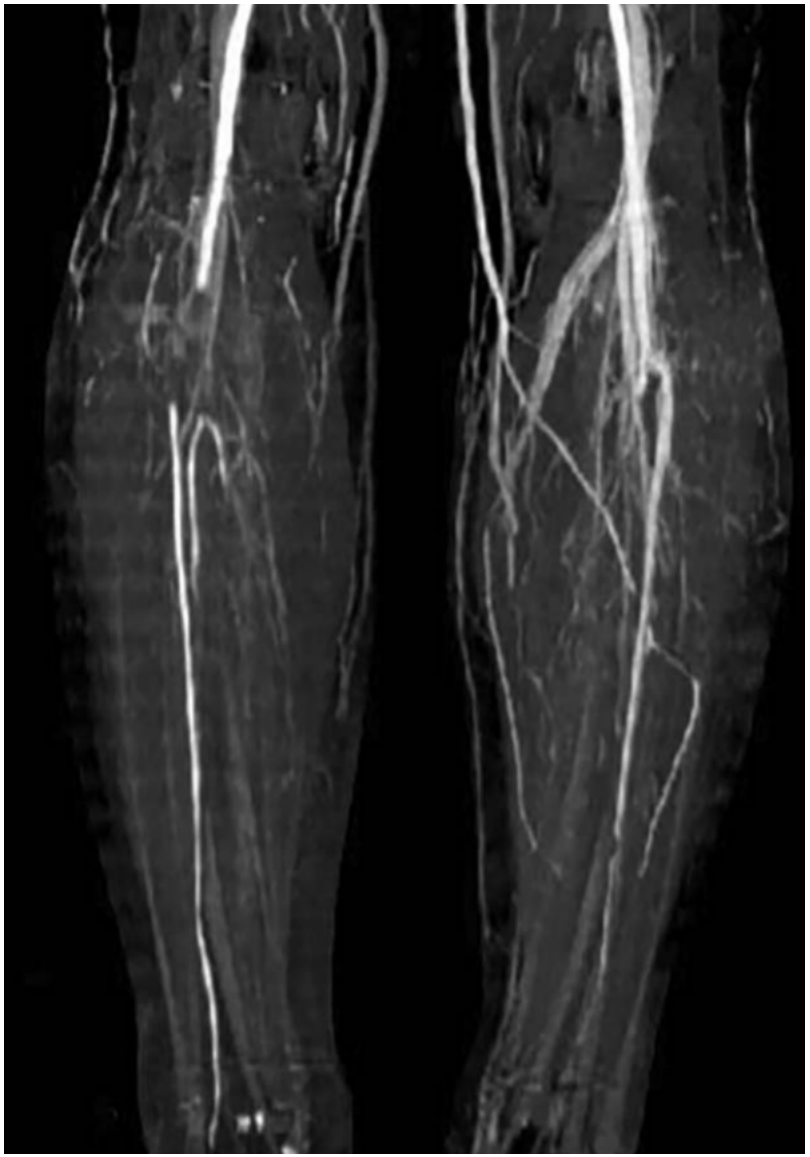
- High energy
  - MVC
  - Pedestrian struck by car



- Lower energy
  - Sporting event
  - Trampoline
  - Low velocity knee dislocation in morbidly obese

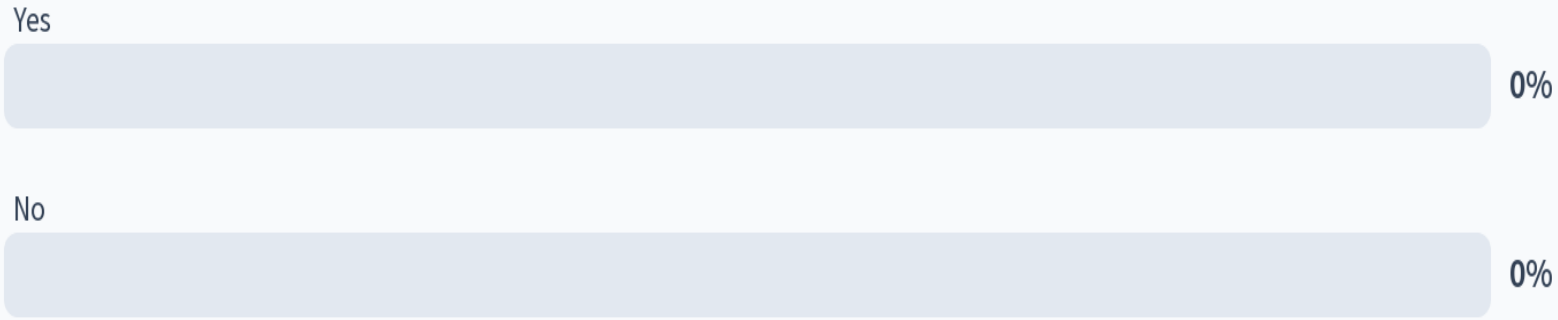
Why does this matter?

- Vascular injury
  - Up to 40-50%
  - Delay of >8hrs resulted in 85% amputation rate
  - Intimal damage vs transection
- Need hospital admission and observation even if normal pulses
  - Intimal flap of artery
- ABIs

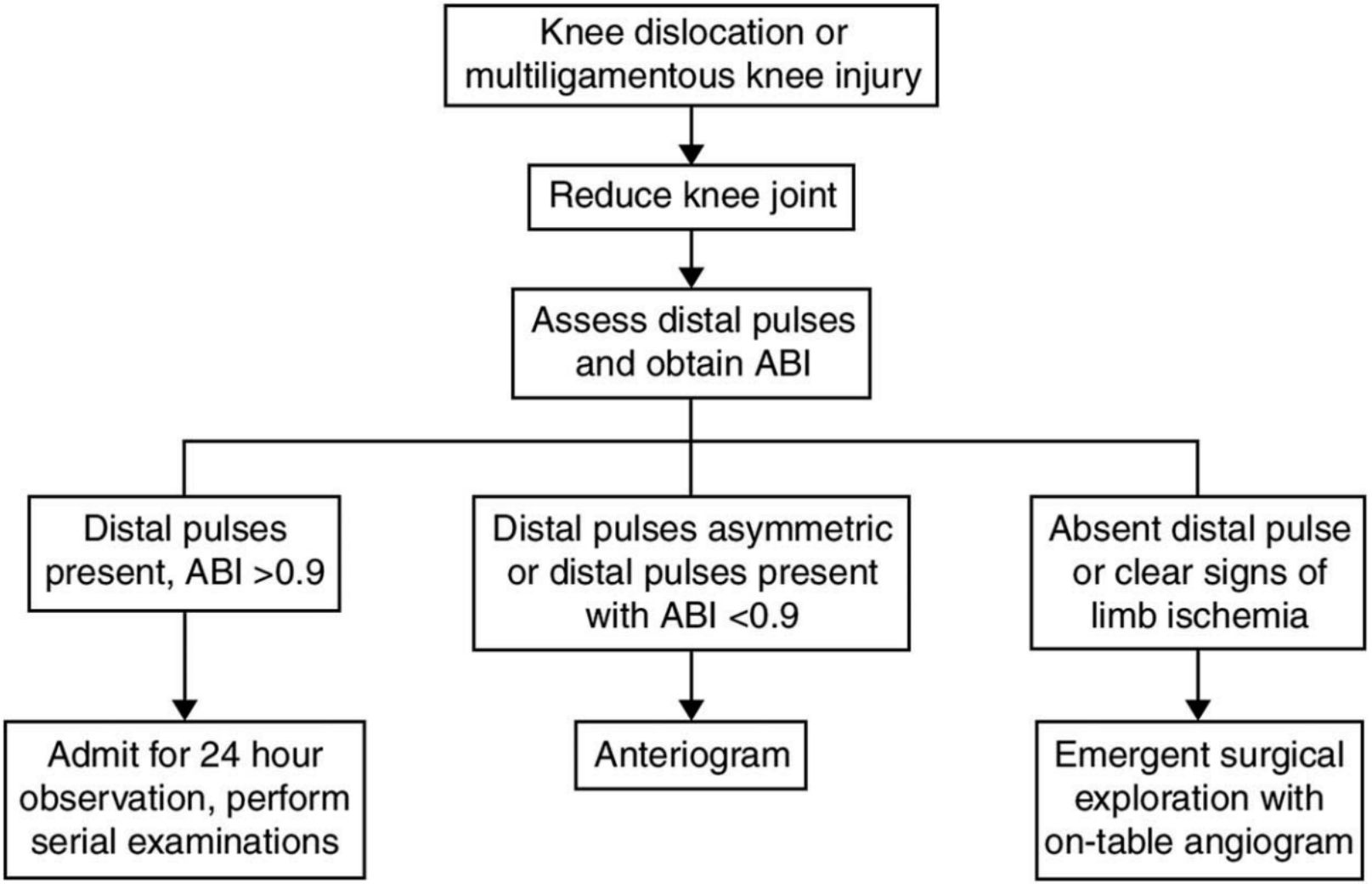


Halvorson JAAOS 2011
Patterson JOT 2007

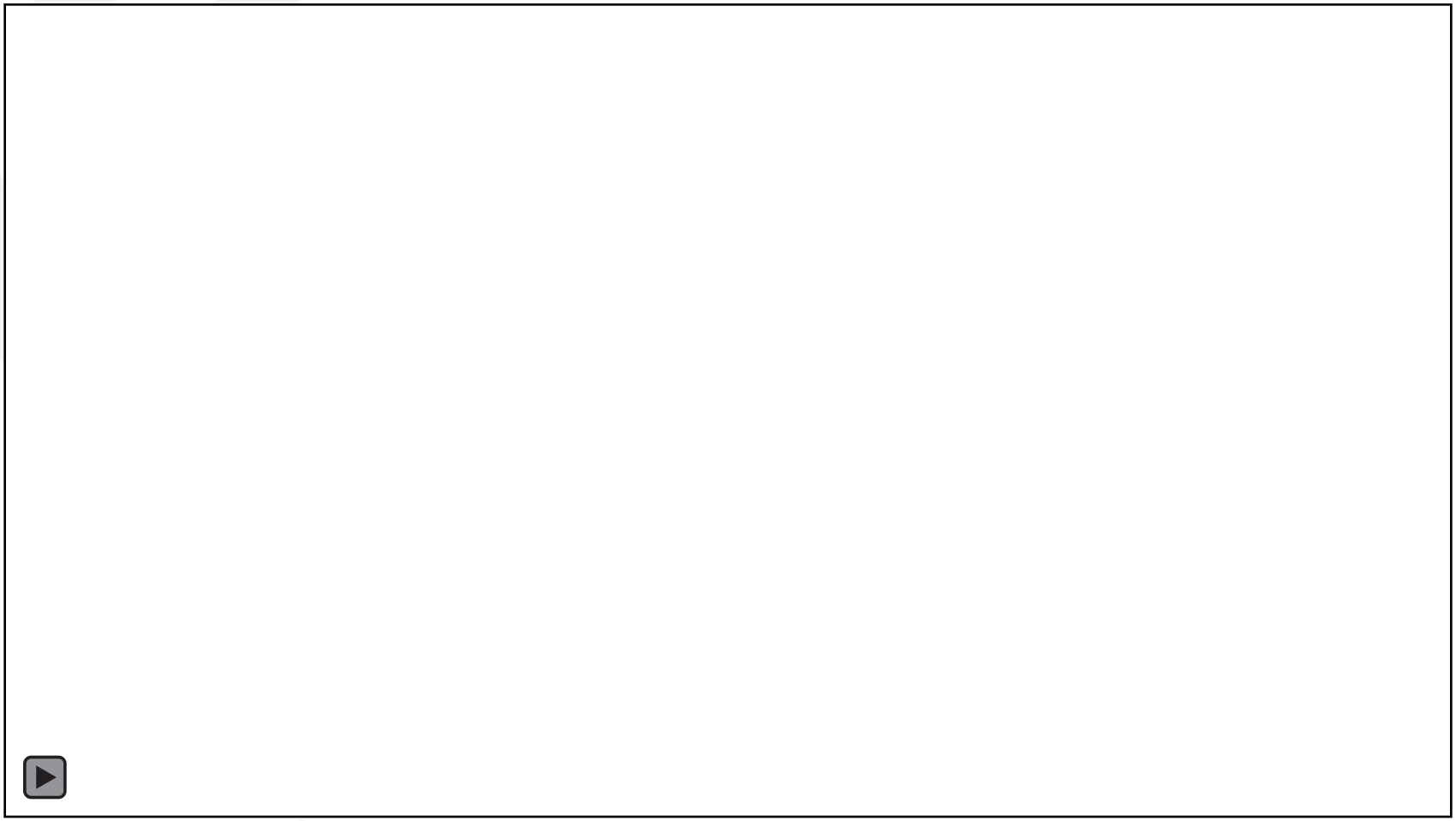
Who has performed an ABI test?



Vascular Algorithm

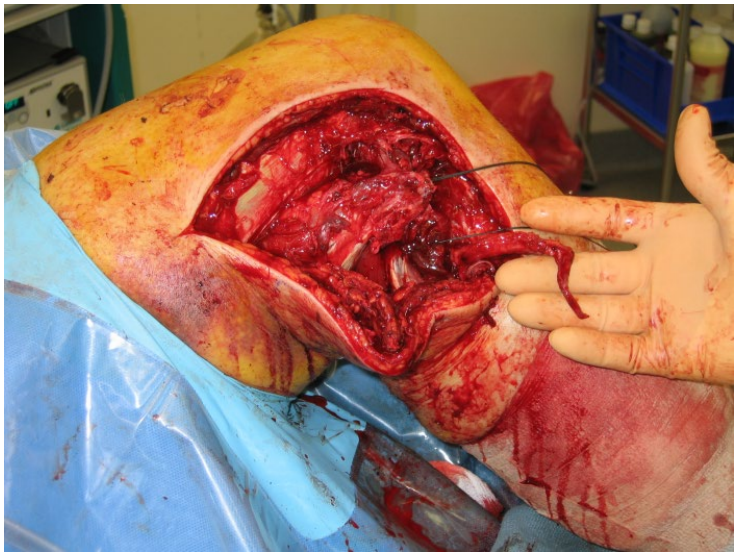


Popliteal Artery is close to the PCL!

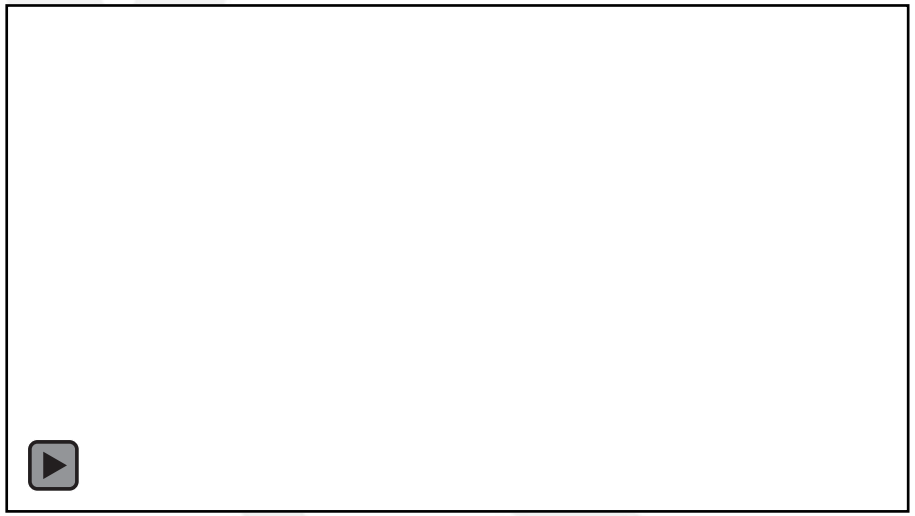


Why does this matter?

- Nerve damage
  - Peroneal nerve most common
  - Occurs in 25% of knee dislocations
  - ~50% will never recover
  - Usually stretch, transection uncommon
  - Tendon transfer, AFO
- Compartment syndrome



History of Acute Knee Injury



-Proper history essential

-Mechanism of injury

Contact or Noncontact

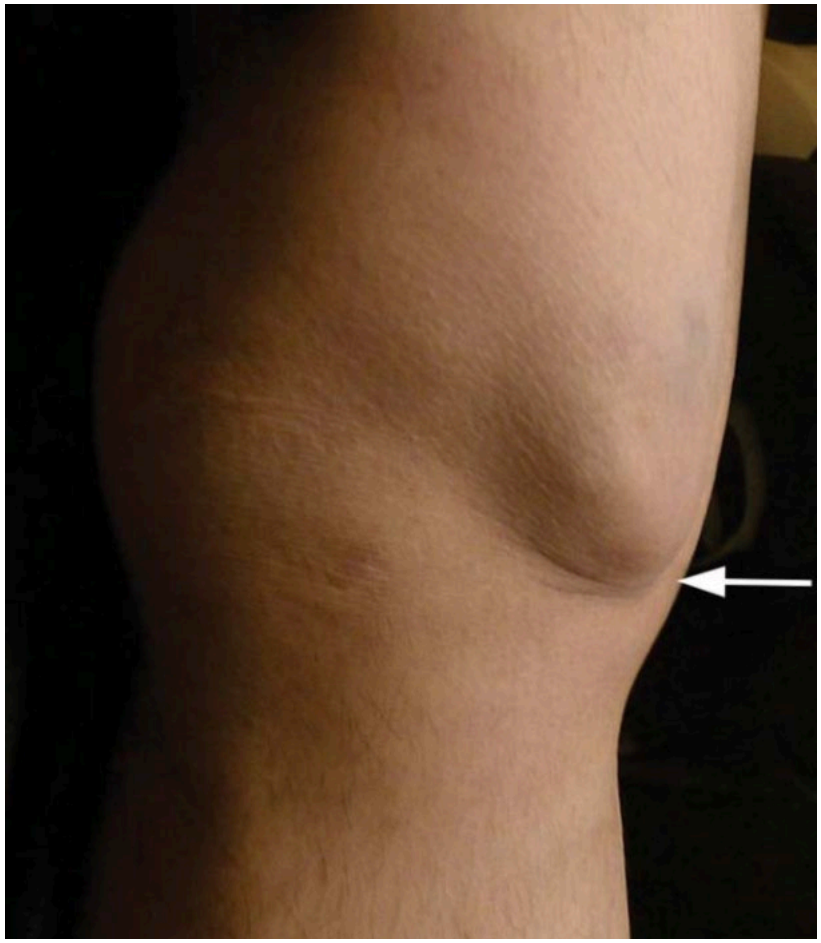
-Symptoms

-Functional limits

squatting, giving way, stairs, pain upon rising, instability, snapping/catching, etc ...

Exam- Sideline Evaluation

- Start with ABCs
- Assess for obvious deformity> reduce
- Coronal plane exam important ***
- Neurovascular exam
- Listen for paresthesias or motor/sensory deficit in the foot
  - If present, increases risk of vascular injury



Sideline Evaluation

- What do you do next?
  - Reduce
  - Knee immobilizer
  - Take cleat/ shoe off
  - Crutches
- If concern for reduced knee dislocation
  - Hospital
  - Ensure knee is reduced…feel condyles
  - Convey concern to family, EMTs, etc.

Exam is important!

-Compare injured knee motion to normal side

-Perform a comprehensive knee exam so you don't miss anything

-Examine the area that hurts the most last

Patellofemoral Abnormalities

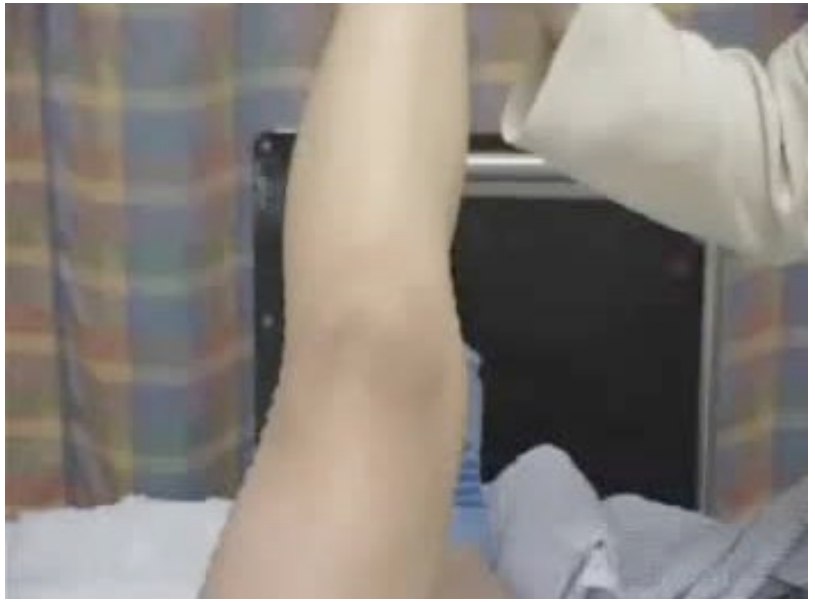
-Athlete often will say “my knee dislocated”

-Lateral patellar subluxation / dislocation

-Traumatic and atraumatic causes

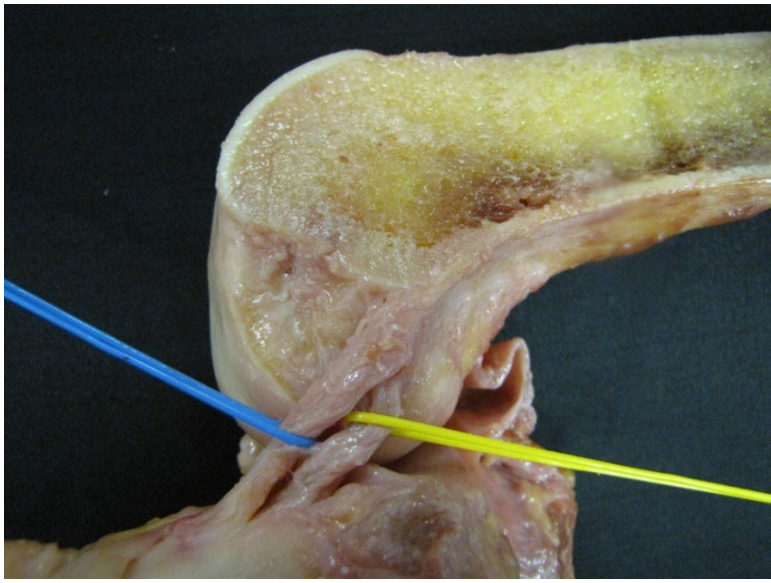
-J-sign

-Lateral patellar apprehension test



Anterior Cruciate Ligament

Main stabilizer to anterior translation (30º)



Lachmans Test

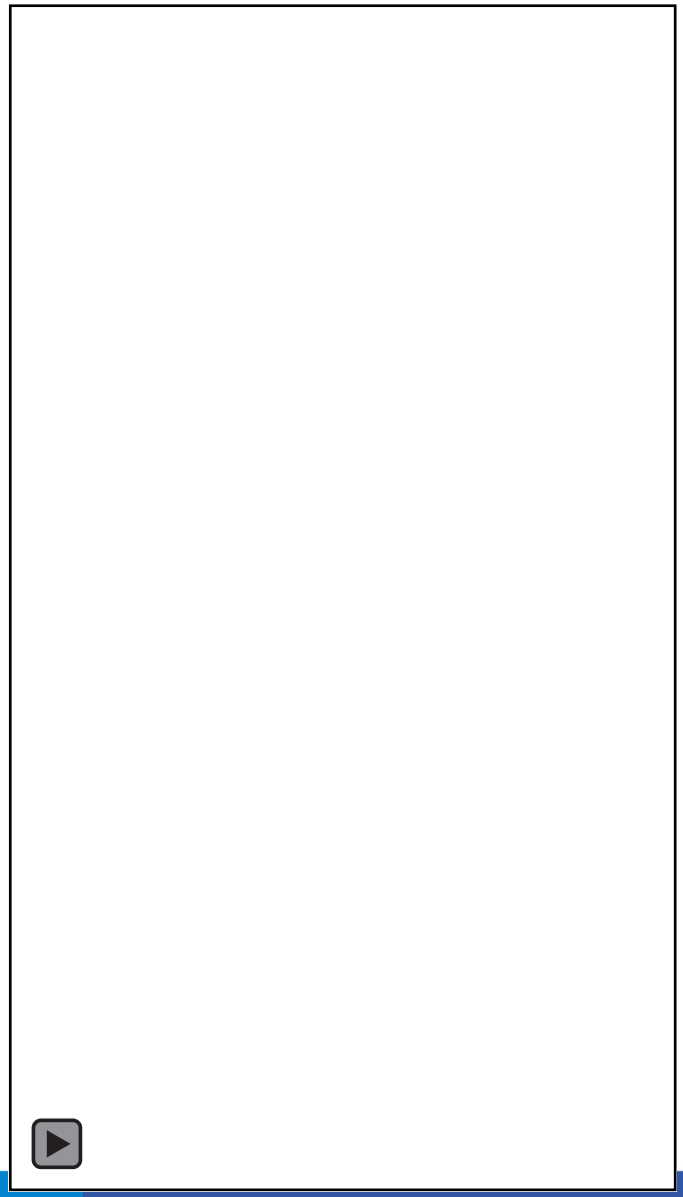
(ACL tears)

- Most effective test for ACL injury
- 20 - 30° knee flexion
- Side-to-side difference > 3 mm
- Soft endpoint

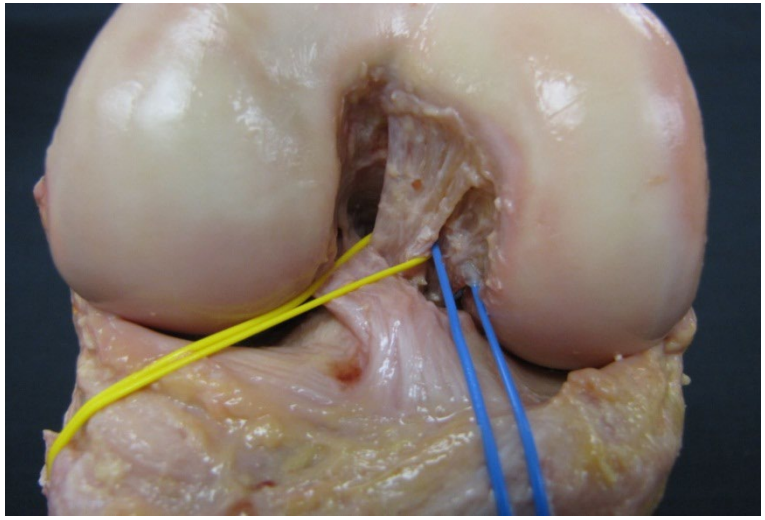
Assessment of Anterolateral Rotatory Stability

Pivot Shift Exam

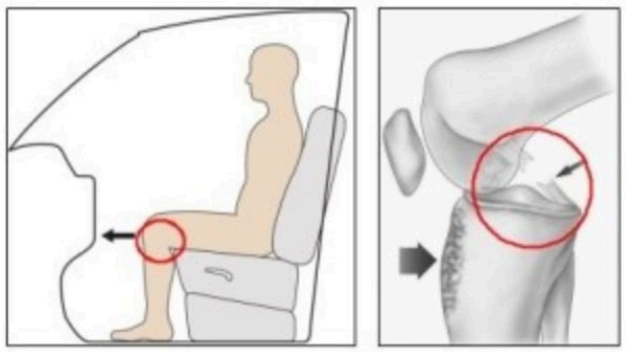
- Knee in extension
- Valgus
- Internal rotation
- Flex knee
- Tibia will reduce as knee flexes around 30°



Posterior Cruciate Ligament



- Main stabilizer to posterior translation (95% at 90º)
- Anterolateral/ posteromedial bundles



Dashboard injury

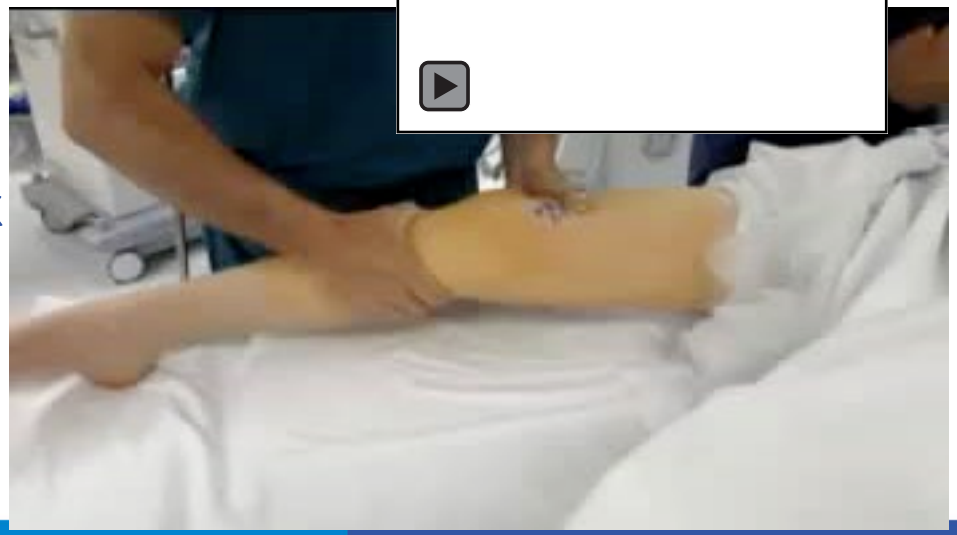
Assessment of Posterior Translation

Posterior Drawer Test

- Complete relaxation
- Neutral, 90°
- Apply posterior force

Psuedo-Lachman's Test

- Results from posterior sag
- Tibia translates anteriorly back to normal position



Medial Collateral Ligament (MCL) Complex

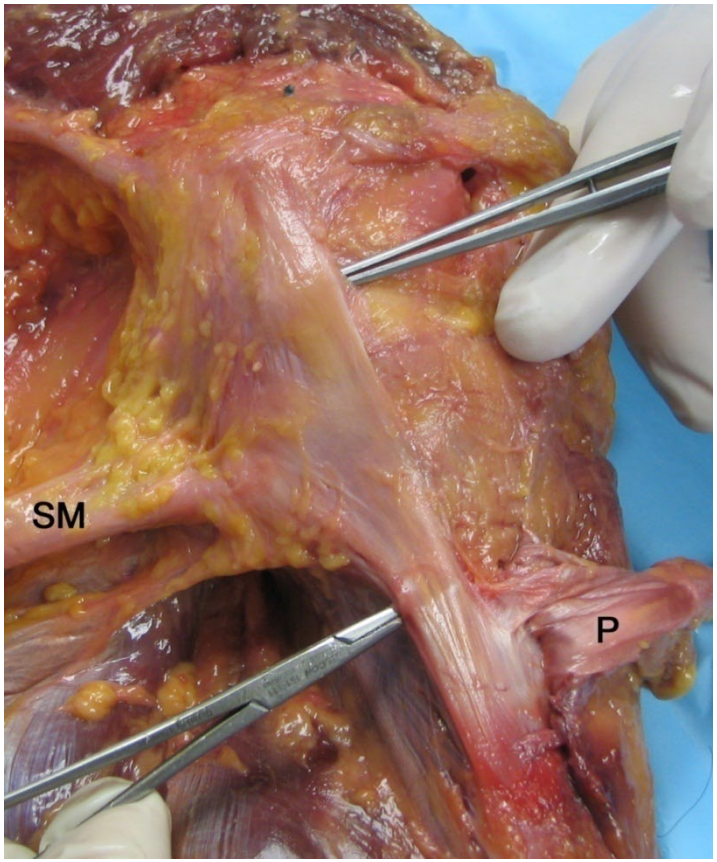
(JBJS, 2007; AJSM, 2009)

A group of anatomic structures

- Superficial / deep MCL
- POL

Provide stability to a valgus force at 30°

- IR at 0°
- ER at 30°/90°

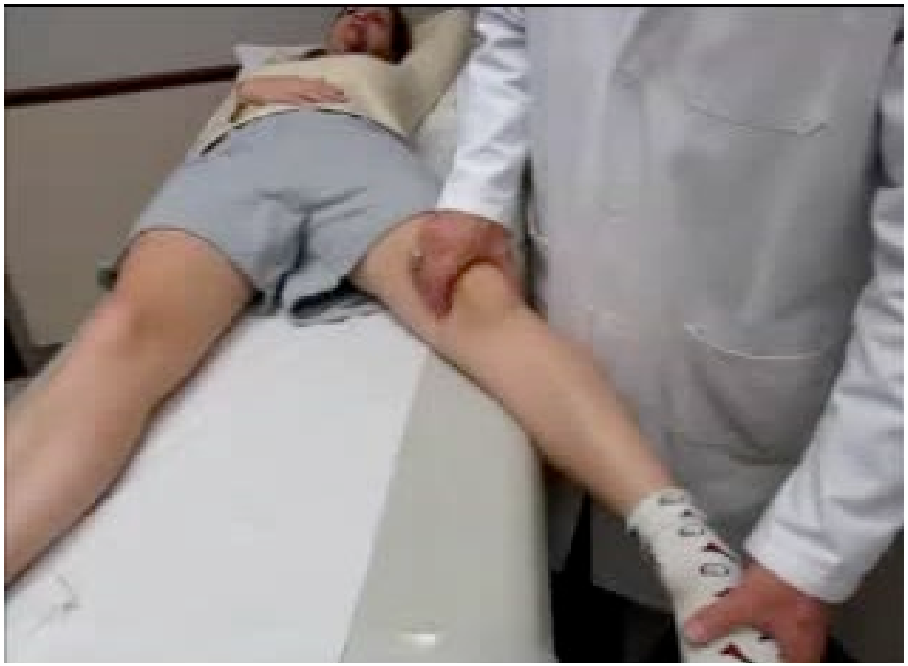


History

- Valgus contact/ noncontact
- Side-to-side instability
- +/- knee effusion

Clinical Diagnosis of Medial Knee Injuries

- Valgus stress test at 0° and 30°
  - Hold ankle not the leg
  - Apply valgus stress through foot/ankle
  - Use fingers to measure joint line opening (AMA classification)



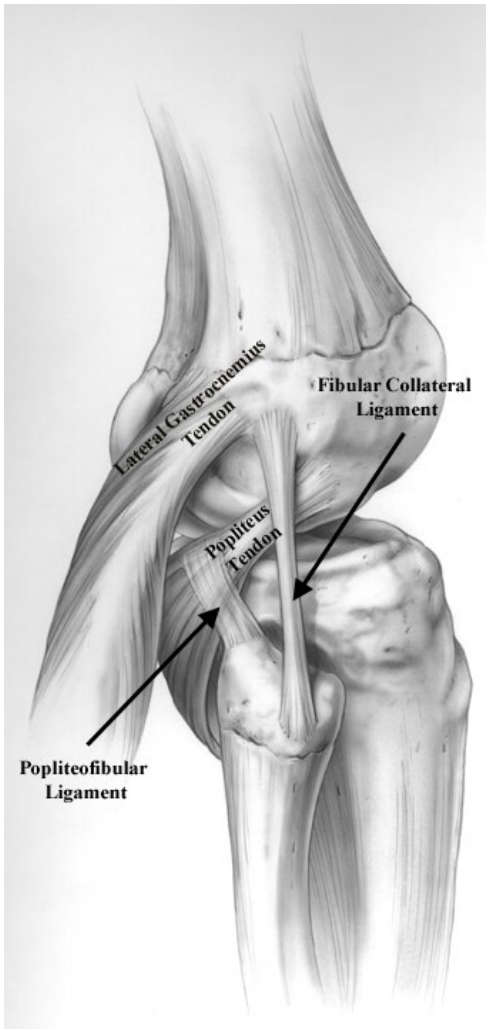
Lateral and Posterolateral Knee Abnormalities

(AJSM, 2003)

-Hyperextension, varus injury, or

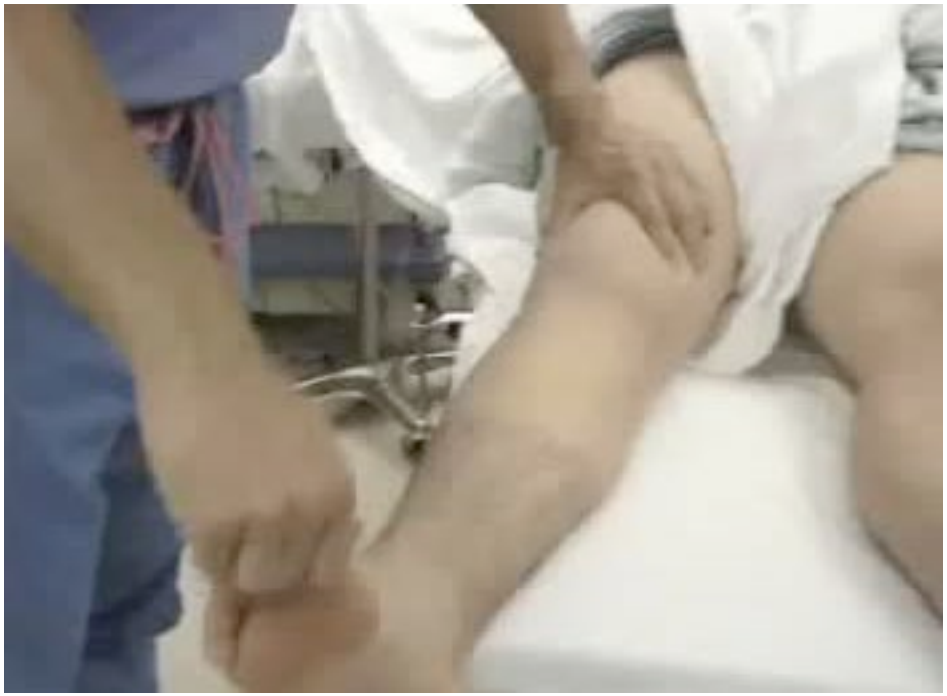
a knee dislocation

-15% peroneal nerve injury



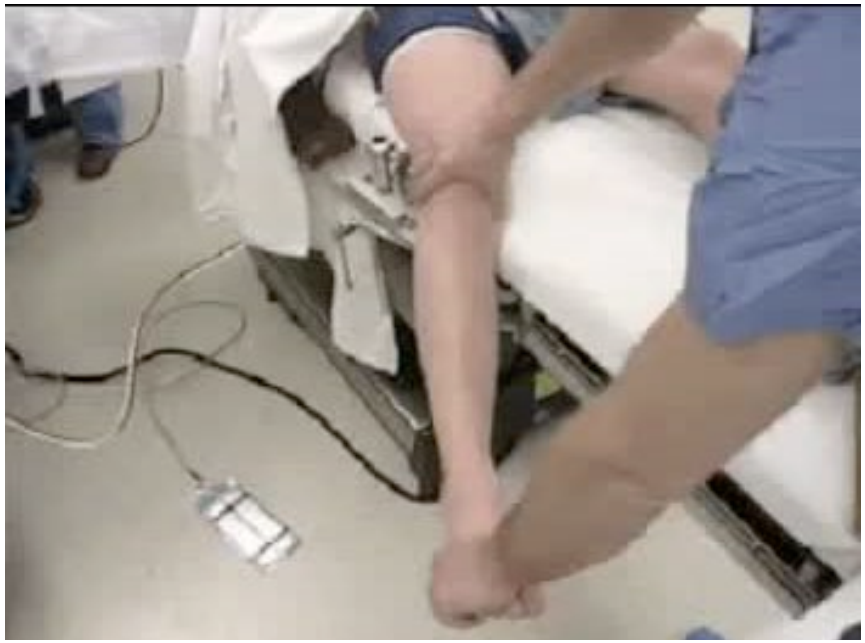
Diagnosis of Posterolateral Knee Injuries

- External Rotation Recurvatum Test
  - Lift big toe
  - Assess recurvatum
  - Indicative of significant knee injury



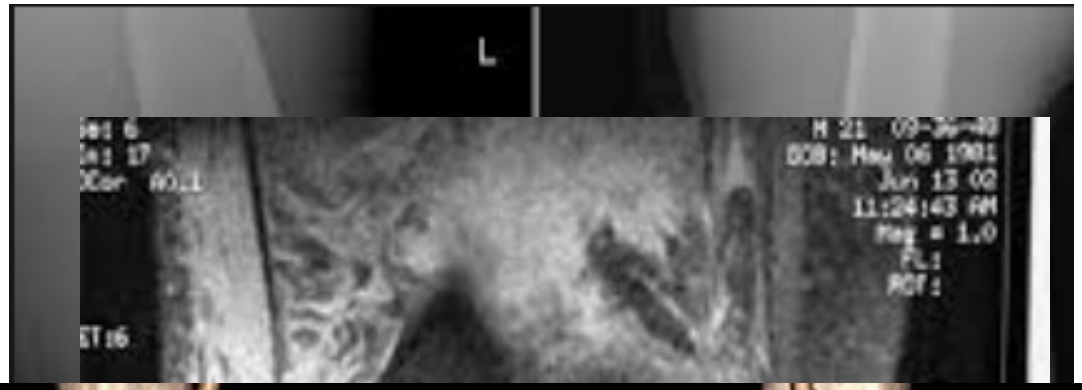
Diagnosis of Posterolateral Knee Injuries

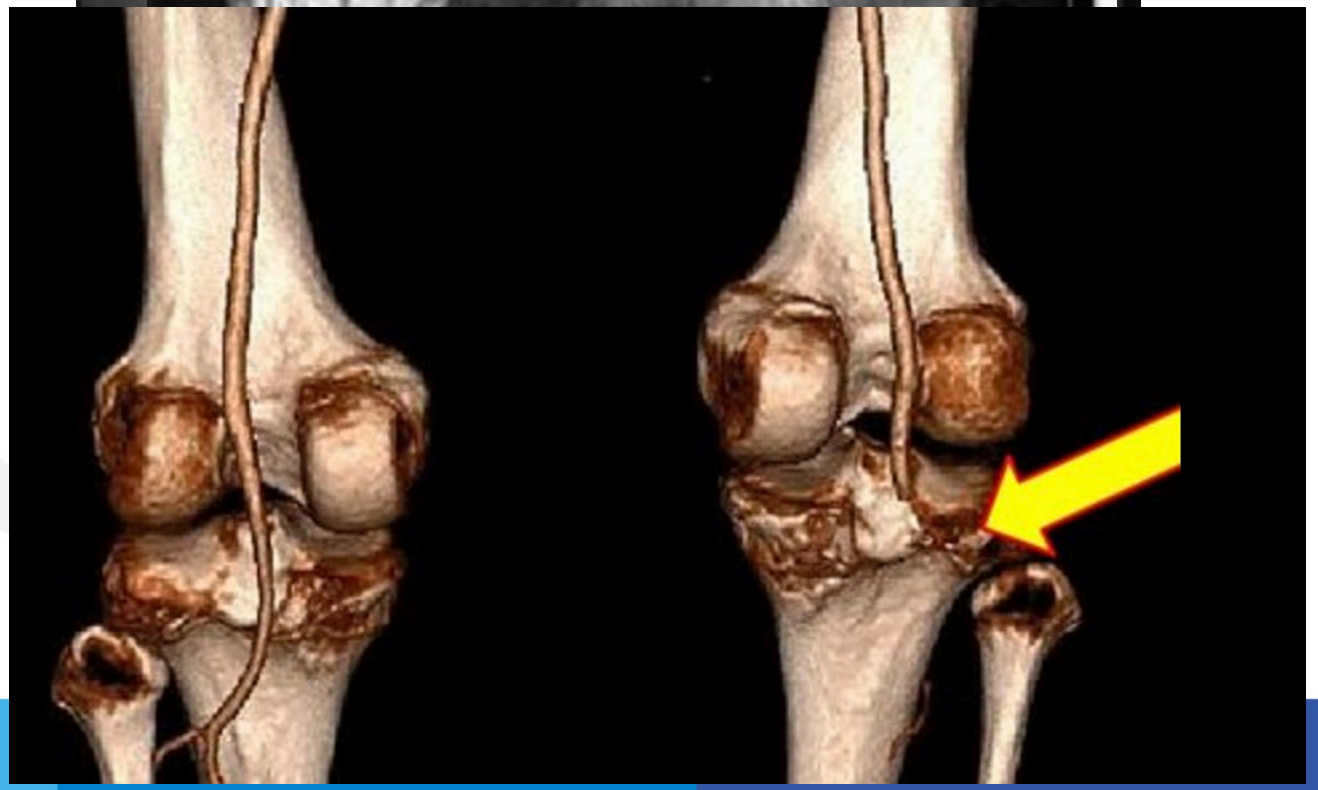
- Varus stress test at 30°
  - Check contralateral knee
  - Put fingers over joint line
  - Apply stress through foot/ankle, not the leg



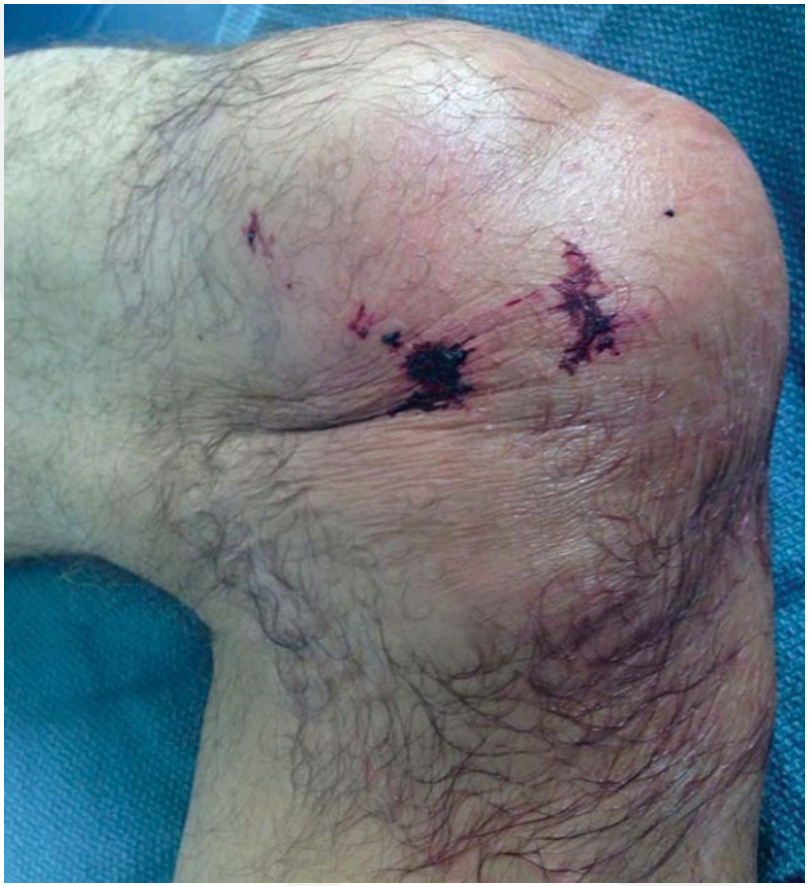
Imaging

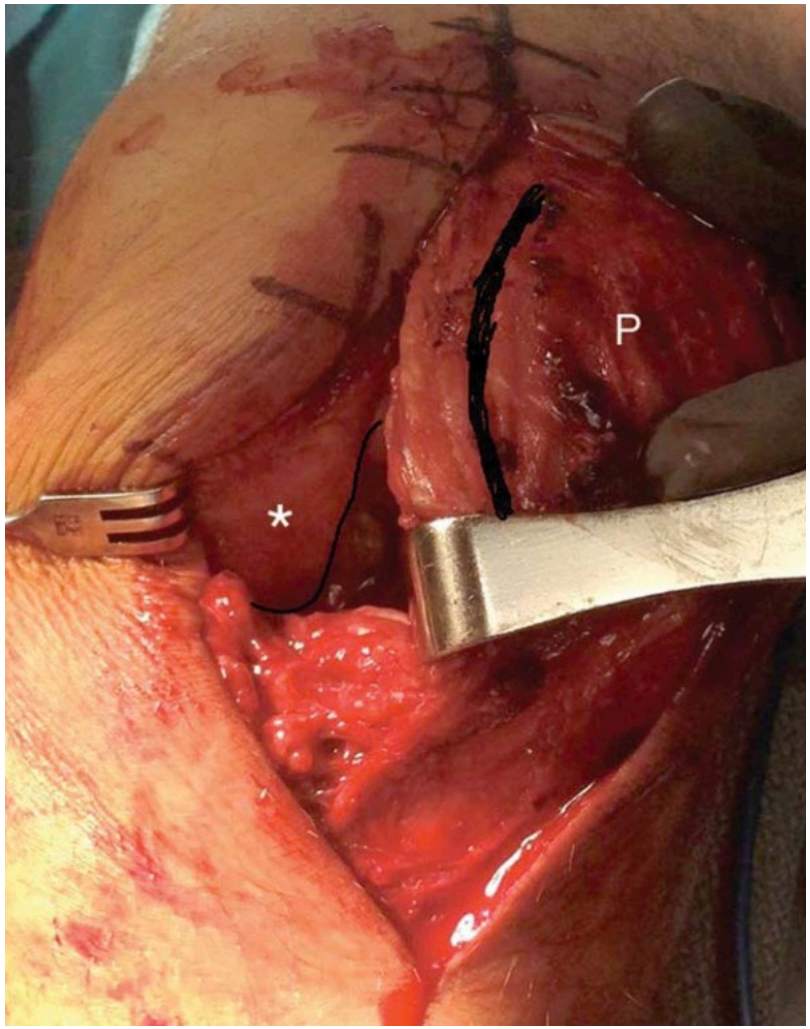
- Xrays
- MRI
- CT Angio





Irreducible Knee Dislocation





Summary

-Review history and mechanism of injury in all patients

-Thorough physical examination

--Physical exam can be as accurate as any other expensive test/imaging methods

-Hospital evaluation important if c/f knee dislocation

Questions? Comments?

Thank you!

Contact:

4810 Belmar Blvd.
Wall Township, NJ 07753

patrickb@uognj.com

More to Come….

- Treatment options
  - Non operative
  - Ex fix?
  - Repair vs Reconstruct?
  - Timing?
- Postop Rehab
- Outcomes
  - Return to sport