Best Practices In Knee Injuries

Chairperson: Suzanne Miller, MD

Tuesday, March 28th, 2023

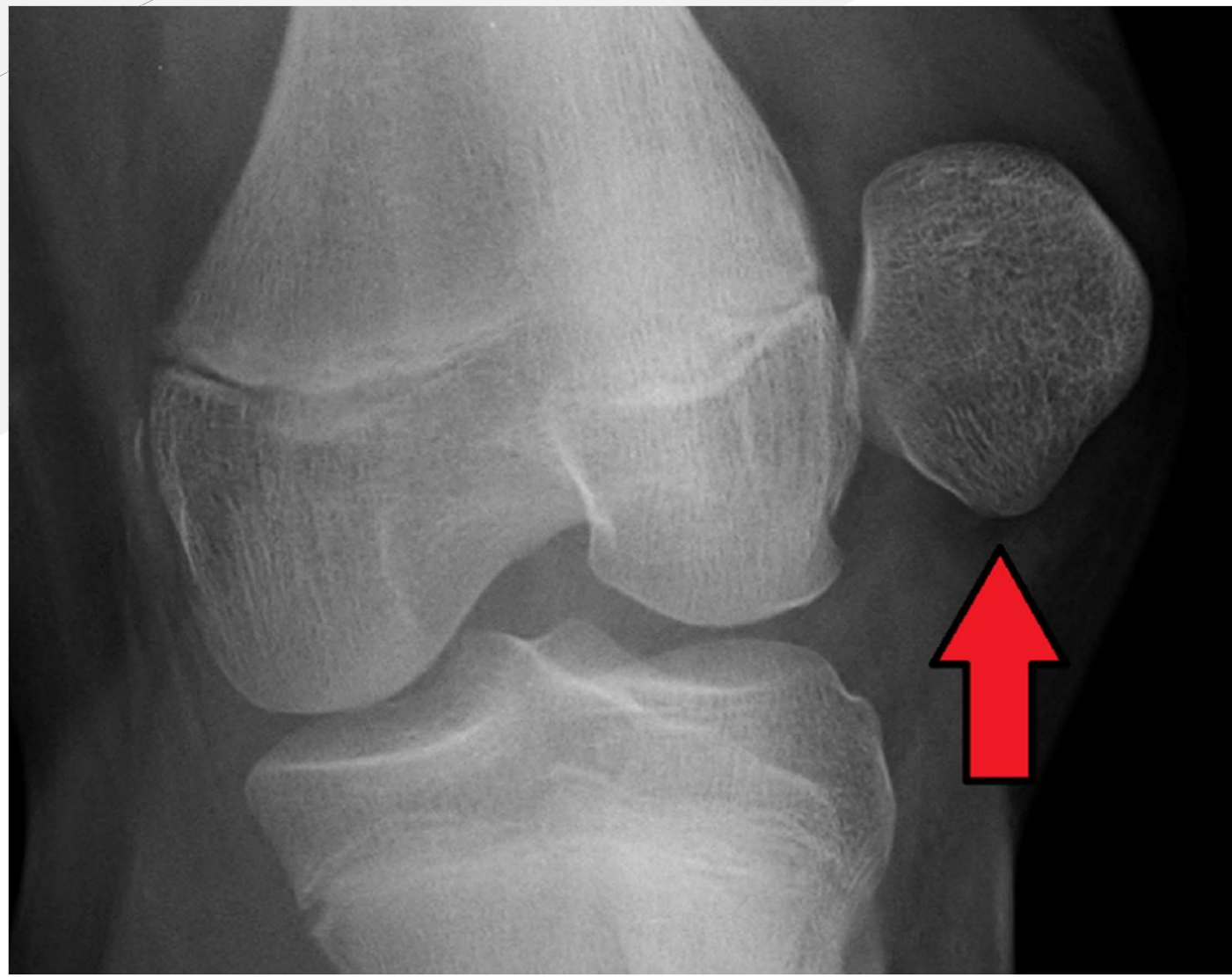
1:20-2pm

Patella Dislocation

Suzanne Miller MD
Boston Sports and Shoulder Center
New England Baptist Hospital

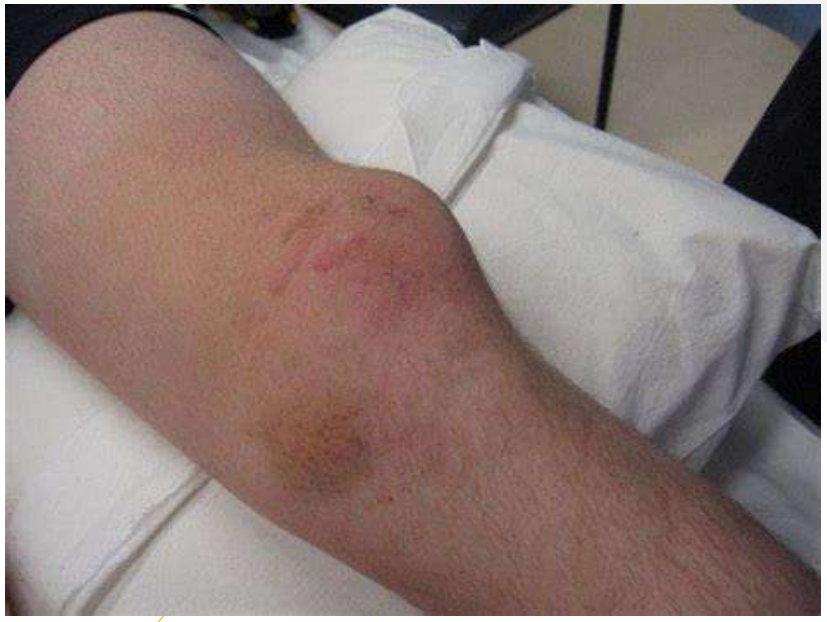
Demographics

- 3% of all knee injuries
- 5.8 in 100,000
- Females 29 in 100,000
- 95% lateral instability
- Noncontact
  - Twisting injury
- Contact
- Direct blow medial side knee



Natural History First time Patella Dislocation

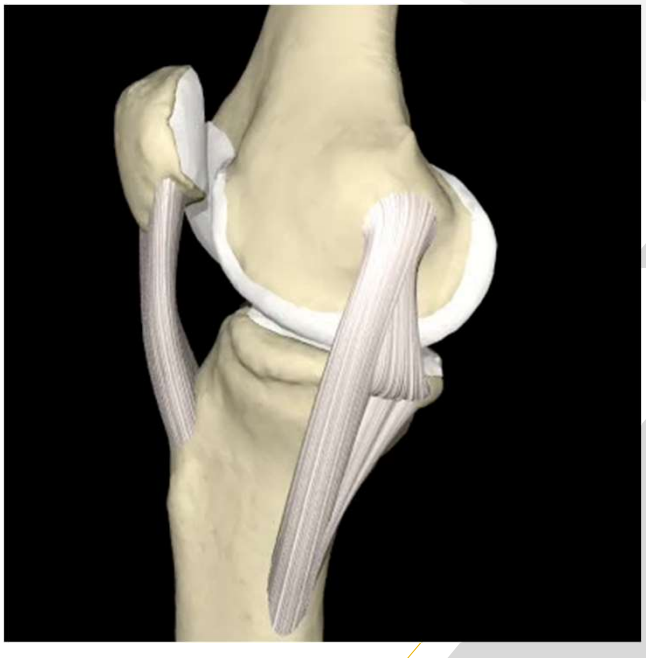
- Rate of recurrence – 17-33%
- With recurrent dislocations- 50%
- Can be associated with cartilage injuries
- 48.9% develop osteoarthritis vs 8.3% in general population

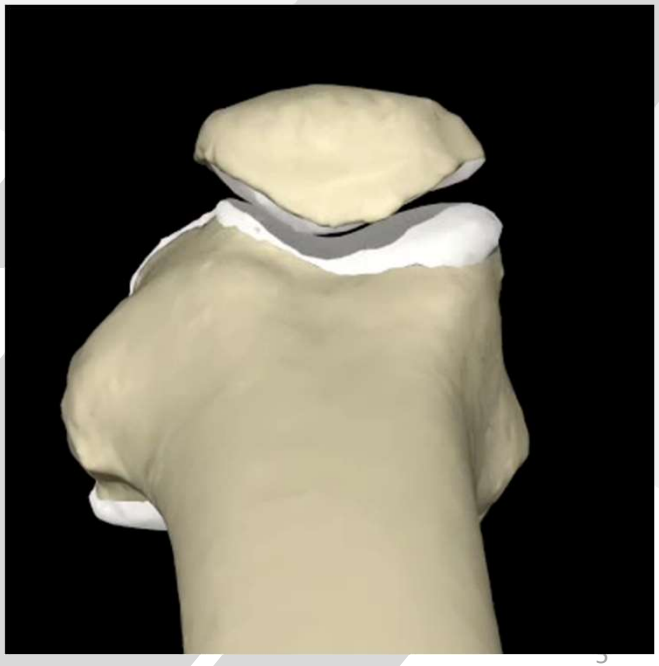


Anatomic Patella Restraints

Complex !!!

- Soft Tissue 0-30 degrees
- Bone >30 degrees

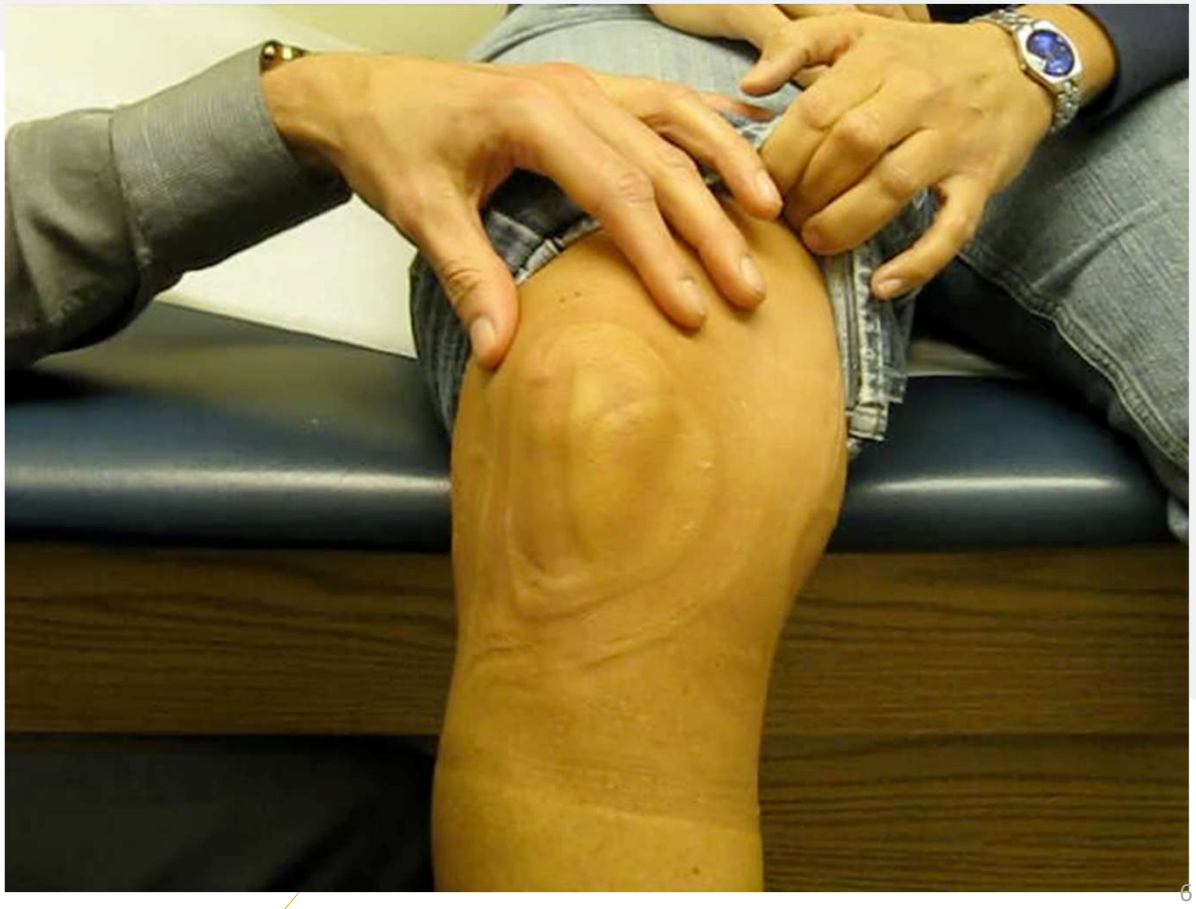




Patella Tracking

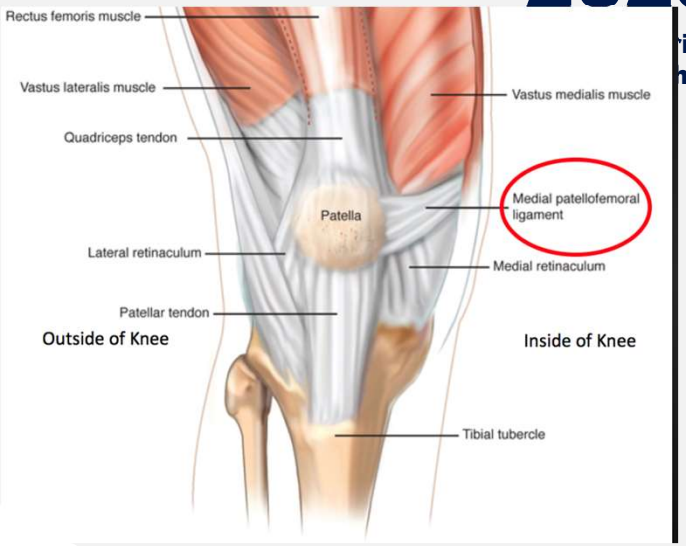
J Sign

Patella wants to pull lateral due to mechanical axis

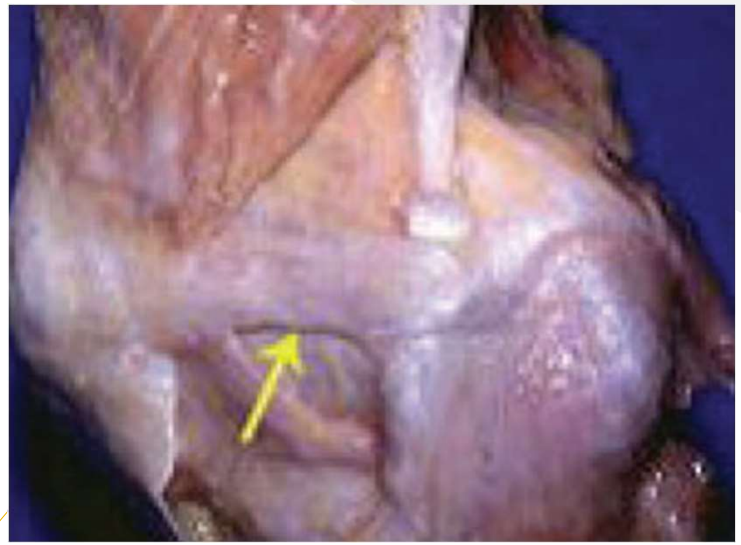


Soft Tissue

Allows knee to stay in a neutral position from 0-30



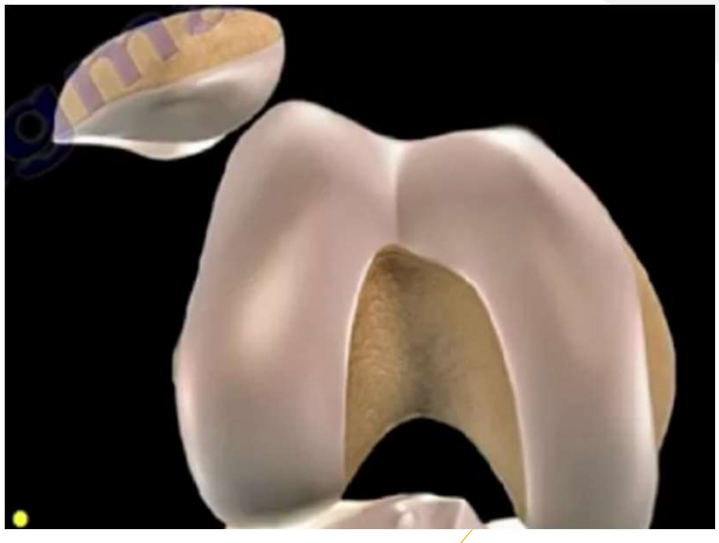
- **Dynamic Stabilizers**
- Medial- vastus medialis oblique VMO
  - Most distal attachment
- Lateral – IT band
- **Static Stabilizers**
- Medial retinaculum
- Medial patellofemoral ligament

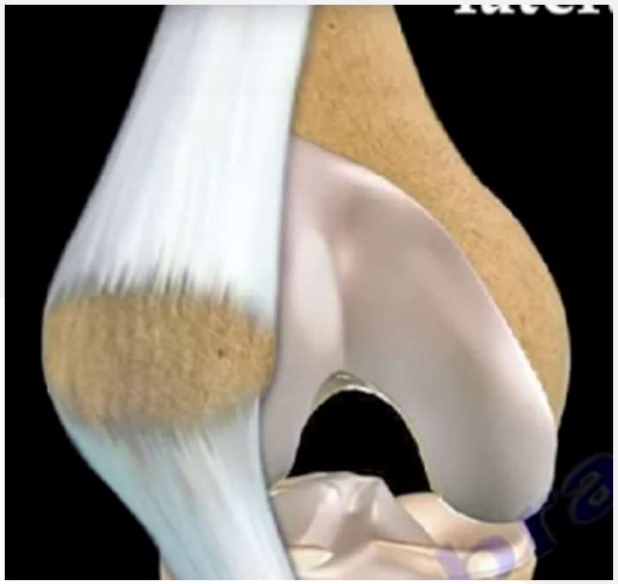


Bone

Stabilizes > 20-30 flexion

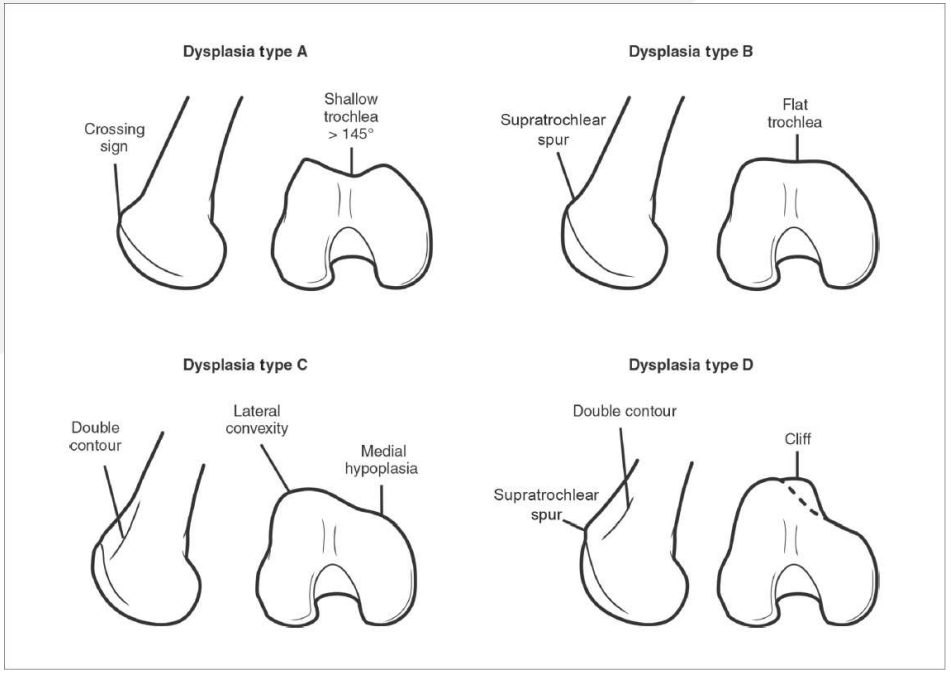
- Trochlea Groove
- Sulcus Angle
- TT-TG

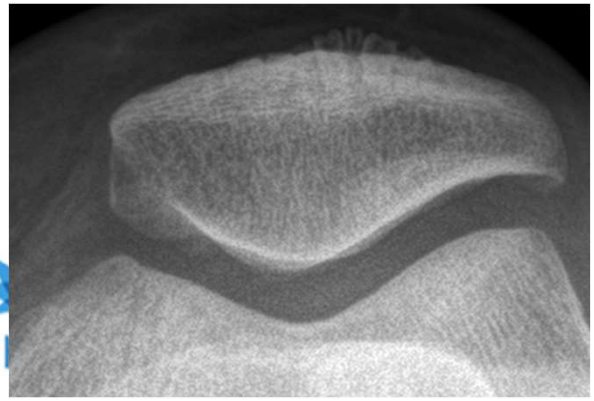


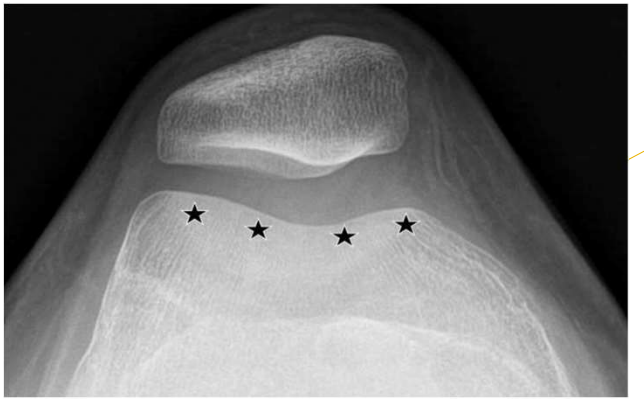


Trochlea Groove- avg 5.2mm

- **Dejour classification**
  - Severity of dysplasia based off anterior femoral condyles
- Most important for stability after 20-30 degrees flexion
- Depth **<4mm** is concerning







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Sulcus angle- Normal 132-144

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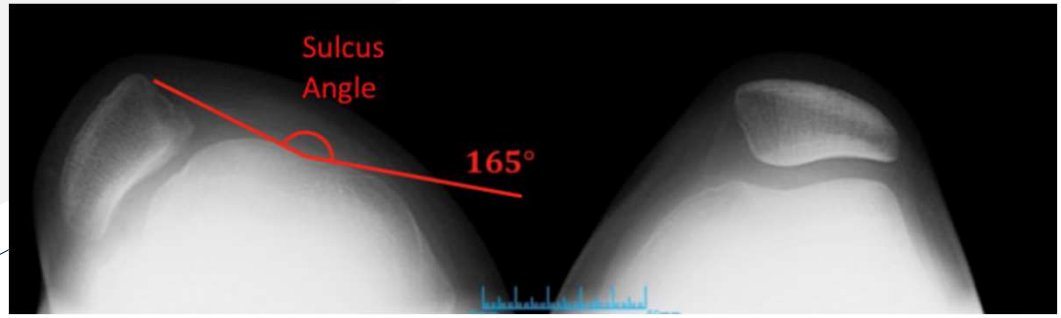
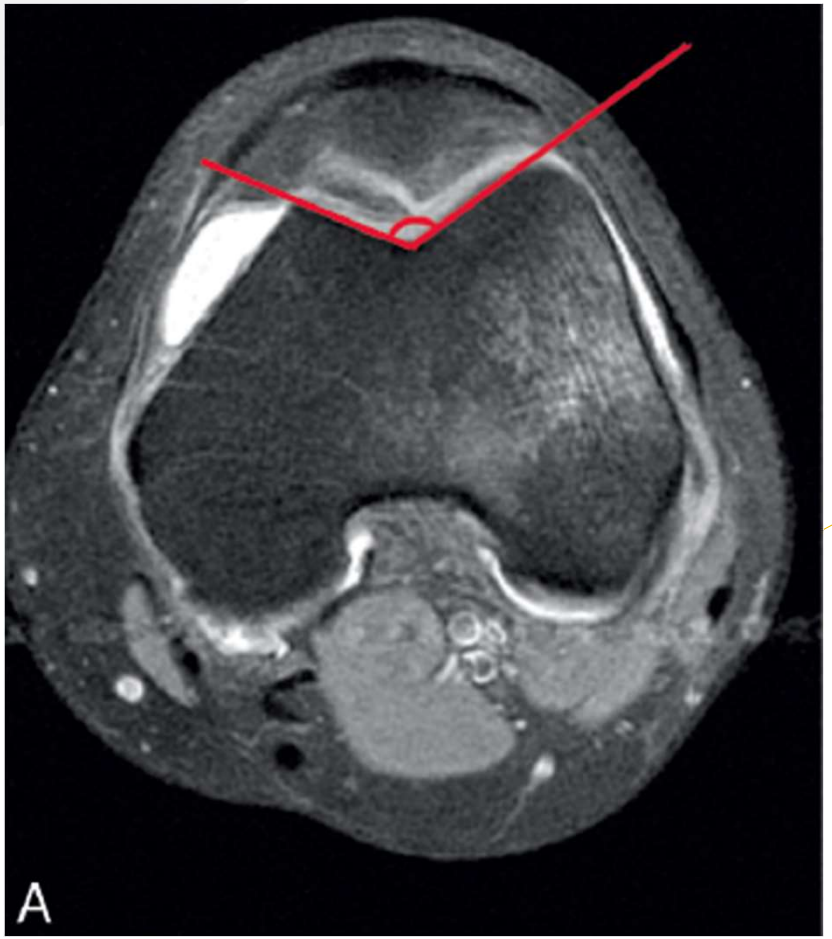
New England Baptist Hospital

- Two Lines that connect the anterior-most points of the medial and lateral femoral condyles to the deepest portion of the trochlear groove
- **>144** is pathologic

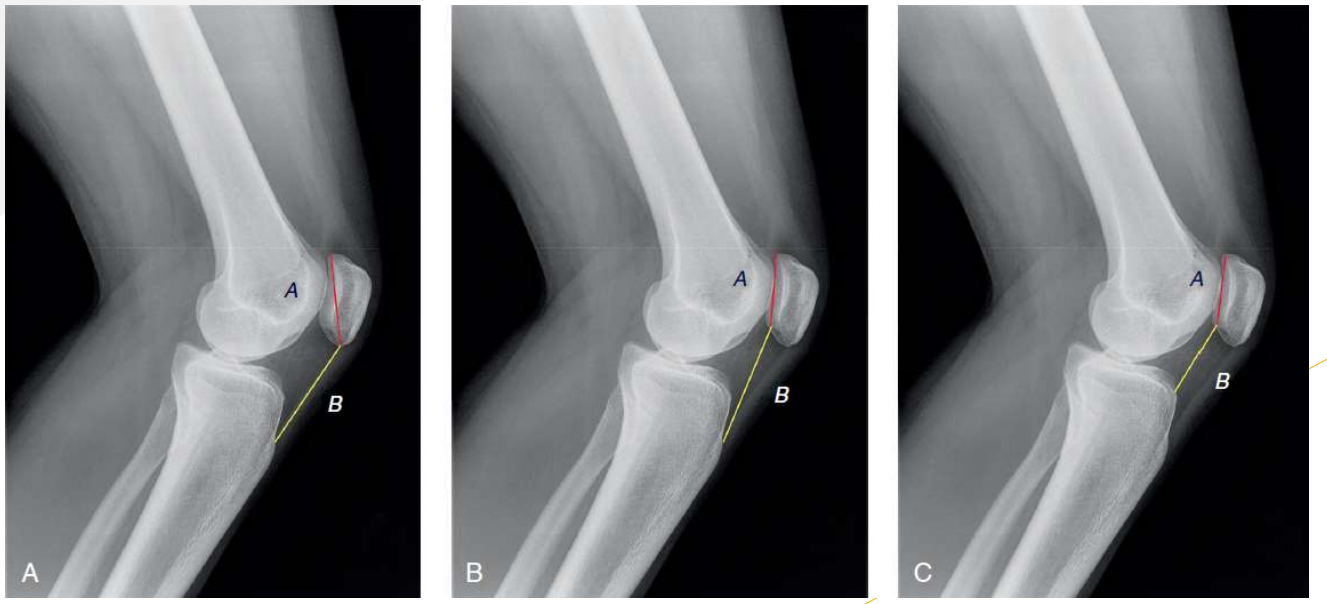




Patella Alta

- **If patella sits high as the knee flexes it takes longer to engage in the groove**

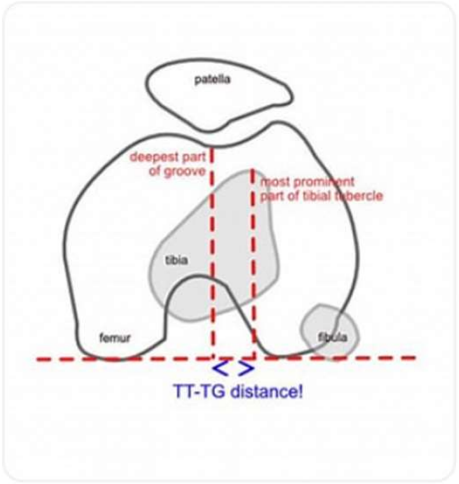
- Radiographic Assessment
- Insall-Salvati
  - Articular length relative to patellar tendon (2 = norm)
- Caton-Deschamps
  - Inferiror articular surface to anterosuperior margin of tibial plaeau over length of patellar articular surface (1.3)

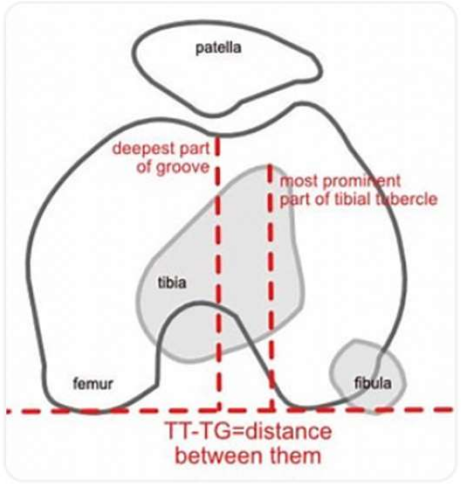


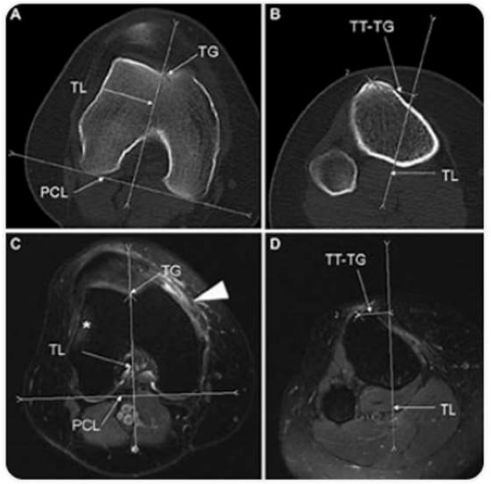
TT-TG angle

Determines lateral displacement of the tibial tubercle in relationship to the trochlea groove

Normal <15
Borderline 15-20
Abnormal >20





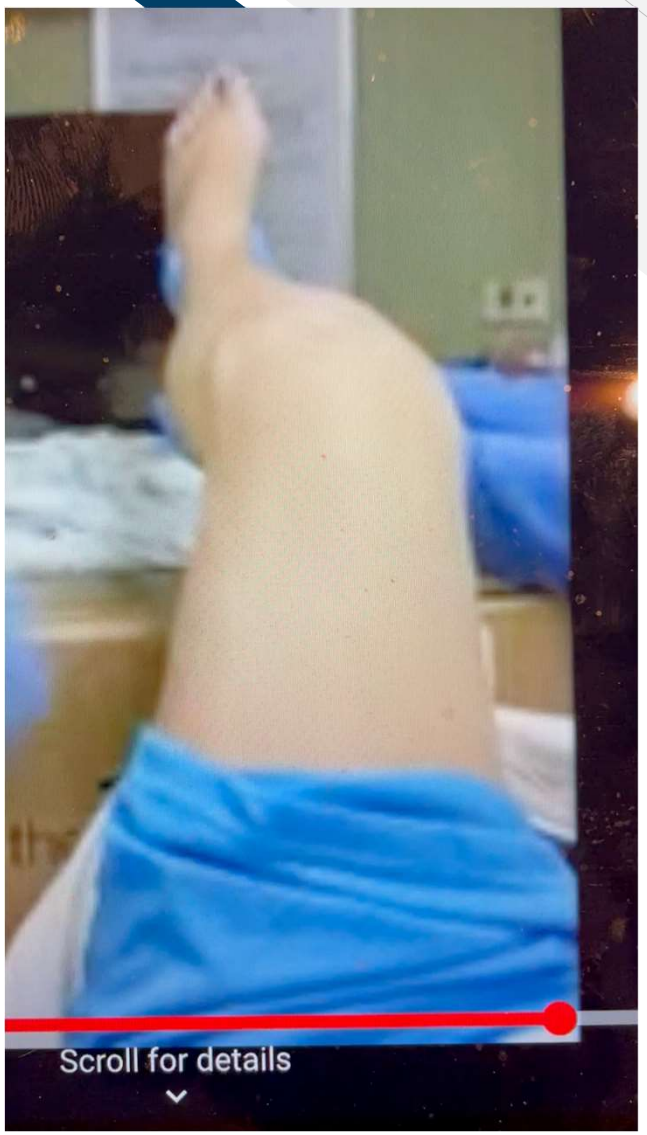


History

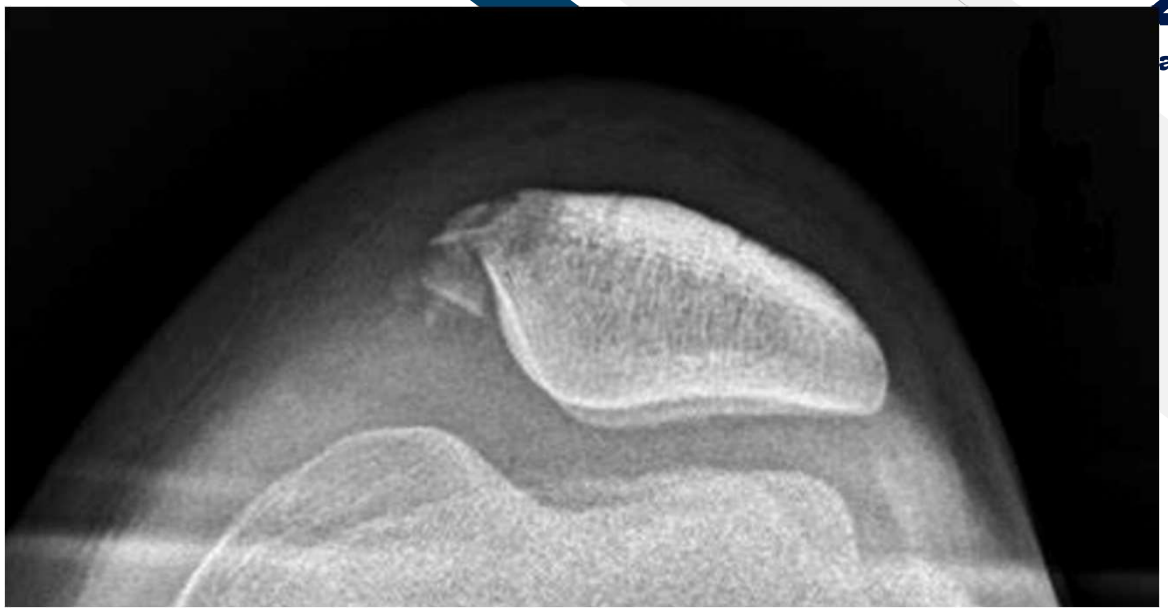
- Age and Gender
  - Younger and female
  - Greater risk future dislocations
- Prior dislocations
  - Greater risk future dislocations
- Job or activity level
  - High demand or risk
- Ligamentous laxity
  - Beighton score

Treatment

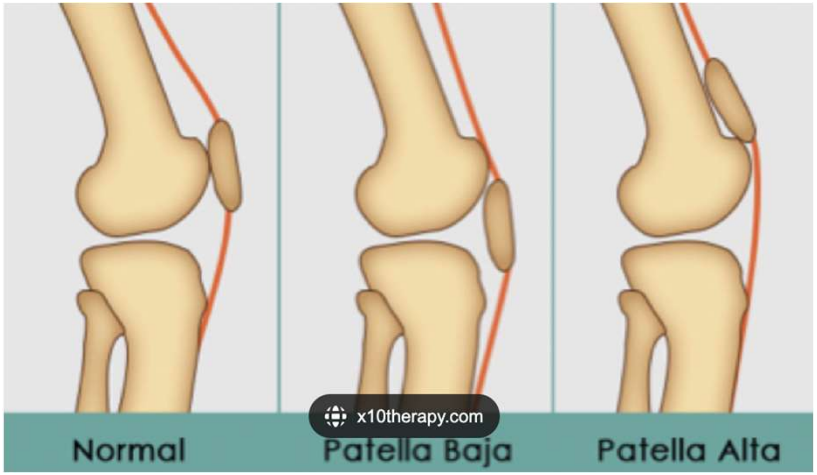
- Prompt reduction
  - With hip flexed
  - Bring knee into extension with pressure on lateral patella in a medial direction



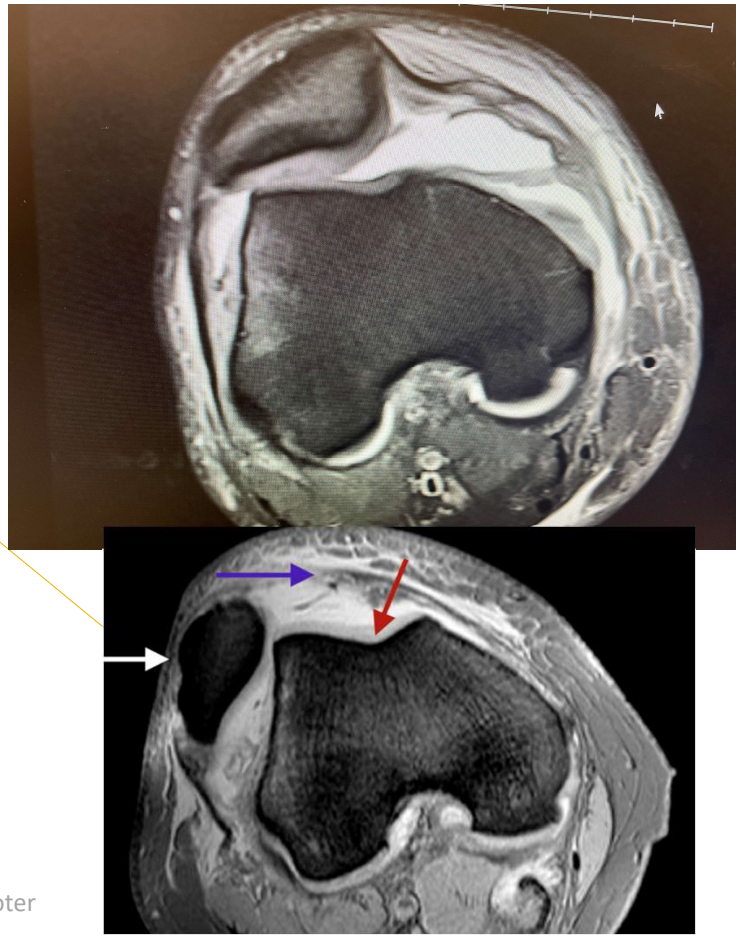
Treatment

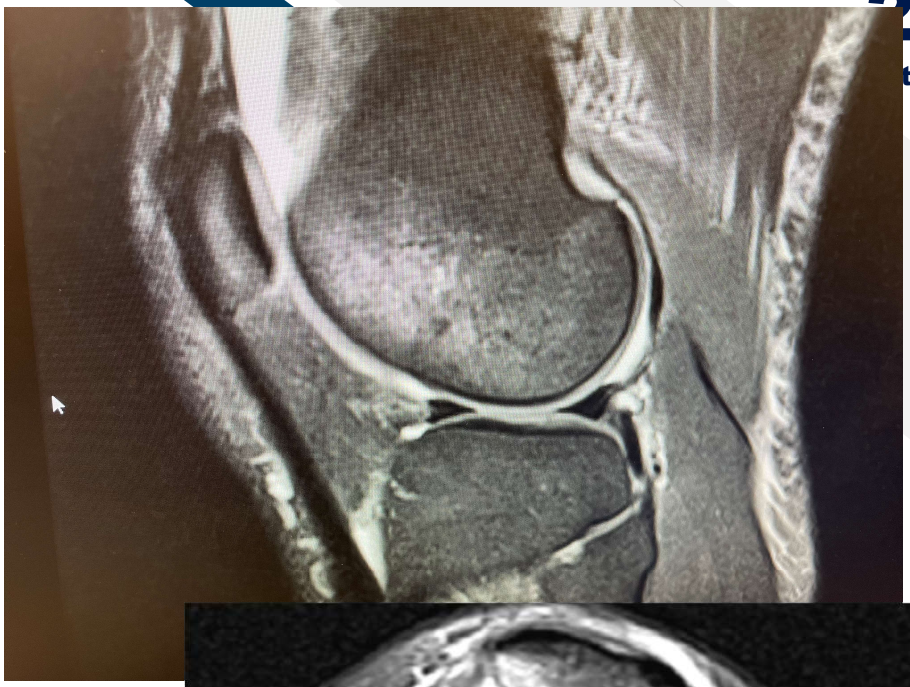


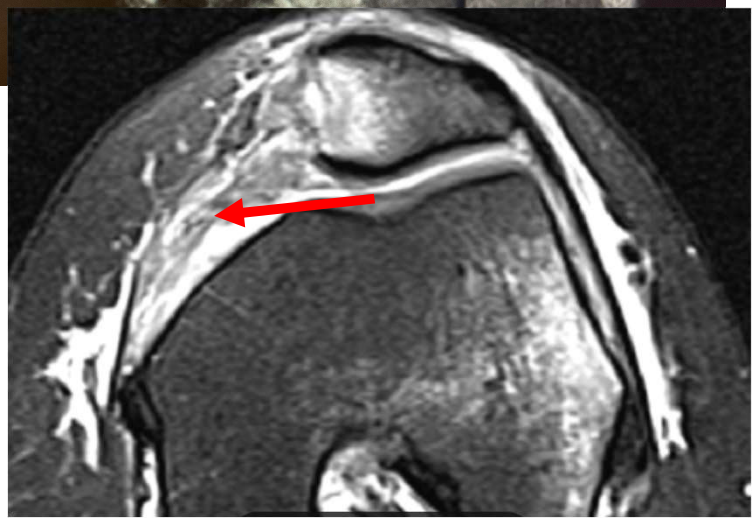
- **Radiographs**
  - Make sure relocated
  - Look for bone fragments
  - Patella alta
  - Trochlea morphology
- **MRI**
  - Bone bruises
  - Cartilage damage
  - Tears of the MPFL
    - Most common off the patella



MRI after dislocation

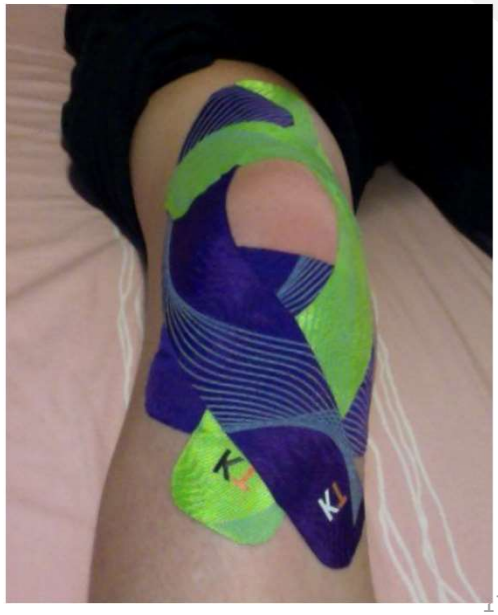






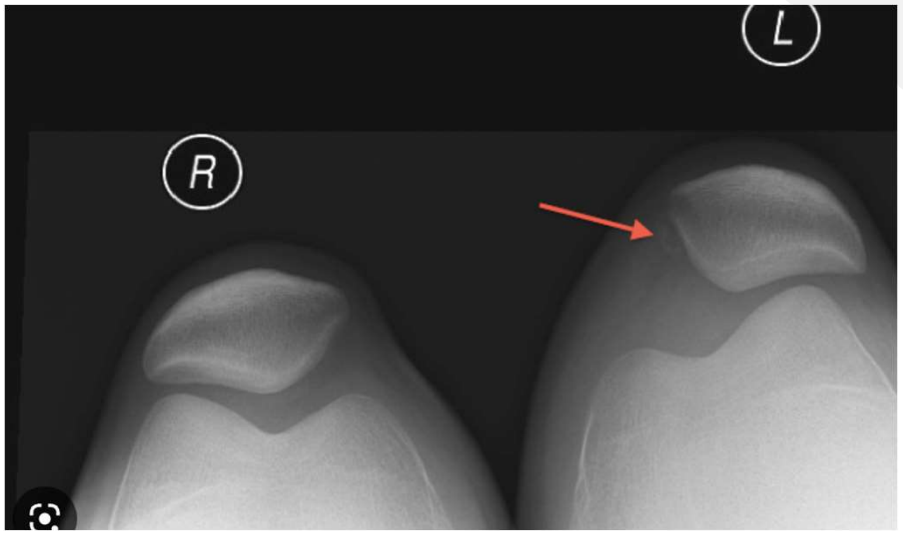
Treatment Options

- **Non surgical in many cases first time dislocation**
- Typically try PT
  - Goals-
    - Decrease swelling
    - Restore ROM
    - Strength
      - Focus is on the **VMO** (**DYNAMIC STABILIZER)**
  - 1-3 months
- Bracing or taping
- Light duty or sedentary work
  - 2-4 weeks
- Full duty
  - 3-4 months



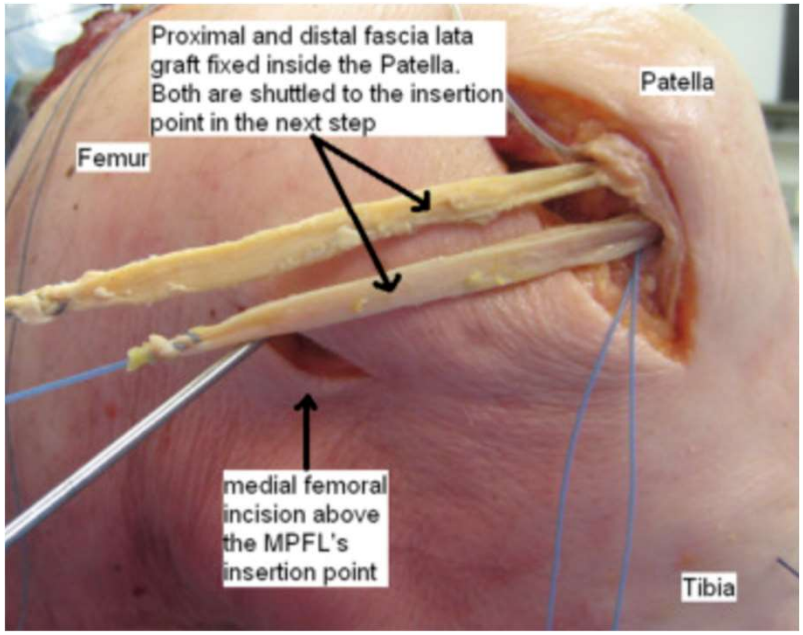
Treatment Options

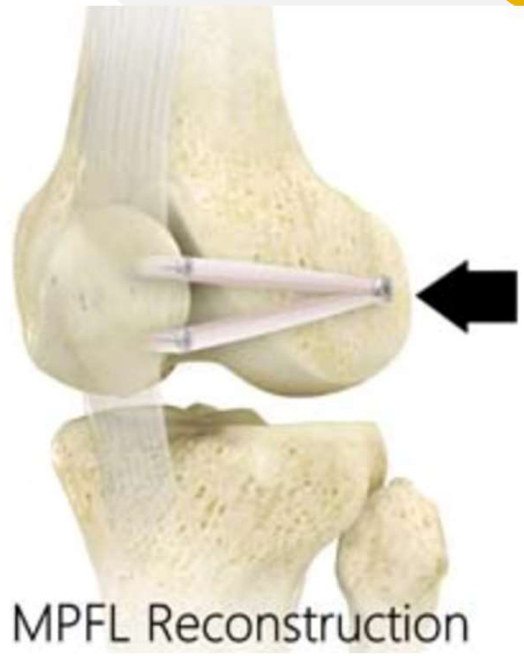
- **Surgery**
  - Loose body
  - Cartilage lesion that can be repaired
- **Relative Indications for Surgery**
  - Subluxed patella
  - 2x or greater dislocation
  - First time in young contact athlete
  - Young person ligamentous laxity
  - Recurrent dislocations



MPFL Repair or Reconstruction

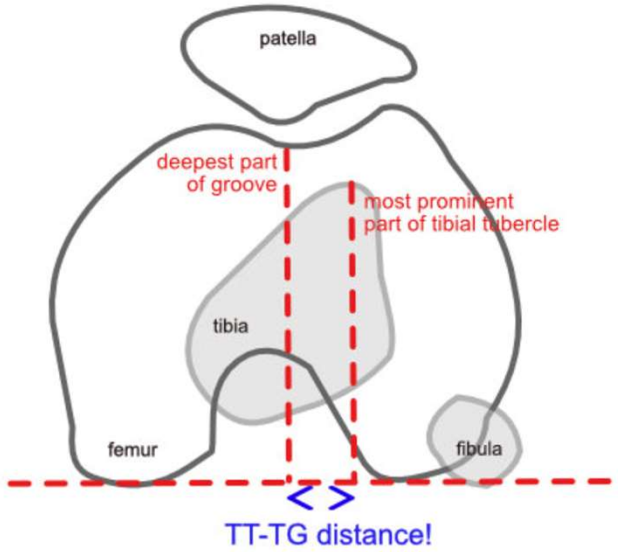
- Can do a primary repair
  - In acute setting
- For a reconstruction
  - Can use cadaver
  - Can use a hamstring autograft

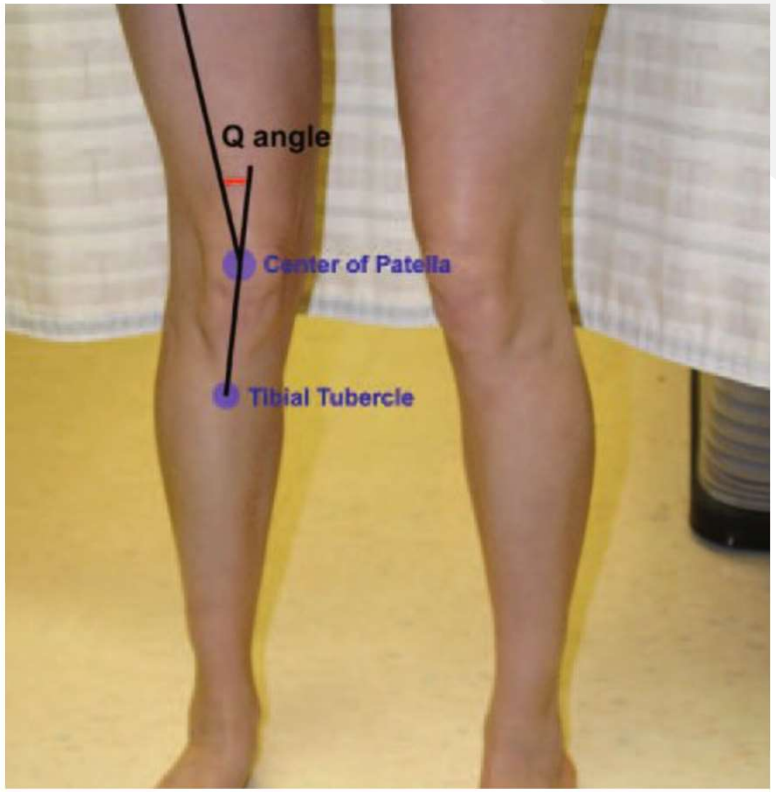




Surgical Management

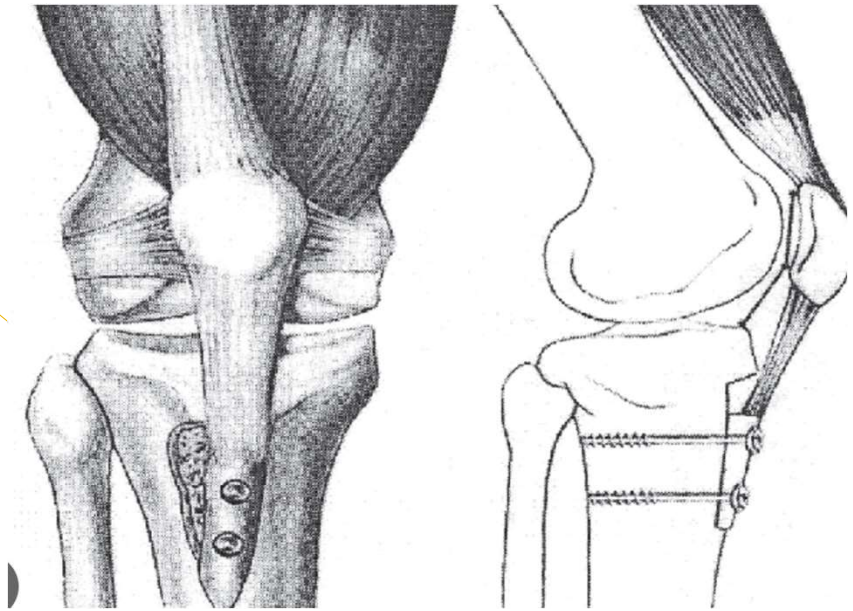
- Needs to tailored to the patients anatomy and associated injuries
  - **Bone Issues**
    - High Q angle
    - TT-TG

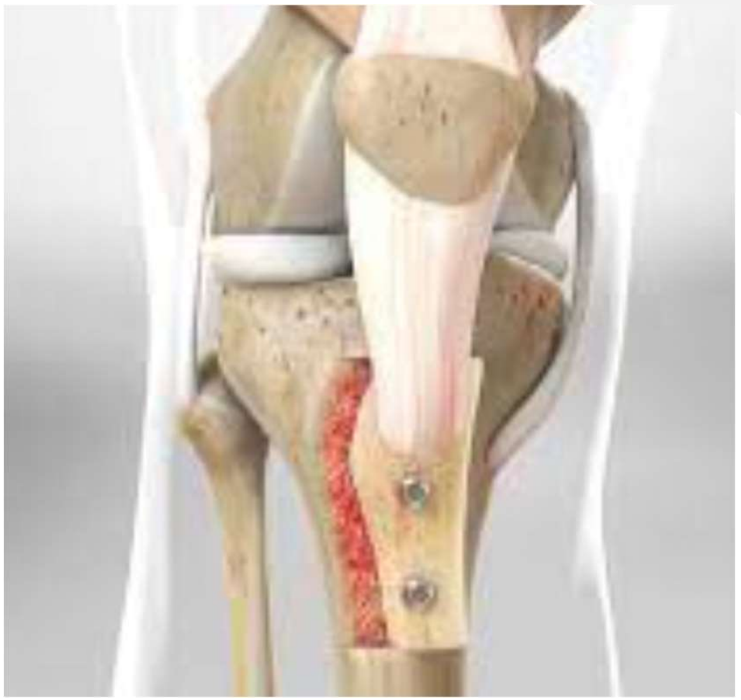




Bone Procedure

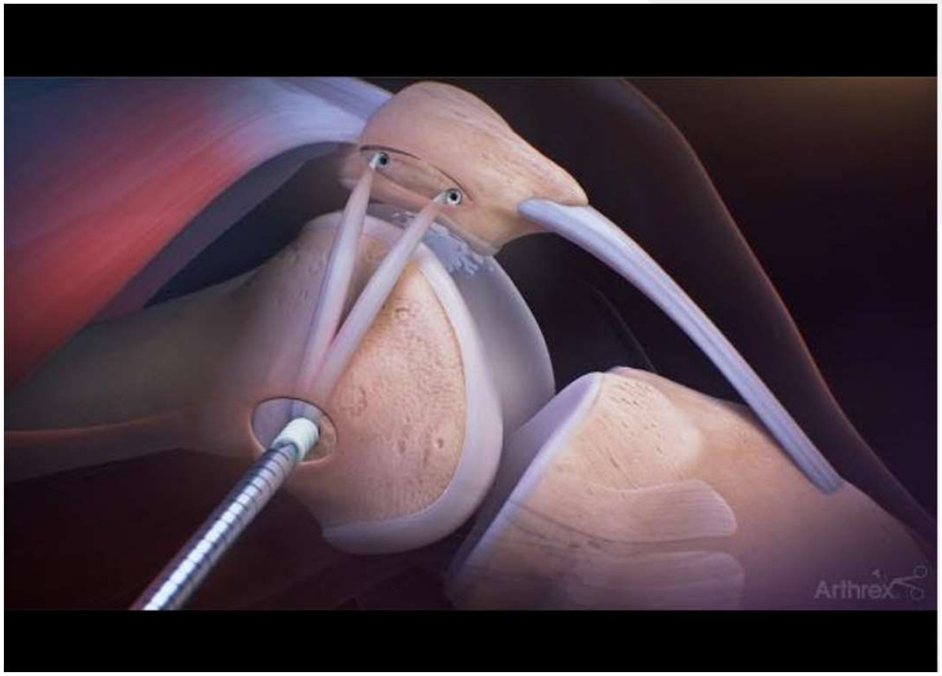
- Fulkerson osteotomy or Tibial Tubercle Osteotomy TTO





Outcomes

- Lowest recurrent dislocation rates with MPFL reconstruction
  - *Hurley et al, AJSM. 2022*
  - *Liu et al, OJSM. 2021*
- MPFL repair is not better for re-dislocation vs reconstruction but better then nonoperative for recurrent dislocation
  - *Liu et al, OJSM. 2021*
  - *Knee Surg Sports Traum*

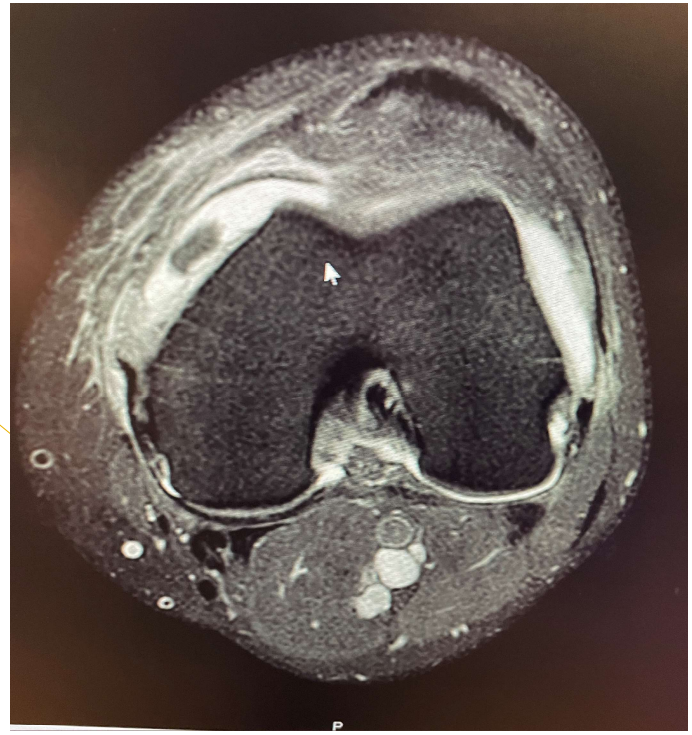


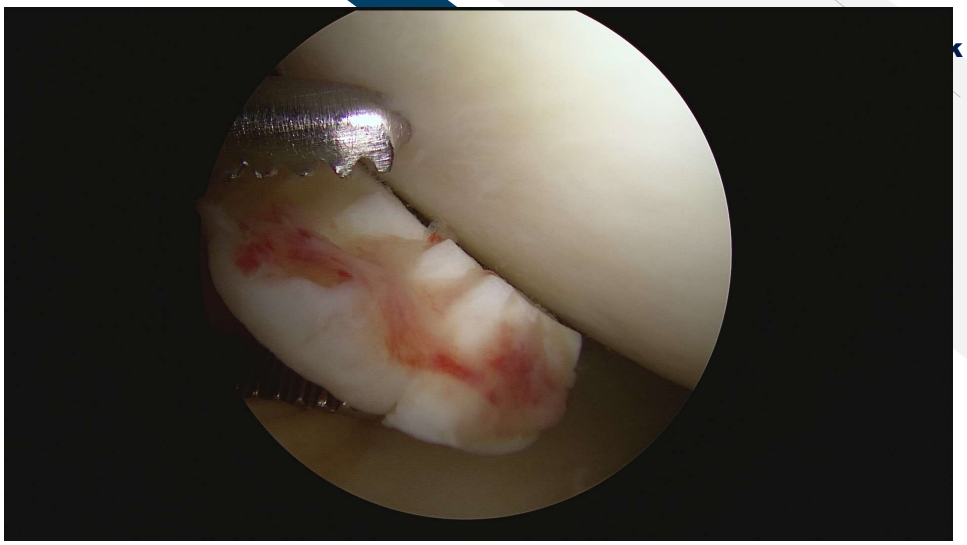
Rehabilitaiton

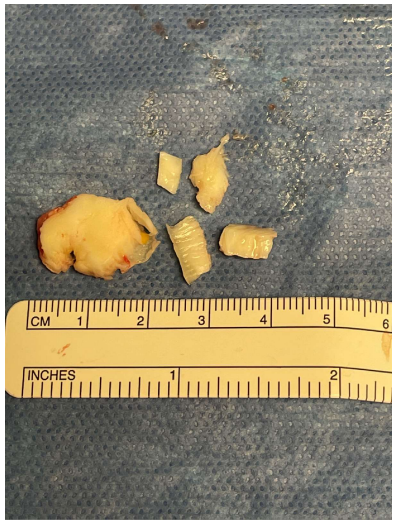
- Typically crutches and brace 3-6 weeks
  - Desk work –
    - When off pain meds
    - Can drive after 6 weeks affected lkeg
  - Light duty
    - 3 months can do most ADL's
  - Full duty
    - Average 6 months
    - Can see improvments with strength up to 1 year

25 yo professional rugby player

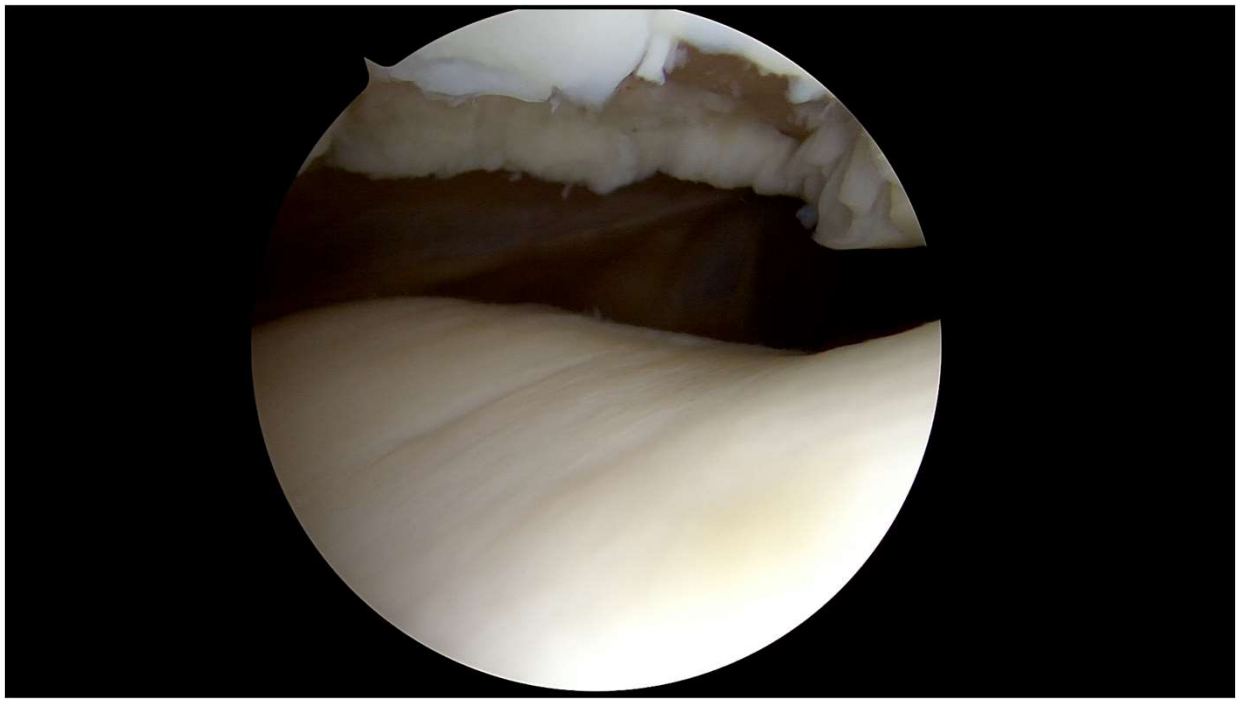
First time dislocater







25 y/o rugby player



Conclusion

Must assess all Risk Factors for recurrent dislocation when treating patella dislocation!!!

- **Hx**
  - How many times has it dislocated
  - Activity level
- **PE**
  - Ligamentous laxity
  - Valgus alignment
- **Imaging**
  - Trochlea morphology, patella alta, TT-TG, partial or full tear MPFL, cartilage injuries

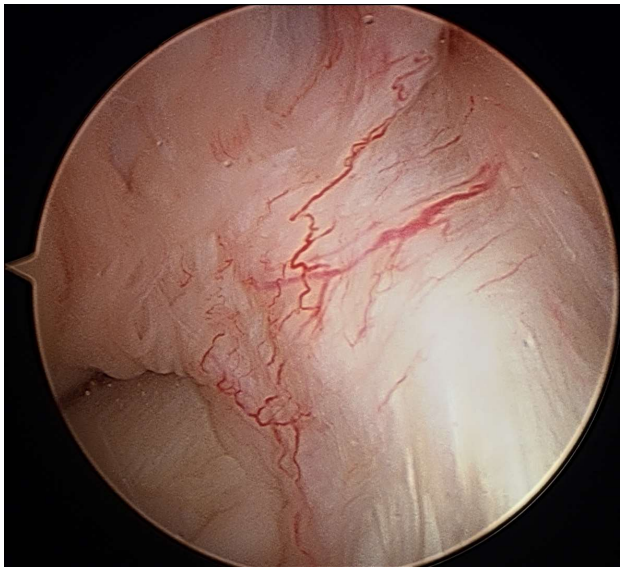
- Trend is towards treating the first time dislocater with surgery

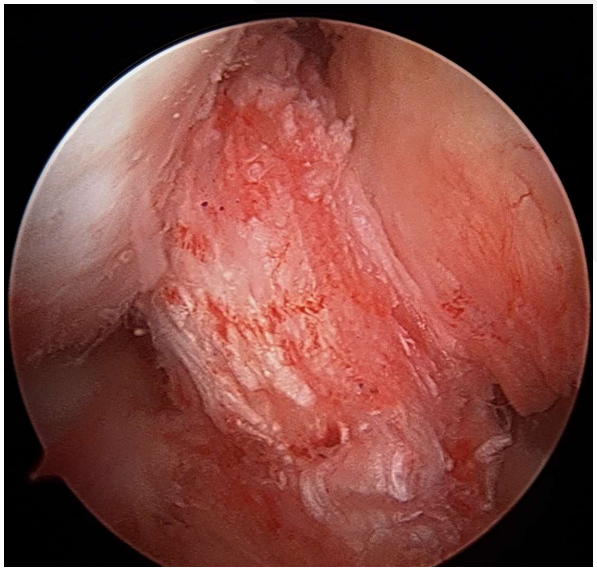
Thank You

Update on ACL Injuries

Joseph J. Czarnecki, MD
Director, Cartilage Care Center
Excel Orthopaedic Specialists

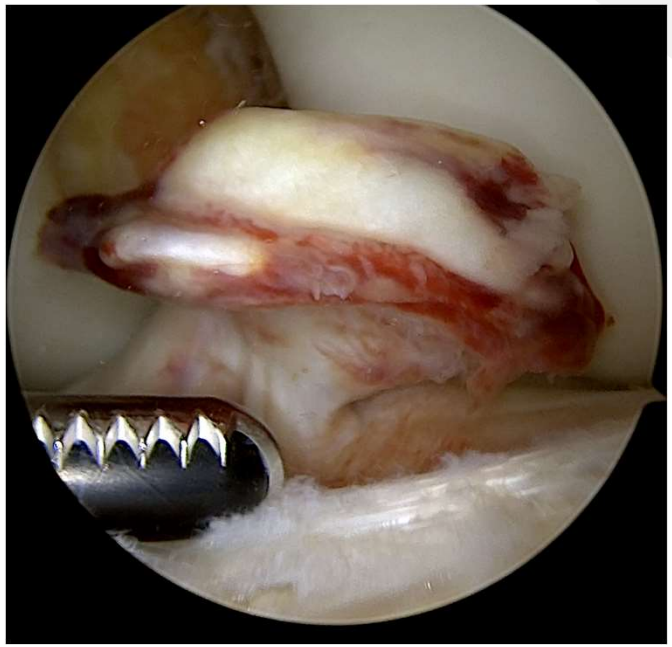
- ACL Overview
  - Associated Injuries
  - Reconstruction Techniques
    - Autograft vs. Allograft
    - Soft-tissue vs. bone
  - Return to work





ACL Injuries

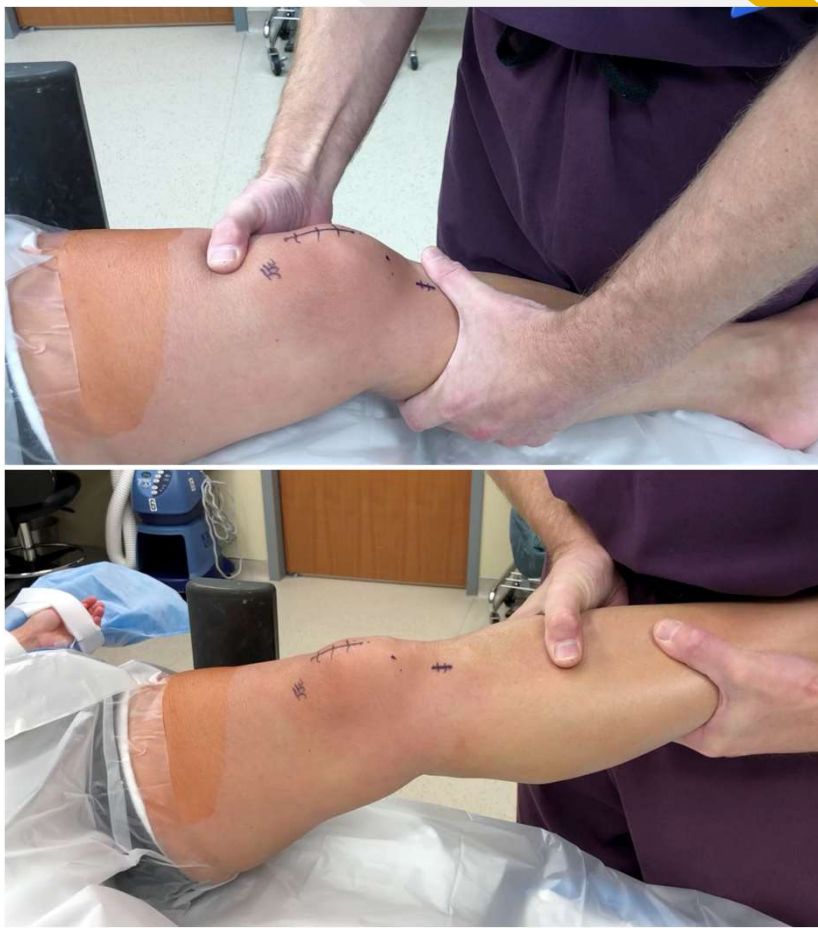
- Non-contact usually more frequent than contact
- Work injuries more commonly contact from trauma or fall on slippery surface
  - Pop, buckling, immediate swelling and pain
  - If no associated injuries, pain usually goes away
  - Knee remains unstable for stopping, jumping, cutting, pivoting, twisting
- General population incidence 1 in 3,000
  - 100,000 – 200,000 people a year in US



Diagnosis

History
- Pop, buckles (gives way,) immediate swelling, instability
- Often confused with patellar subluxation

Physical Exam
- Limited ROM
- Effusion (joint swelling, “water on the knee”)
- Lachman test
- Pivot shift
- Lateral joint line tenderness from bone bruises



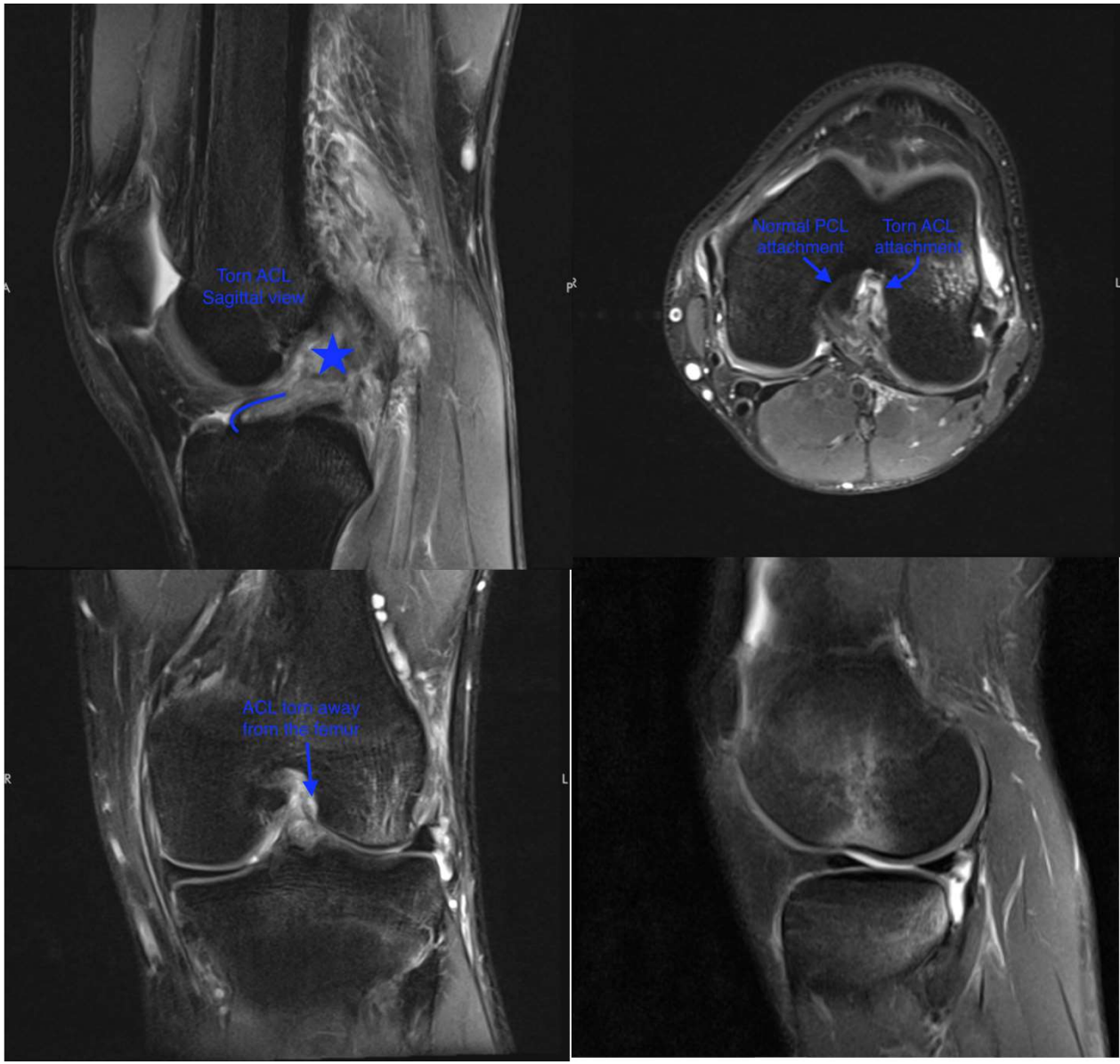
Imaging

X-ray

- Occasional Segond fracture at Gerdy's tubercle lateral tibia (anterolateral ligament attachment)

MRI

- Usually mid substance tear; occasionally detached from femur
- Corresponding bone bruise pattern (pivot shift injury)

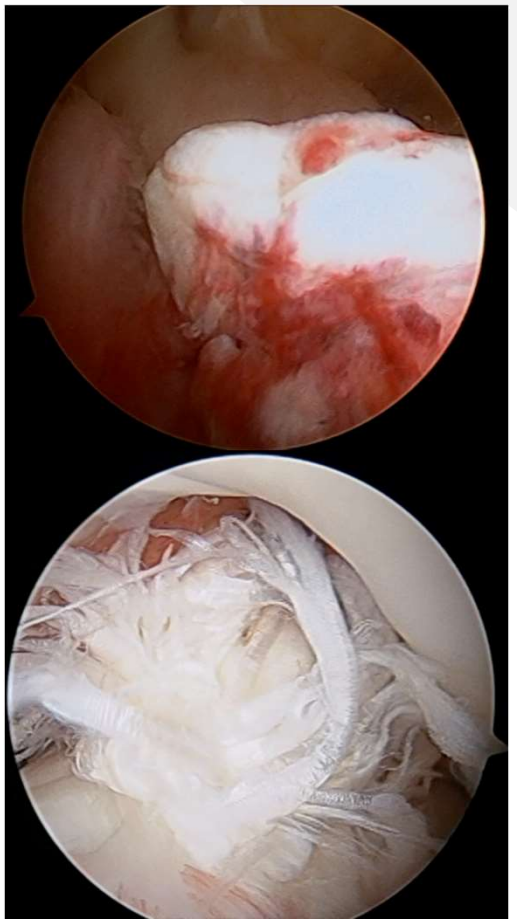


“Doc, Do I Need Surgery ?”

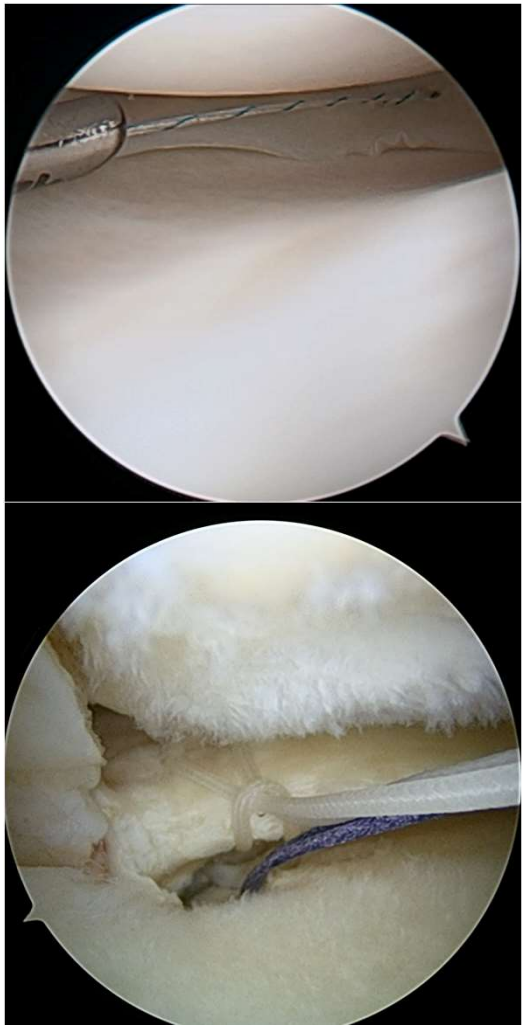
- Under age 35
- Symptoms of instability
- Meniscal tear or cartilage injury at same time

- Active lifestyle
- No significant arthritis

- Trial of physical therapy for some patients
  - Prehab of proceeding with surgery
- Bracing for at-risk activities



Meniscal Tears

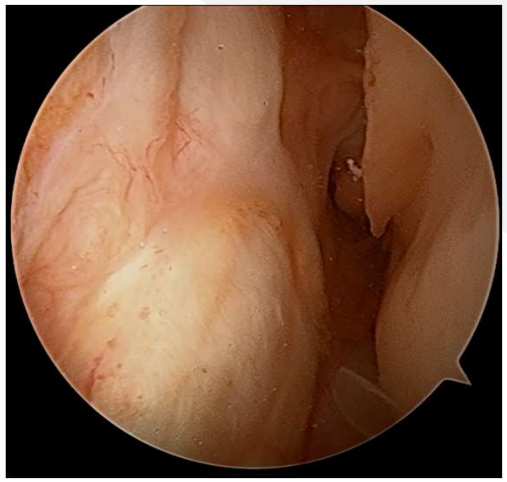


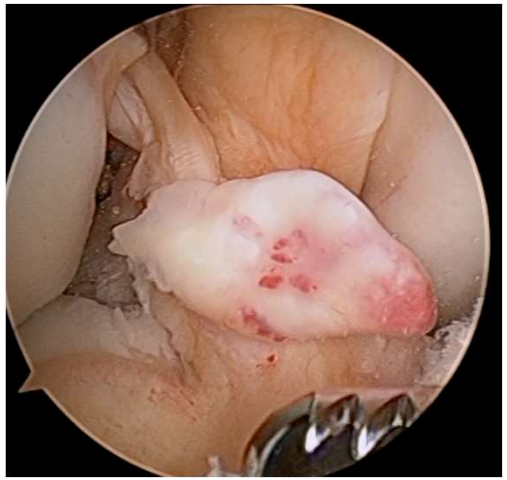
- Normal menisci serve as a gasket, increasing the surface area of contact, reducing stress per unit area
- Acute knee injuries more likely to tear lateral meniscus
- Chronic ACL instability leads to medial meniscal tears
  - Secondary stabilizer to anterior tibial translation
  - Chronic damage in which posterior horn sees excessive stress

“I Have Decided Upon Surgery. Now What Do I Do?”

- Autograft (Using your own tissue)
  - Quadriceps
  - Hamstring
  - Patellar Tendon (BTB)
  - Lower re-tear rates (2-5%)
- Allograft (Cadaver)
  - Less pain
  - Higher re-tear rate (10-40%)
  - Non-irradiated grafts have re-tear rates similar to autograft (4.5%)

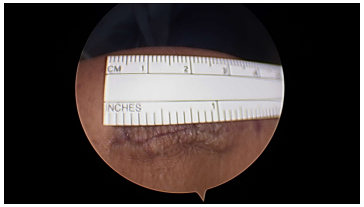
- Sports medicine surgeon

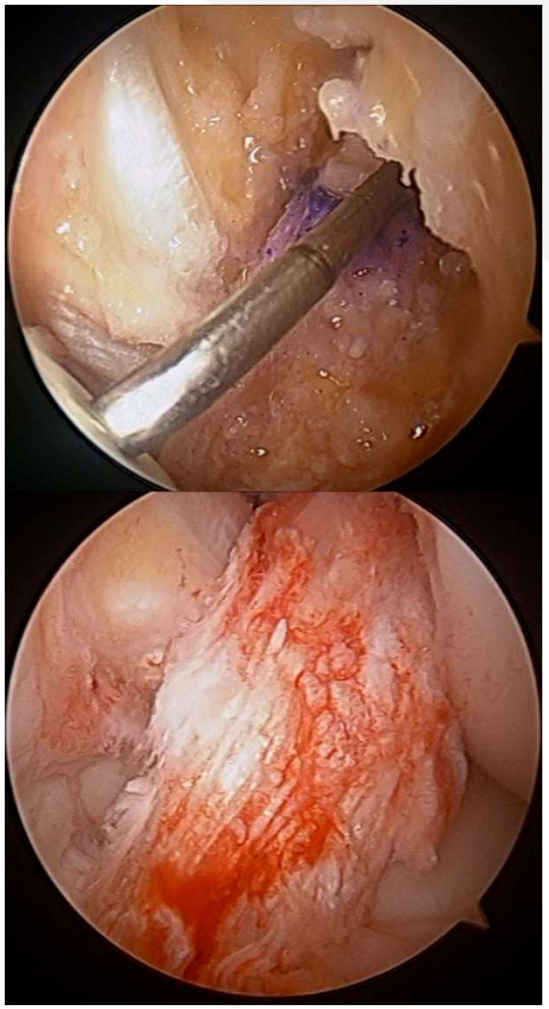




Autograft – Quadriceps (with or without bone plug)

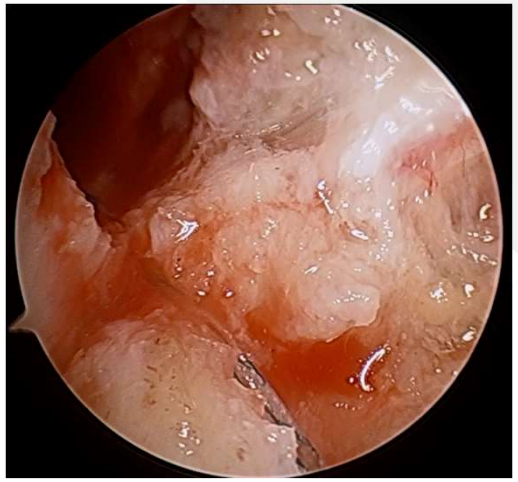
- Advantages
  - Larger graft (8-10mm wide, 4-6mm thick)
  - Partial thickness graft (walls and floor preserved)
  - Bone-to-bone healing on femoral side
  - No negative impact upon knee flexion strength
  - Low re-tear rates
  - No increased incidence of anterior knee pain and arthritis
- Disadvantages
  - New to many surgeons
  - Visible scar when sitting (only 1.25”)

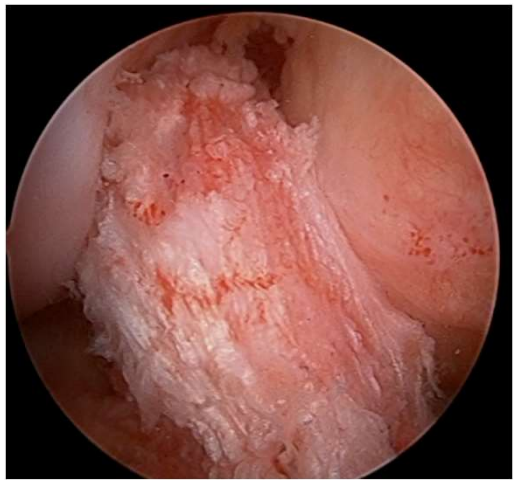




Autograft – Bone patellar tendon bone (BTB)

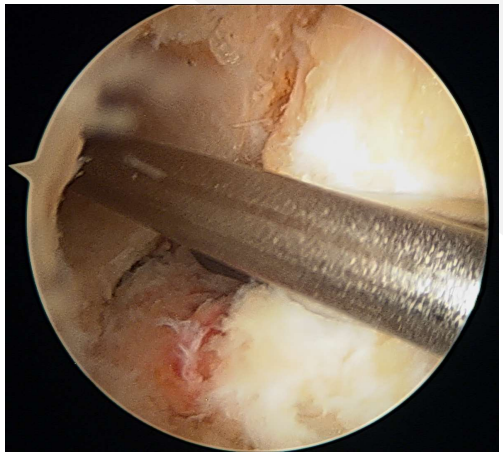
- Advantages (historical gold standard)
  - Large graft (8-10mm wide, 3-4mm thick)
  - Bone-to-bone healing on both sides
  - No negative impact upon knee flexion strength
  - Low re-tear rates
- Disadvantages
  - More painful larger scar, difficulty kneeling
  - Increased anterior knee pain, PF DJD
  - Full thickness graft of central tendon, shortens tendon

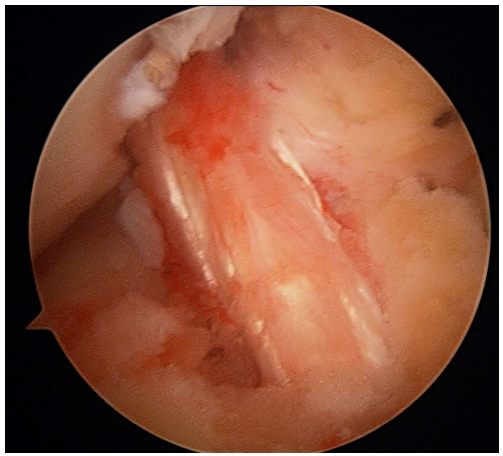




Autograft – Hamstring

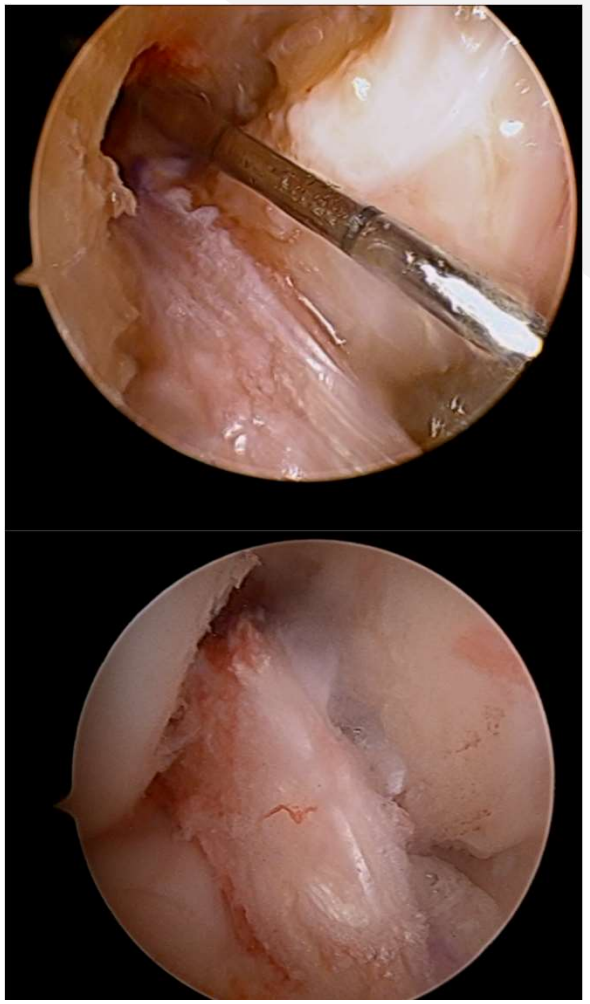
- Advantages
  - Popular
  - Relatively easy harvest
  - Cosmetic scar
- Disadvantages
  - Decreased knee flexion strength, cramping, loss of top-end speed
  - Smaller grafts (6.5-9mm)
    - Supplement w/ allograft under 8mm
  - Laxity on instrumented testing
  - Soft tissue healing slower, tunnel widening on X-rays
  - Occasional truncated grafts
  - Avoid with MCL injuries



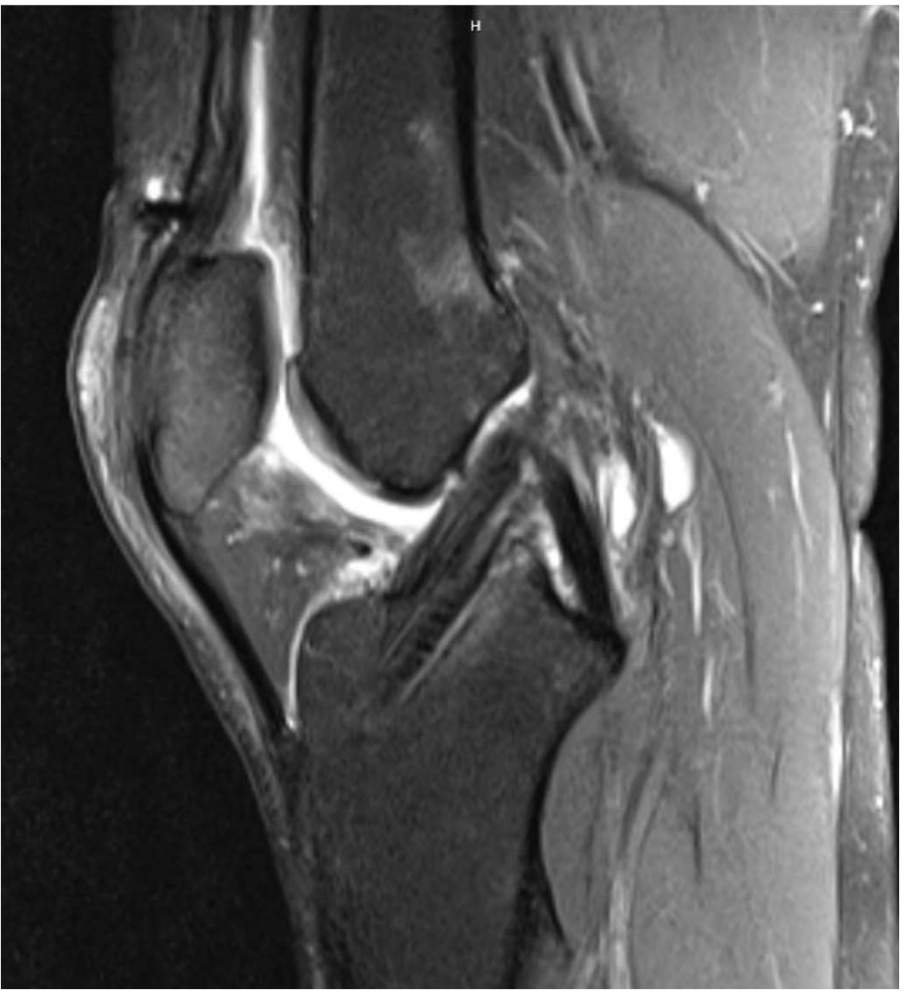


Allografts

- Advantages
  - Over age 35-40, revision, collagen disorders, multi-ligament injuries
  - Fast, easy
  - No harvest
  - Most cosmetic scar
- Disadvantages
  - Higher re-tear rates (4.5-40%)
    - Irradiated, soft tissue
  - Tunnel widening
  - More difficult revisions requiring bone graft at times
  - Rare communicable disease <1:1,000,000



ACL Post-op



2023
Work Related Injuries Workshop

- Significant variability for return
  - Pain tolerance and motivation
  - Available accommodations
  - Right versus left with driving
  - Associated procedures affecting weight-bearing and ROM

- Ideal scenario
  - Out 1-2 weeks, then sedentary
  - Light duty at 6 weeks
  - Moderate duty at 3 months on stable terrain, no pivoting
  - 6 months more significant
  - 8-9 months no restrictions

Knee Cartilage Injuries: Treatment Options 2023

Joseph J. Czarnecki, MD

Director, Cartilage Care Center

Excel Orthopaedic Specialists

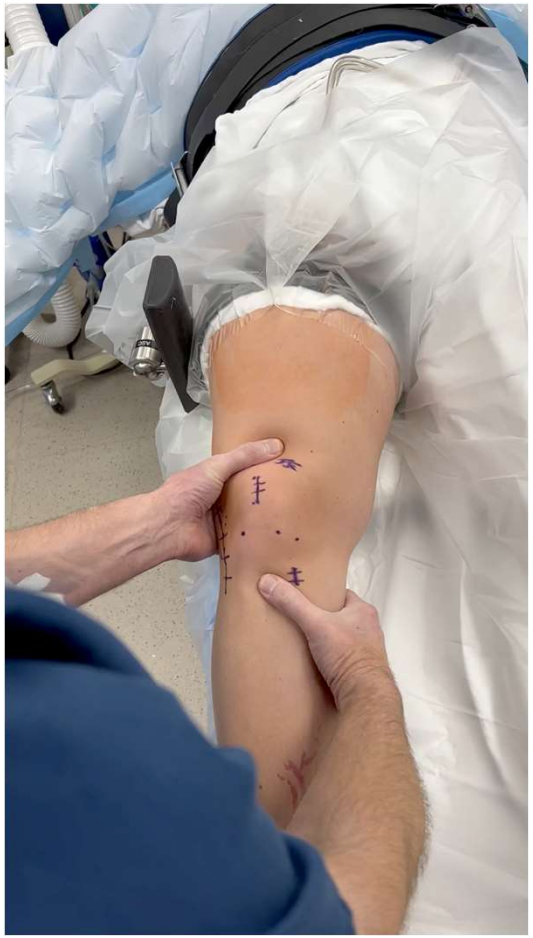
Disclosure

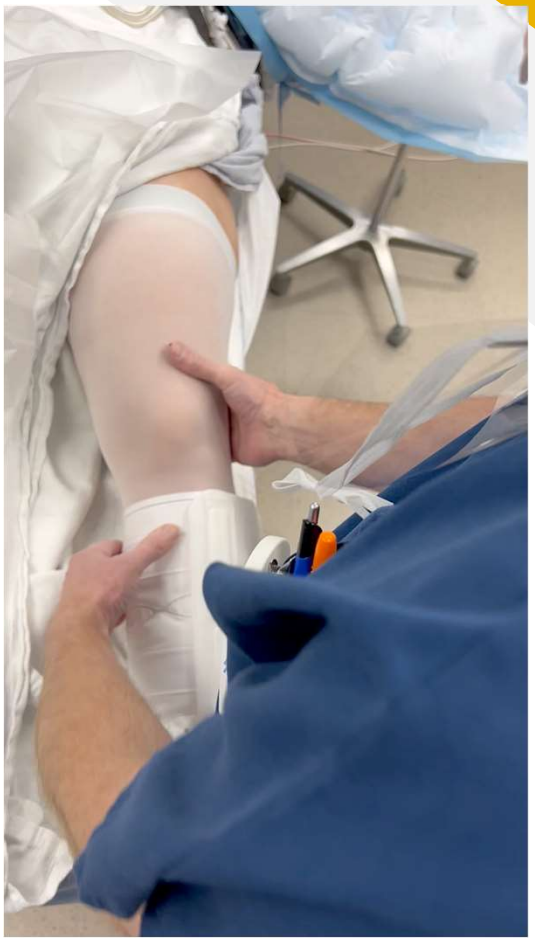
Speaker's Bureau:

- Vericel Corporation

Cartilage Injury Work-up

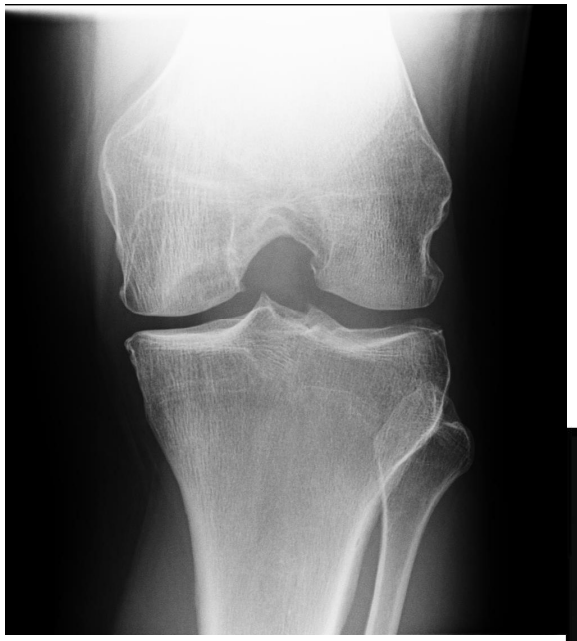
- History
  - Trauma or repetitive; prior history
  - Pop, crack, tear, rip, giving way (AKA mechanical Sx's)
  - Swelling – immediate, hours or next day
  - Location - "point to the pain"
- Physical Examination
  - Effusion
  - Range of motion
  - Tenderness
  - Stability and tracking
  - McMurray

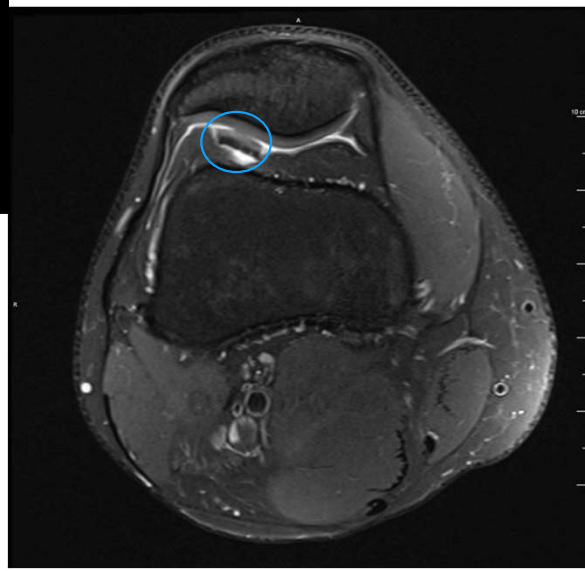




Cartilage Injury Work-up

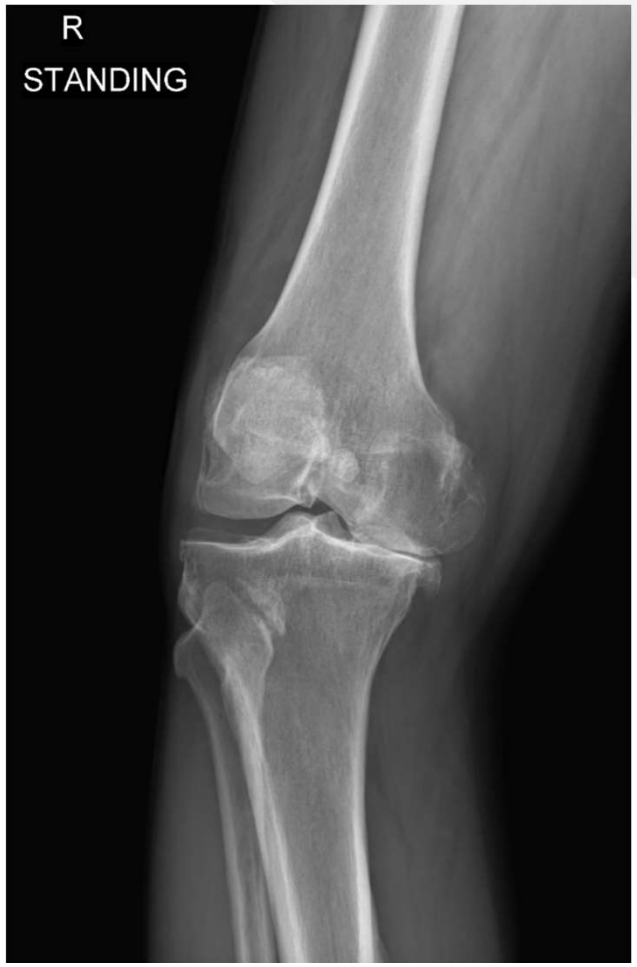
- Imaging
  - Weight-bearing knee films
    - Evaluate carefully for subchondral changes
    - Standing alignment films at times
  - MRI
    - Ligamentous injury, stability, tracking
    - Marrow edema
  - Occasionally CT scan





Million Dollar Question: Is this arthritis???

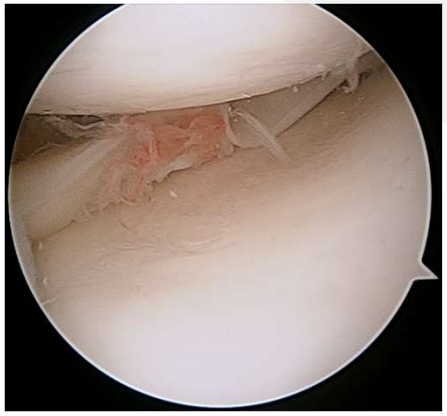
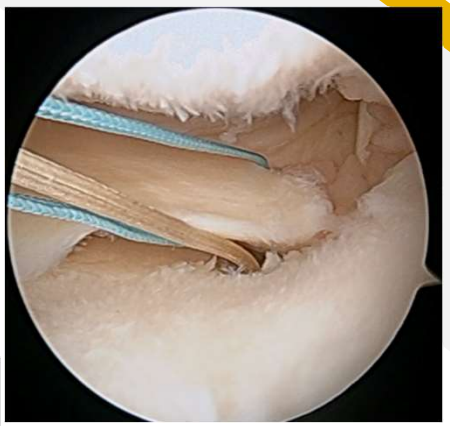
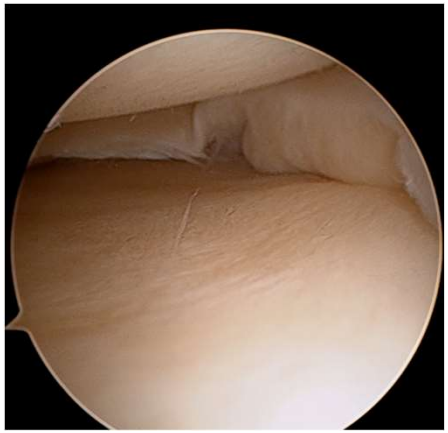
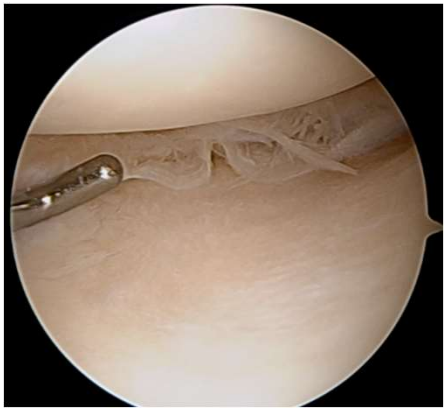
- This is not a cartilage problem!
  - Does not need a meniscectomy, plica, chondroplasty, synovectomy, loose body removal (which he received unnecessarily)
  - Needed a cortisone injection to get over the “injury” and then a well-done replacement



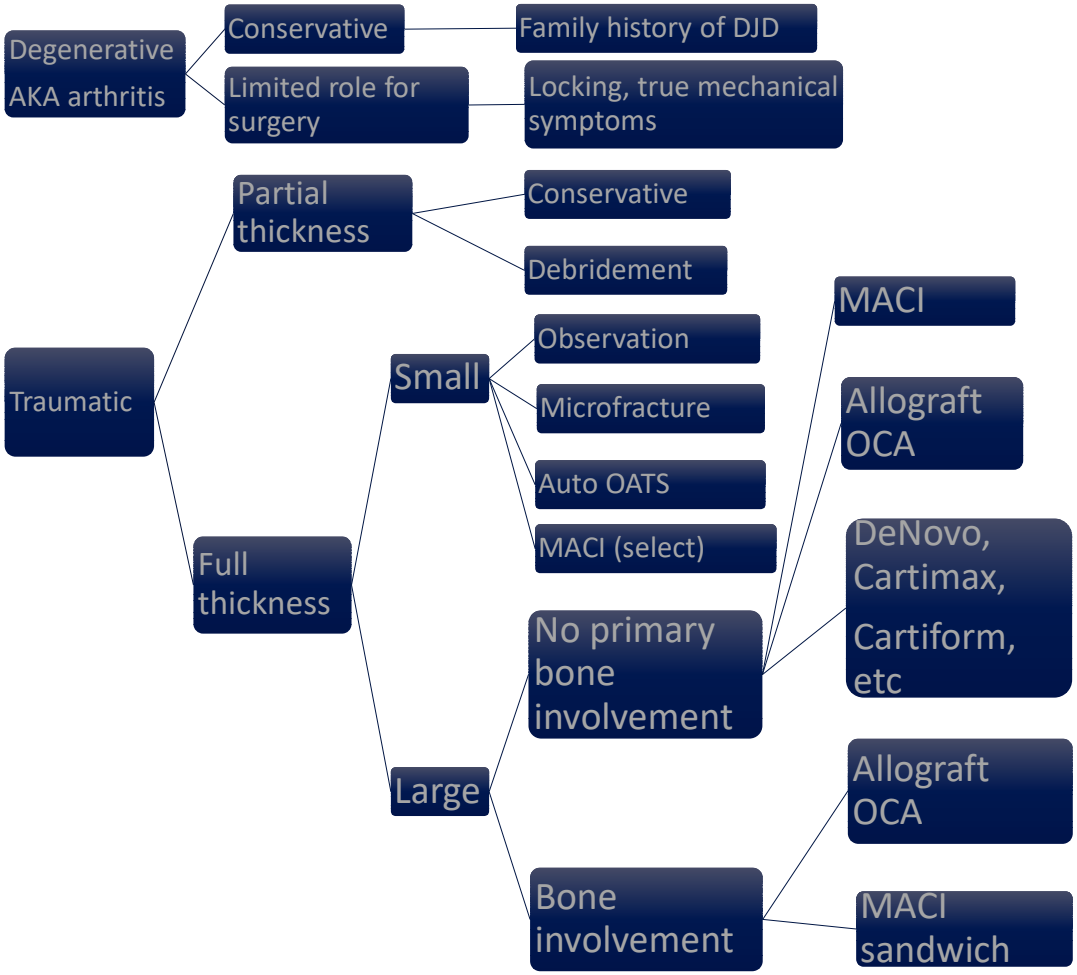
Meniscus Tears

- Different tear patterns with different treatment options:

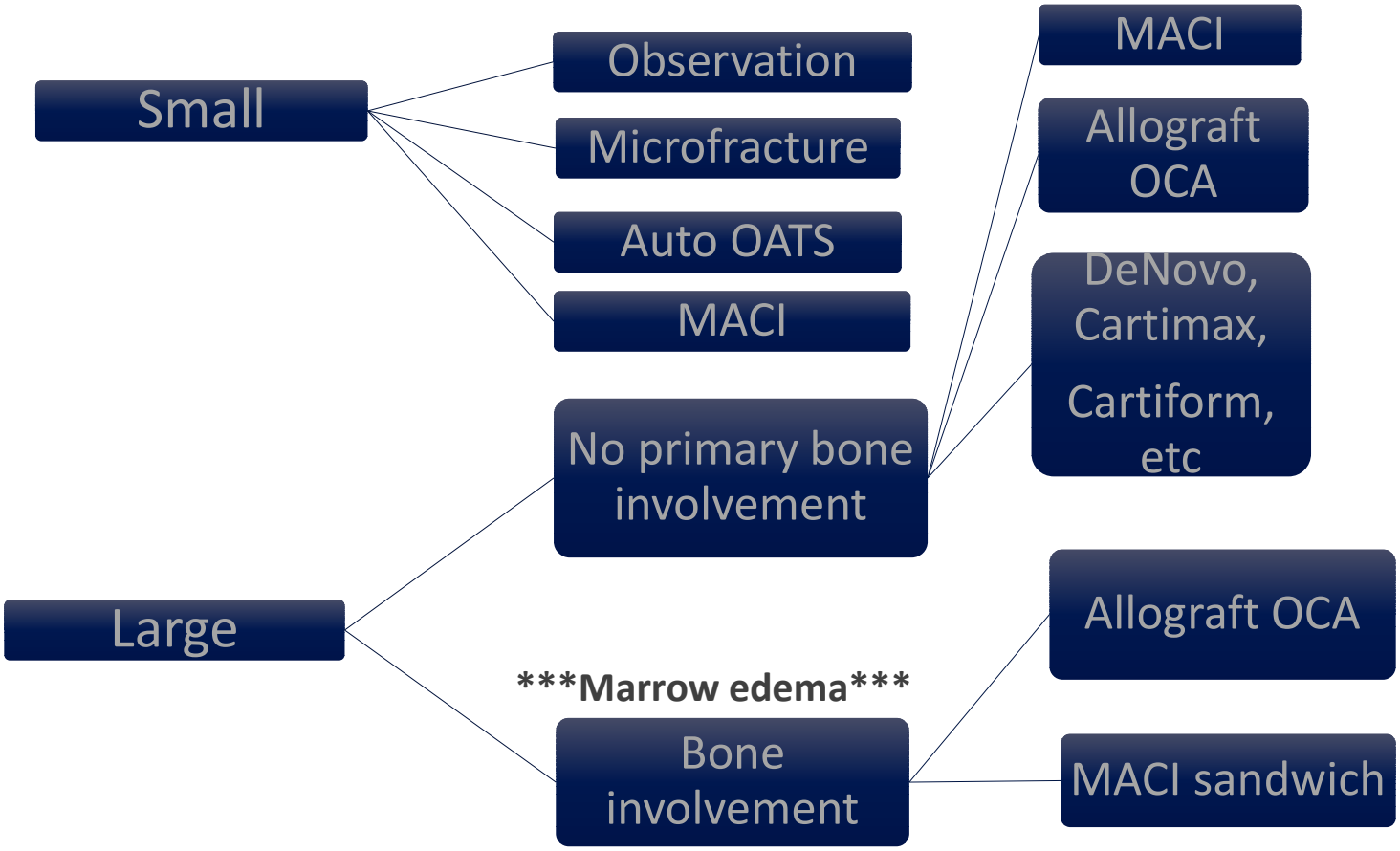
1. **Peripheral, including bucket handle**
   - Should be repaired; **PRP** to enhance healing
   - Rehab – PWB to WBAT with brace locked (limiting flexion to 90 for 4 weeks for bucket handle tear)
2. **Root tears and complete radial tears**
   - Should be repaired if no major arthritis; **PRP**
   - Rehab – NWB or TDWB with brace locked, limiting flexion to 90 for 4 weeks
3. **Radial oblique and complex tears**
   - Arthroscopy, partial meniscectomy if locking or fails conservative
4. **Free margin, horizontal cleavage and degenerative tears**
   - Conservative, injections unless refractory and no arthritis

Cartilage Treatment Algorithm



Cartilage Treatment Algorithm Continued



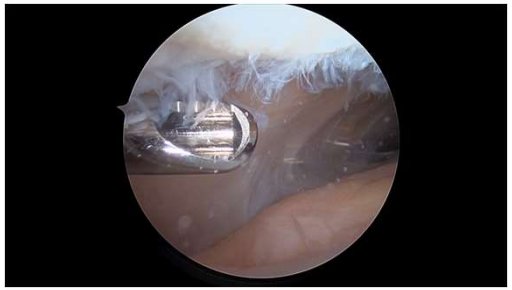
Treatment Options for Cartilage Defects

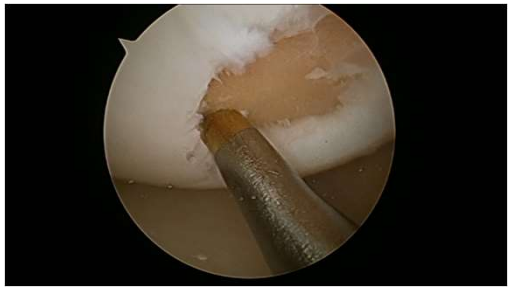
Conservative

- Physical therapy
- NSAID's, injections
- PRP / BMAC

Arthroscopy

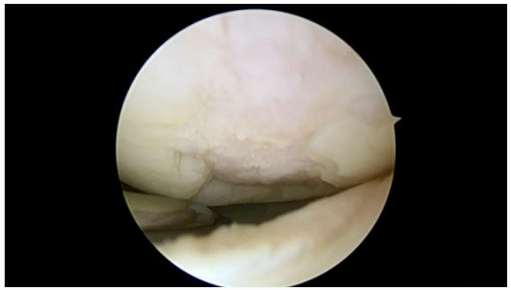
- Chondroplasty (debridement)
- Microfracture (Drilling)
- Microfracture augmentation

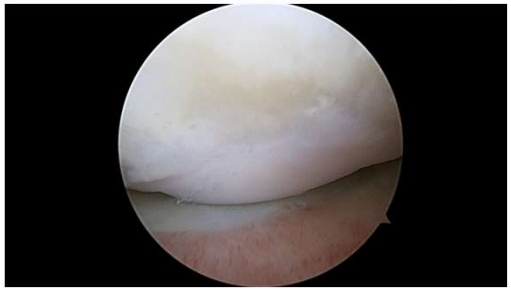




Repair/restoration

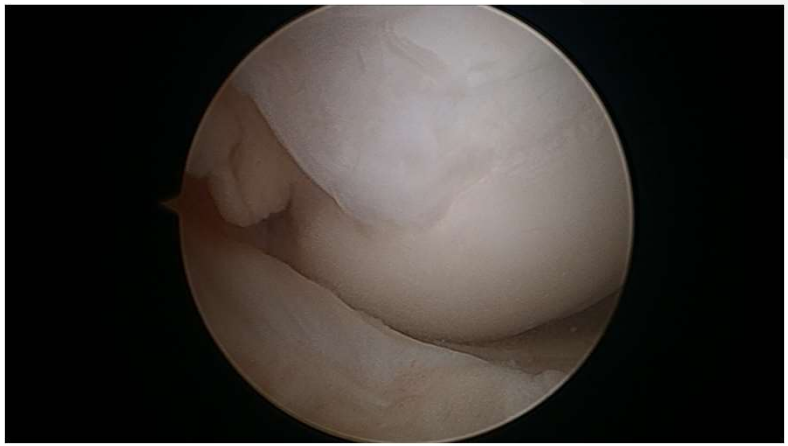
- Osteochondral autograft transfer (OATS)
- Autologous chondrocyte implantation (MACI)
- Osteochondral allograft (OCA)

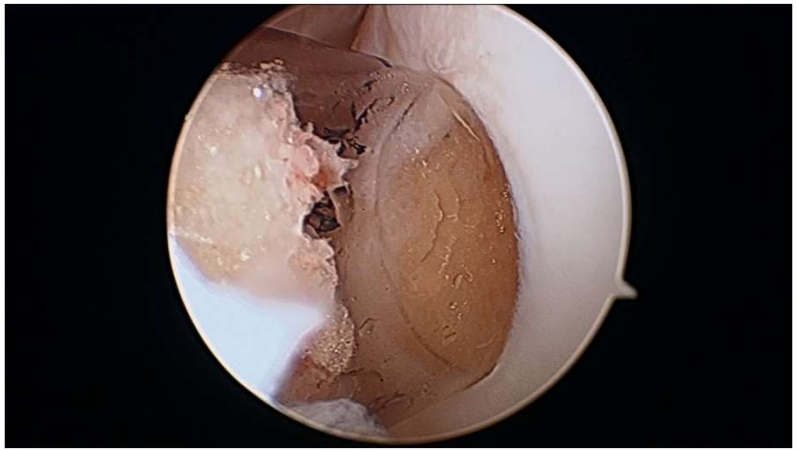


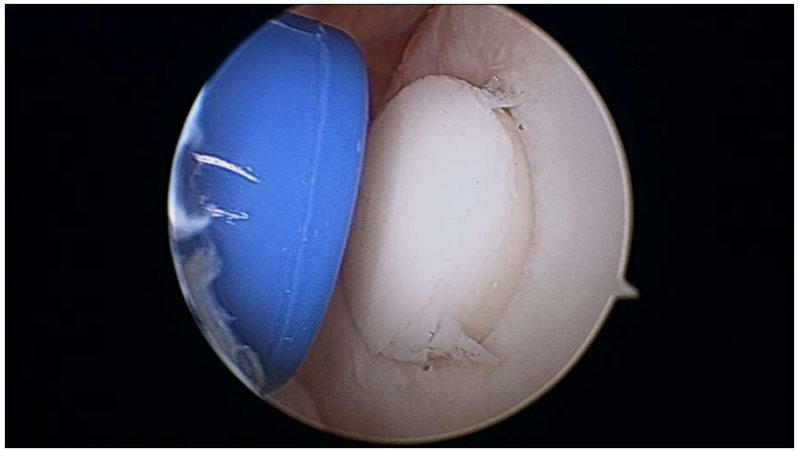


Osteochondral Autograft

- Smaller lesions with bone involvement
- Earlier weight-bearing
- Mini-open implantation
- Limited amount available

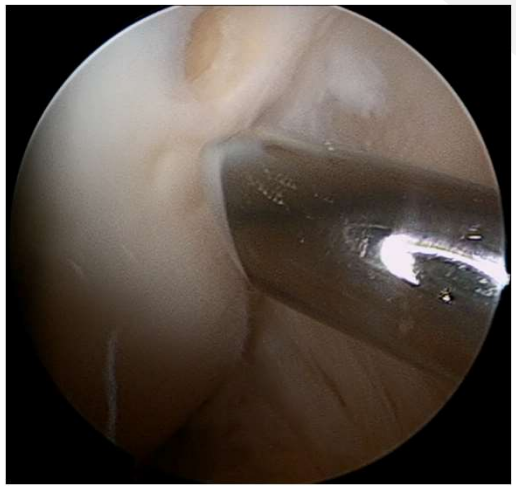


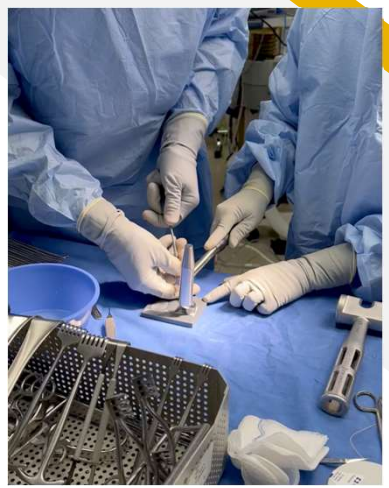


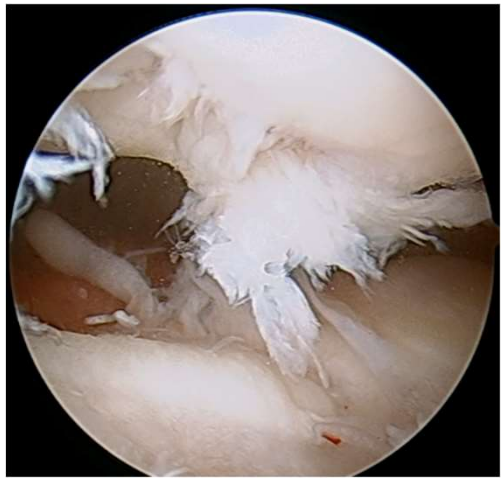


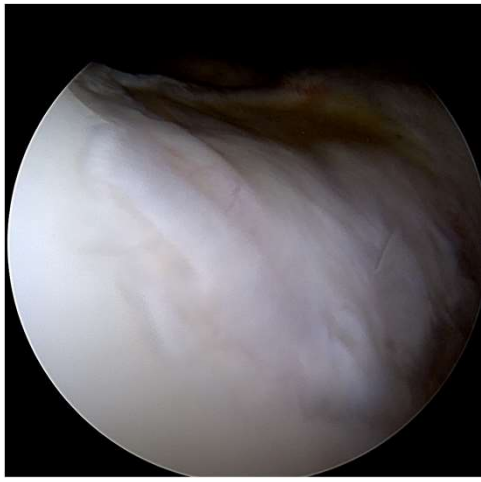
MACI: Autologous Cultured Chondrocytes on a Porcine Collagen Membrane

- Two step surgery to obtain the patients own cartilage cells for cell culture and reimplantation
  - ACI origin 1994; MACI FDA approved 2016
- Pros
  - Native cells ideal for long-term use
    - Forgettable once integrated and mature
  - Atypical lesion geometry accommodated more easily
  - No infectious disease concern
- Cons
  - More delicate rehab
  - More out of work time
  - Requires a more committed and savvy patient



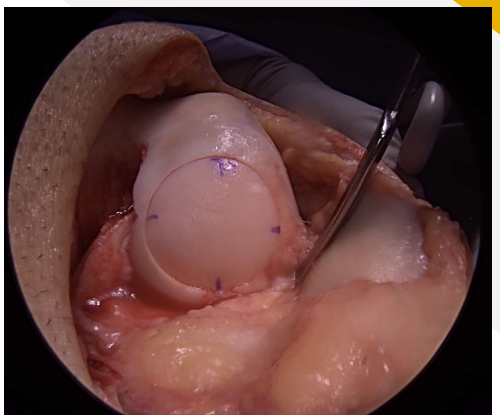


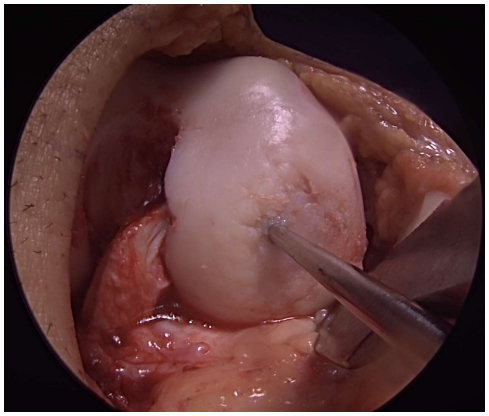


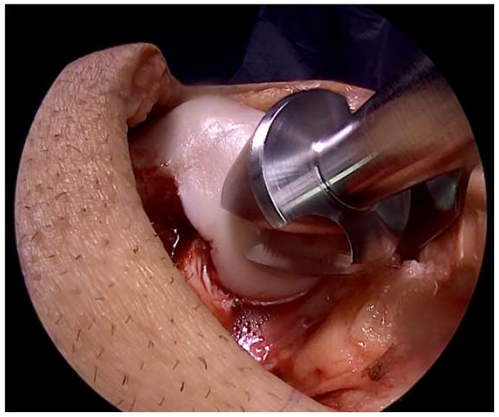


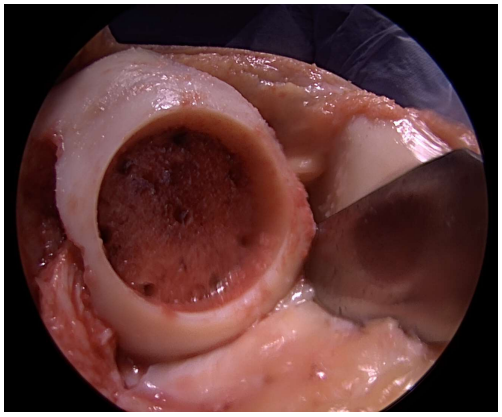
Fresh Osteochondral Allograft

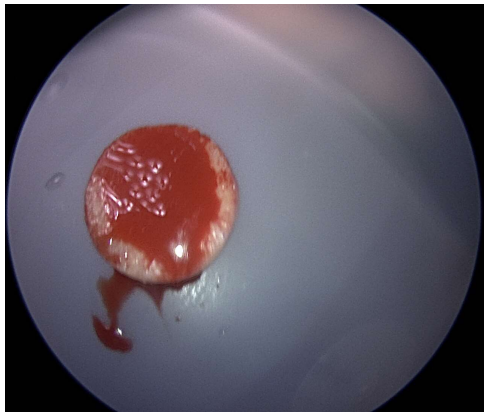
- Bigger lesions with bone involvement, earlier weight-bearing
- Open implantation
- Size match with young donors, not always readily available
- Rehab – partial weight-bearing 20% x 4 weeks, then 50% until 6 weeks, then WBAT



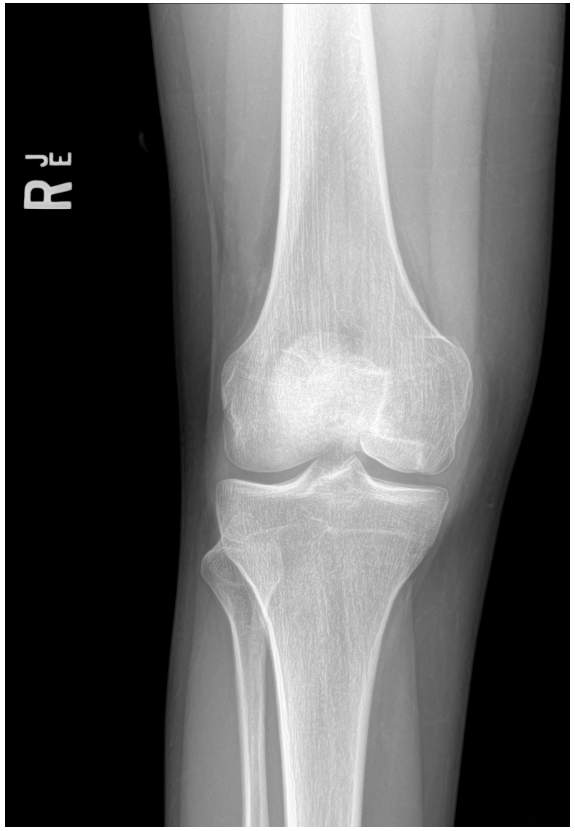


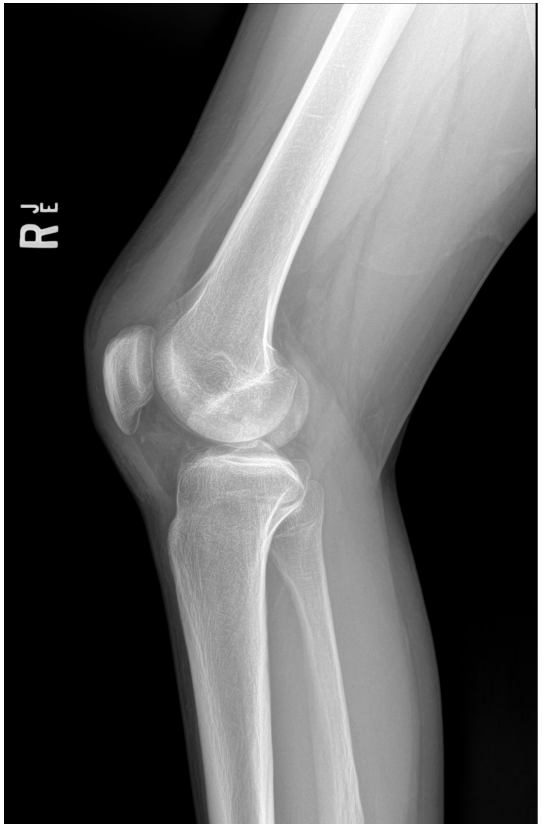


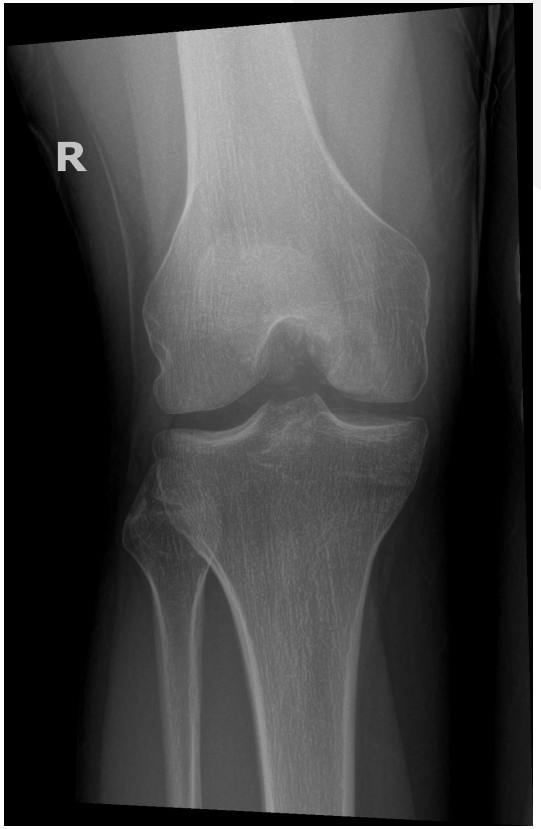




Fresh Osteochondral Allograft MFC
X-rays at 6 weeks







Thank you!

Joseph J. Czarnecki, MD