

Treatment of Pediatric & Adolescent Patellar Instability

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The logo features the word "SMART" in large, bold, blue capital letters. To the left of the "S" is a stylized graphic of a hand with fingers pointing upwards. To the right of "SMART" is the word "SERIES" in smaller, blue capital letters, oriented vertically.

SMART SERIES



Disclosures

- I have no relevant financial interests/relationships to disclose.

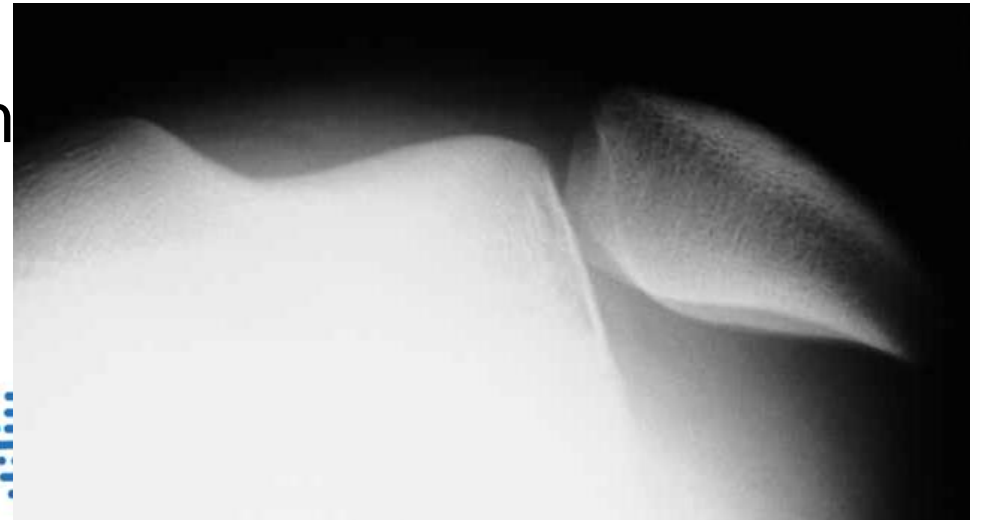


Outline

- Evaluation
 - Correct diagnosis
 - Identify high risk patients
- Treatment
 - NOM
 - Surgery: Who? When? Why?
- Return

Make the right diagnosis

- ACL's are often missed initially
 - Tough exam acutely
 - Plenty of imitators
 - Patellar instability is the most common
- Don't be fooled by
 - Previous evals
 - Lack of significant injury/mechanism
 - Otherwise benign xrays



Initial Evaluation (H&P)

Most have an underlying pre-disposition

- 25% positive family history
- 75% will have one element present:
 - Shallow patellofemoral articular groove
 - Patella alta
 - Excessive Q angle
 - Ligamentous laxity

Funky kids = funky results

- Congenital
- Teratologic
- **Syndromic**
- Absent
- Hypoplastic
- Juvenile
 - Fixed
 - **Obligate**
 - Habitual

Andrish J. Sports Med Arthrosc 2007



Underlying Conditions

- Syndromic
 - Down
 - Arthrogryposis
 - Larsen
 - S.E.D.
 - Contractural arachnodactyly
- Collagen Laxity
 - Ehlers-Danlos
 - Marfan
- Neuromuscular
 - Myelo
 - CP
 - Myopathies



Obligate - Flexion

- Reduces in extension
- Dislocates in flexion



Obligate - Extension

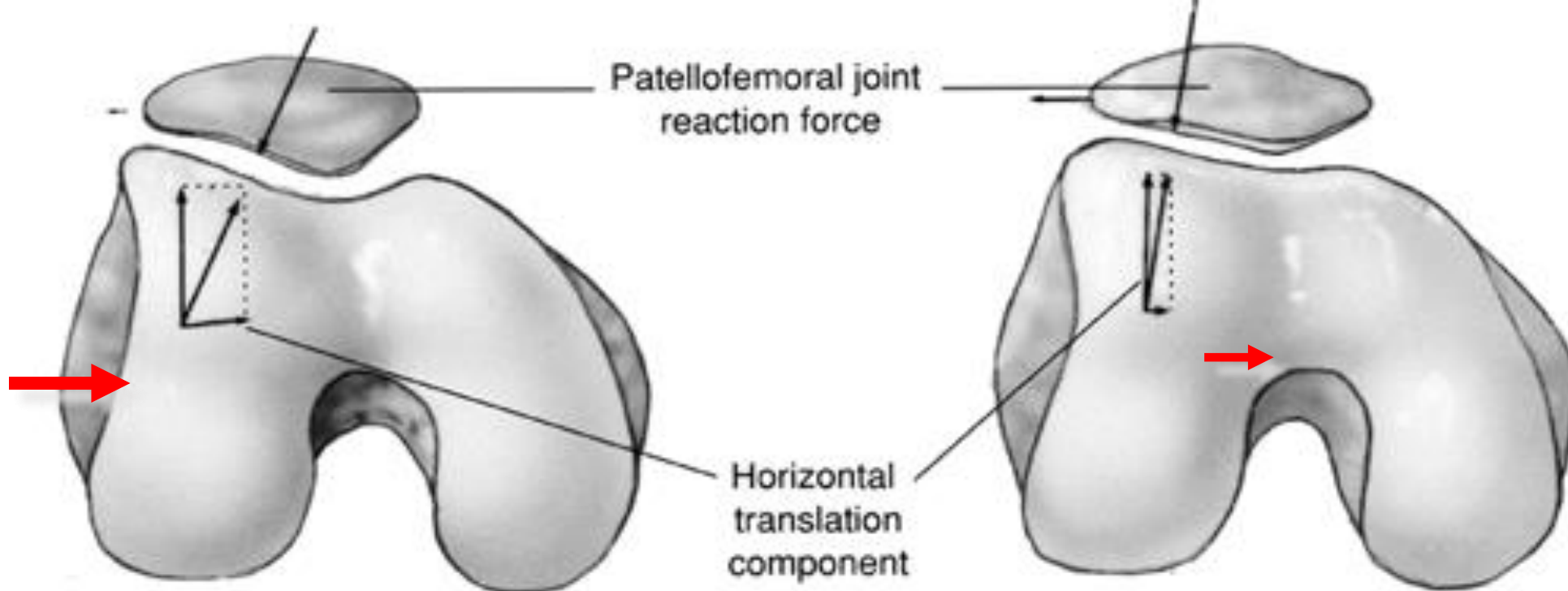
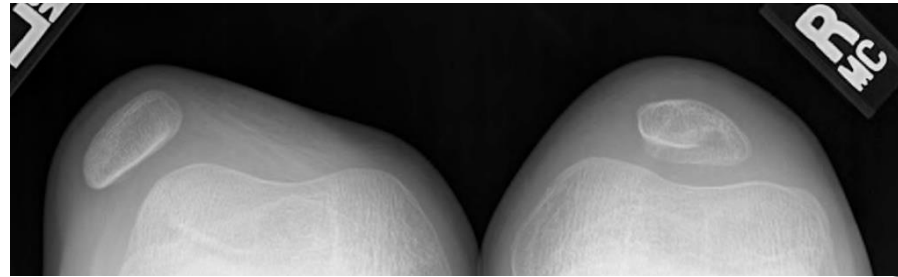
- Reduces in flexion
- Dislocates in extension

Risk Factors for Failure of NOM

- Osteochondral fracture
- <14 years of age
- Highly competitive athlete
- Mechanism other than direct blow
- Palpable medial defect
- Biomechanical “faults”

Intrinsic Biomechanics

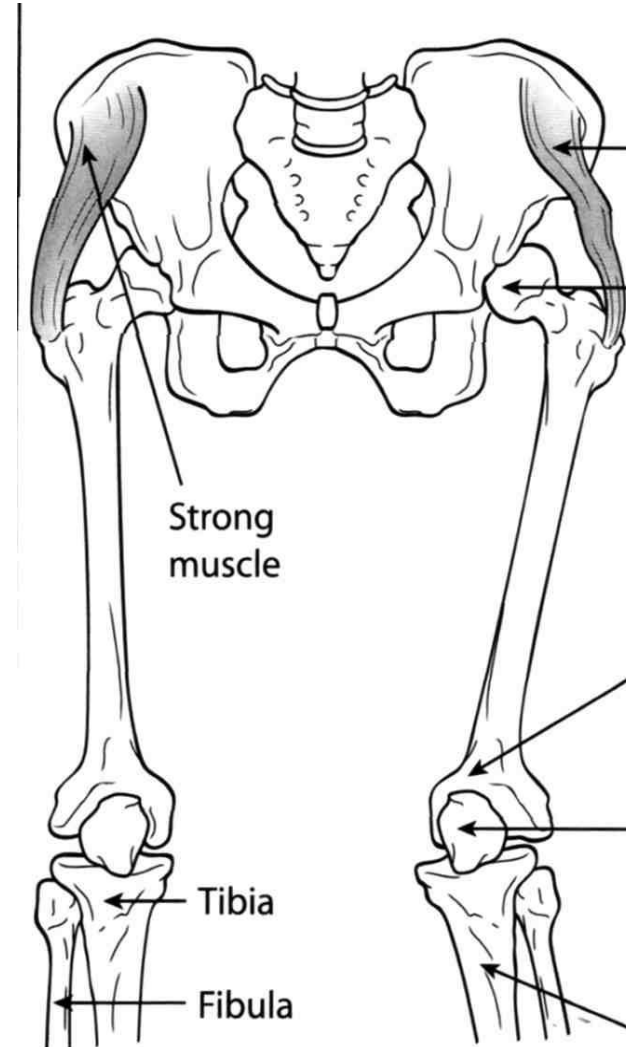
Shallow groove = more unstable



Extrinsic Biomechanics

Dynamic

- Weak core
- Lumbar lordosis
- Weak glutes
- Tight adductors
- Femoral anteversion
- External tibial torsion
- Genu valgum
- Pes planus
- Generalized laxity



Acute Treatment & Education

Prone reduction

- Hip extension relaxes the hamstrings
- Gravity extends the knee
- Easy to teach
 - Family
 - Residents, ER docs, PCP's
 - Coaches, trainers, etc.



Try “Conservative” First

Rarely a role for primary repair*

- RCT, 74 cases, <16 yo
- No advantage of primary repair

Non-op Rx.

- 3/6 Fine
- 2/6 Some further problems
- 1/6 Ongoing instability/pain



* Palmu, S. JBJS 2008



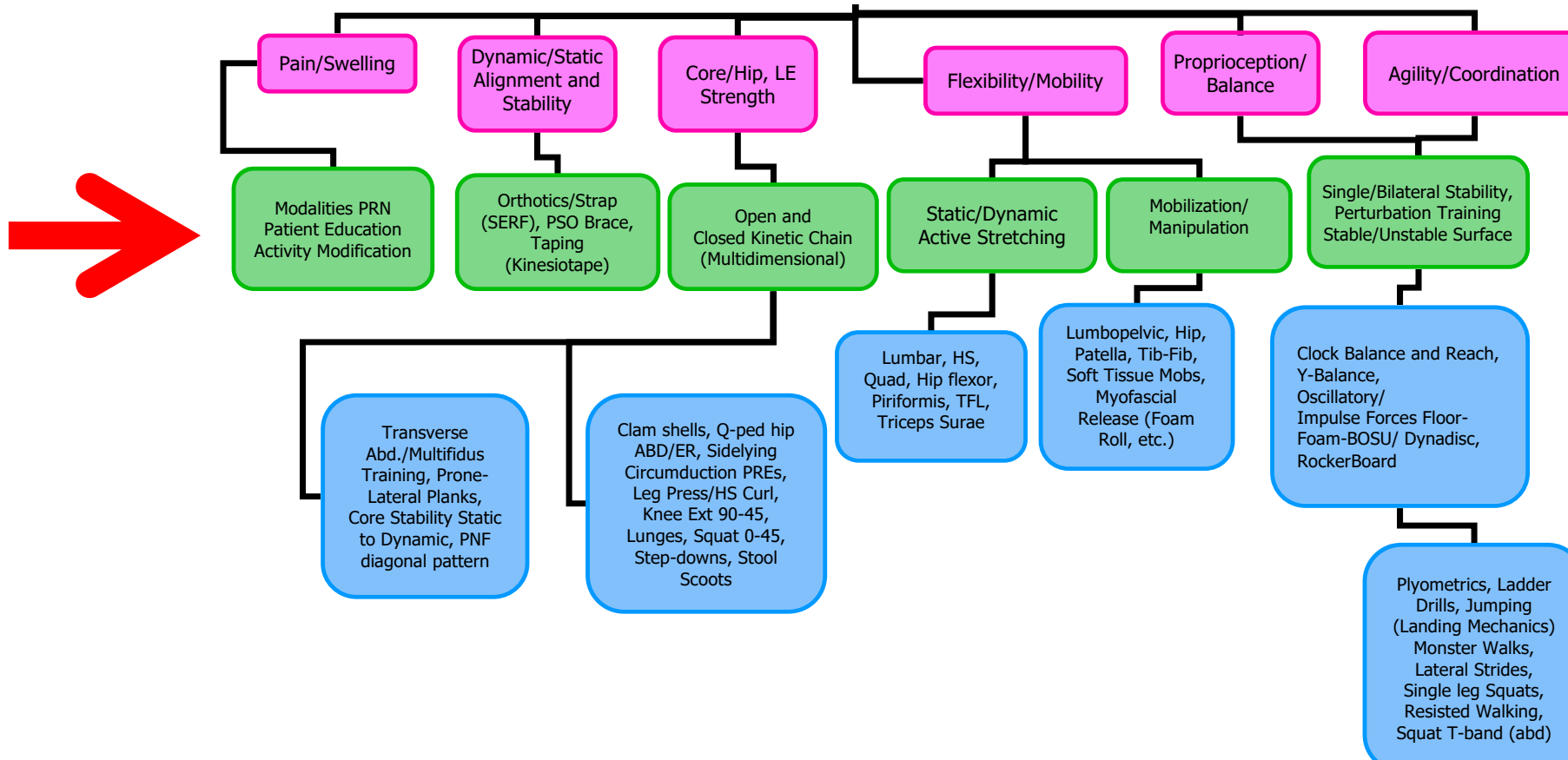
Acute Dislocation of the Patella in Children

The Natural History

FRANK McMANUS, M.B., F.R.C.S. (I.),* MERCER RANG, M.B., F.R.C.S. (C).*
AND D. JAMES HESLIN, M.D.**

- 55 cases
- 1/6 will develop recurrent dislocation
- 2/6 children have minor symptoms
- 3/6 asymptomatic

PT: Multimodal Therapy Guidelines



Courtesy of Keith May, PT, DPT, ATC, SCS, CSCS

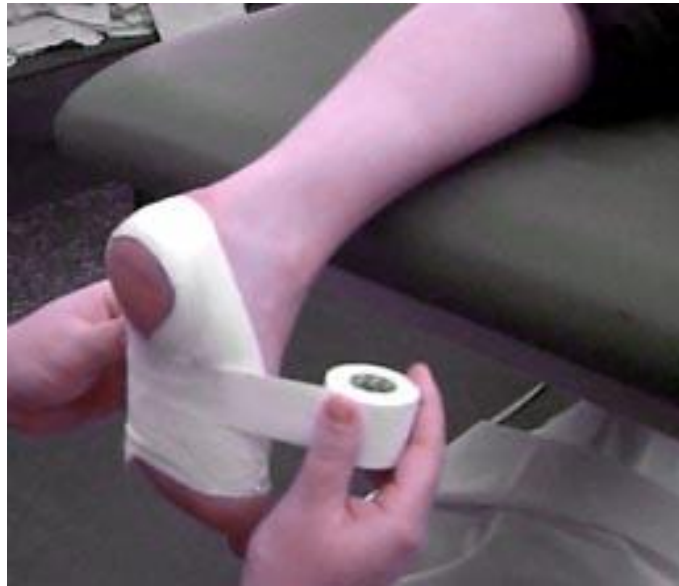
1) Acute Pain/Swelling

- Rest medial structures
- Rest chondral surfaces
- Allow the hemarthrosis to resolve
 - Significant effect on quadriceps
- Knee immobilizer
 - Full weight bearing
 - 2-6 weeks
 - Immediate quad sets + SRL's
- Keep the rest (mind & body) toned



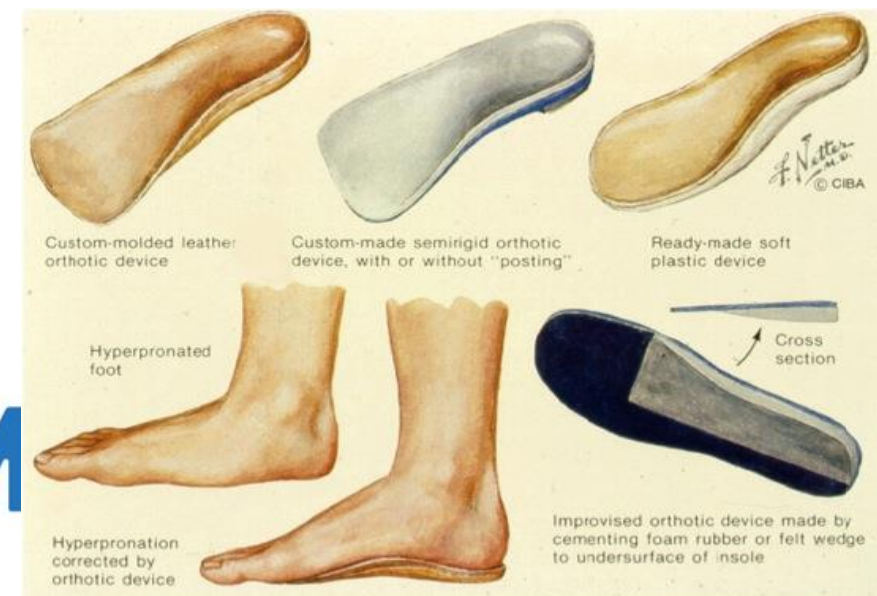
2) Dynamic & Static Mechanics

- Patellar Stabilizing Brace
- FO's/taping
- Patient/family education

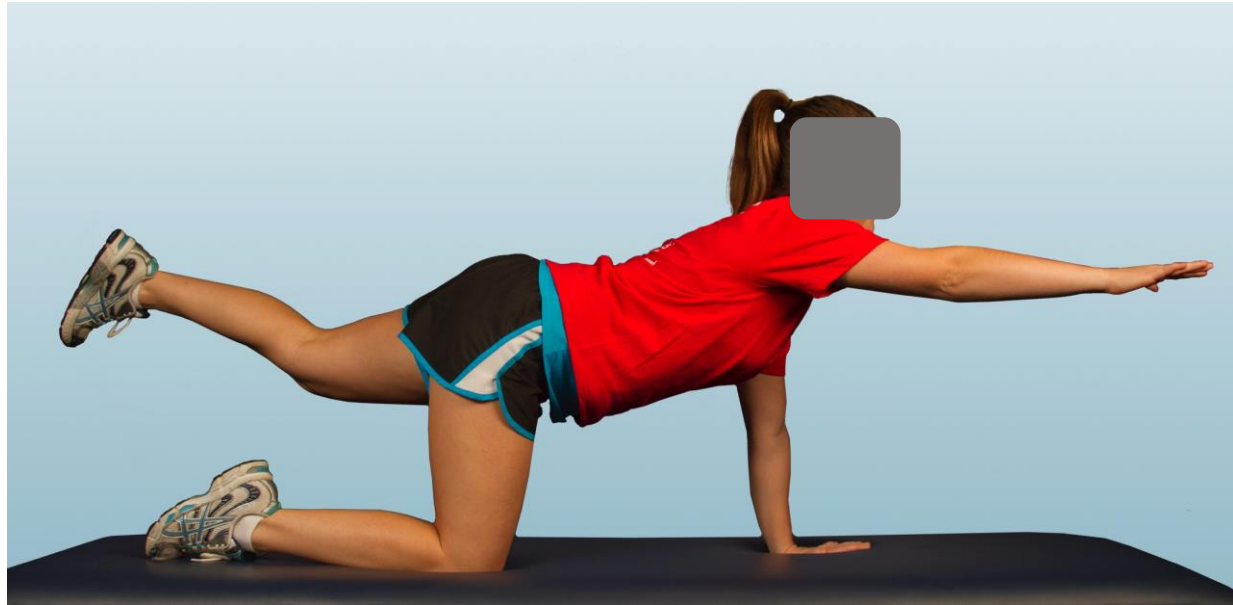


Foot Orthotics

- Reduces pronation
- Lessens torsional forces of the tibia
- Needs to be substantial
 - More than a cushion
 - OTC FO's typically work well
 - Some may need custom - \$\$\$



3) Strengthen: Core, Hip, LE's

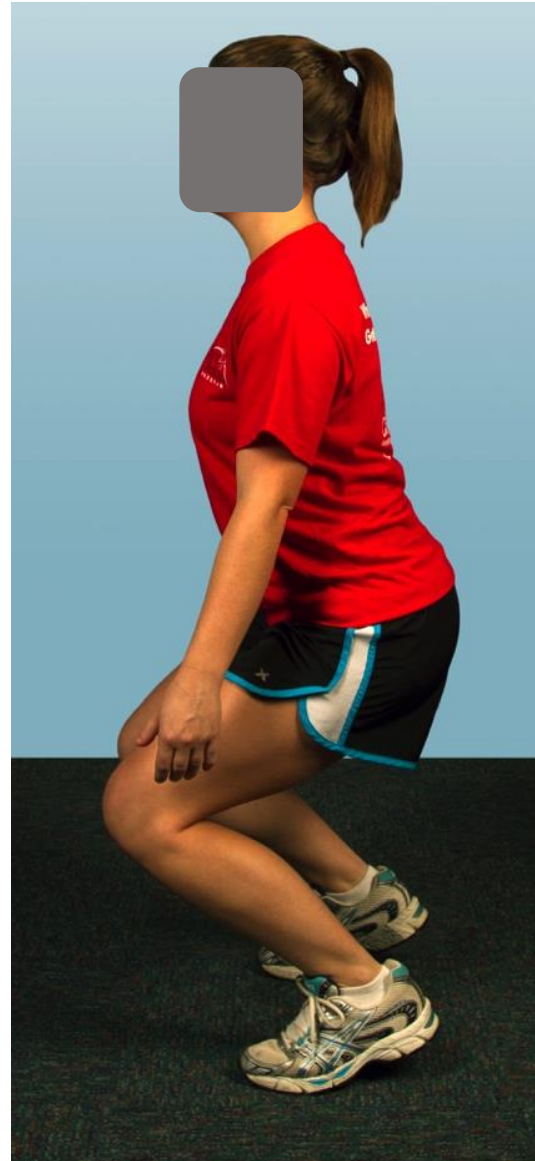


3) Strengthen: Core, Hip, LE's



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3) Strengthen: Core, Hip, LE's



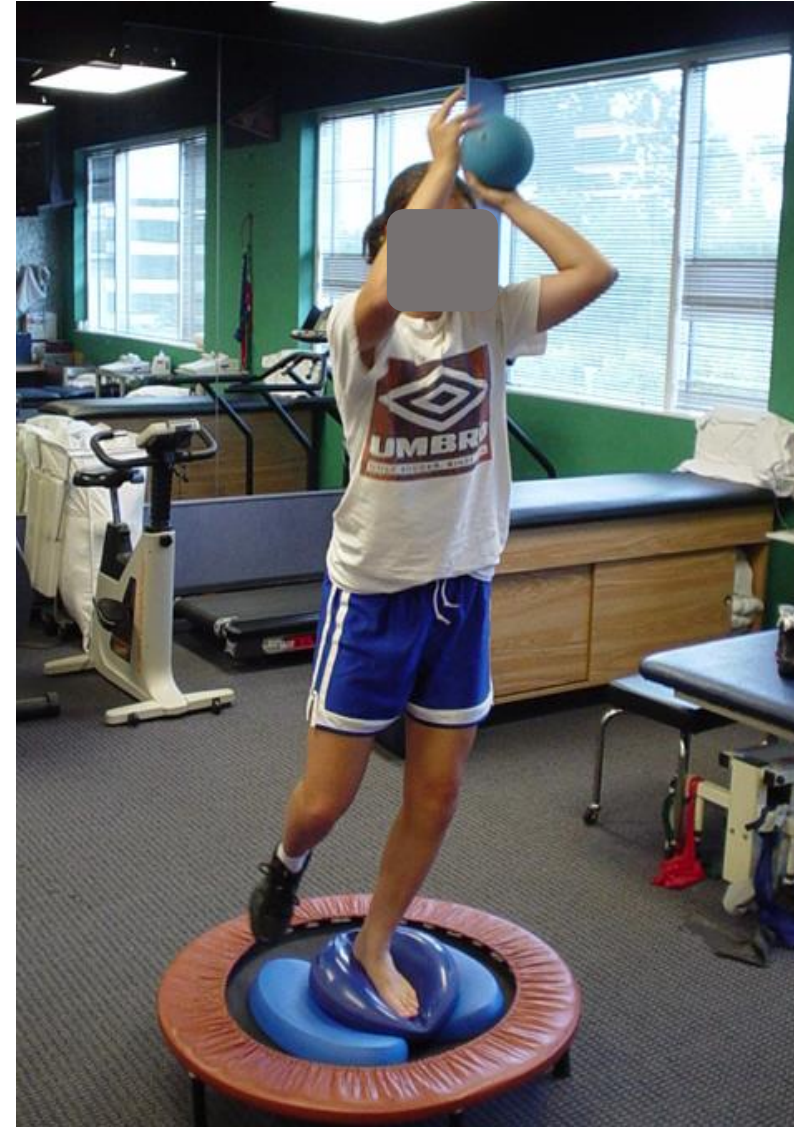
Correct dynamic valgus:

- Quads
- Hams
- Calves

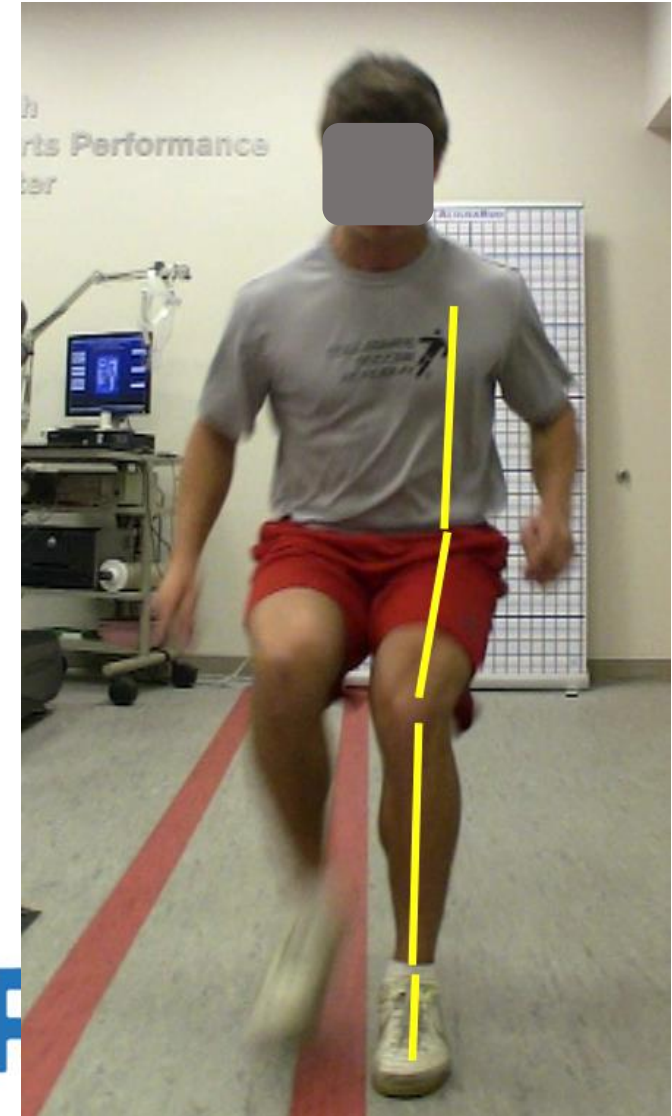
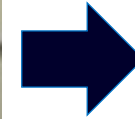
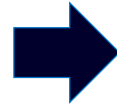
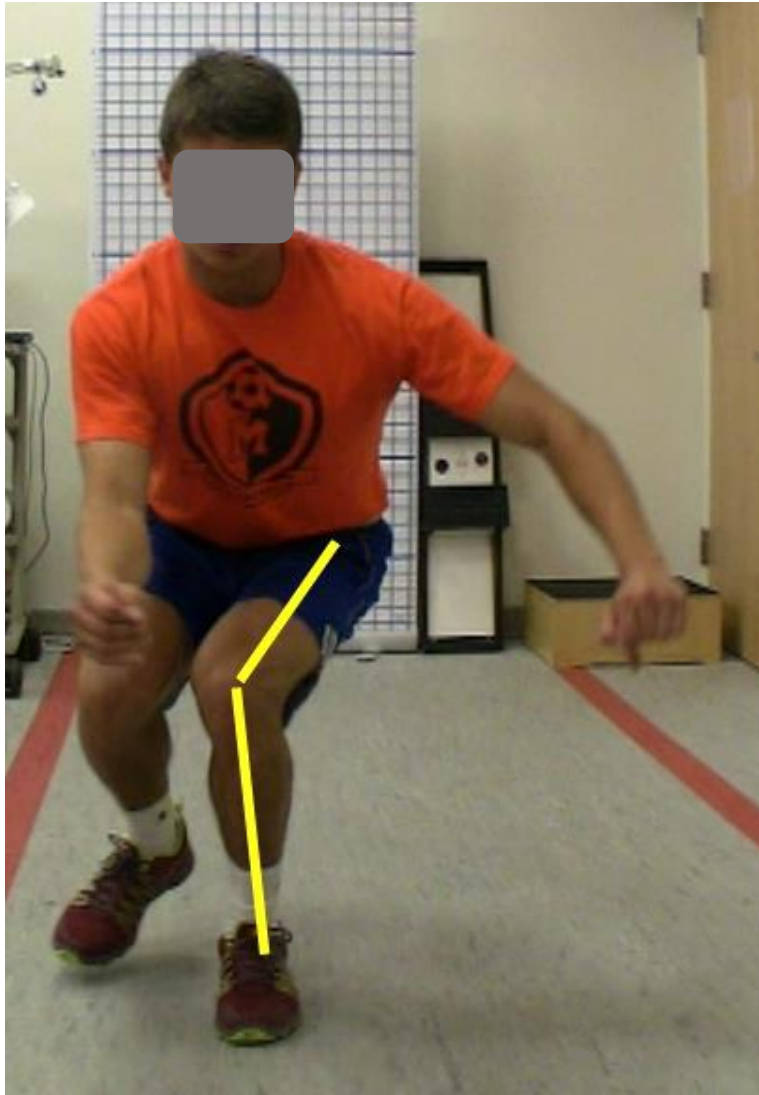
4) Flexibility/mobility



5) Proprioception/balance



6) Agility/coordination



Address Modifiable Risk Factors

Movement quality

Balance

Strength

Flexibility

RED-S

Evolved from the “Female Athlete Triad”



Relative Energy Deficiency in Sports

Address

- Fatigue
- Inadequate sleep
- Poor nutrition/energy
- Over-training

Return Criteria

- Pain-free, FROM, No swelling, No limp
- Symmetric strength, 95% hop test side-to-side
- Plan for graduated RTS
 - Individualized by patient and sport
 - Brace/taping
 - Ongoing conditioning
 - Demonstrated compliance

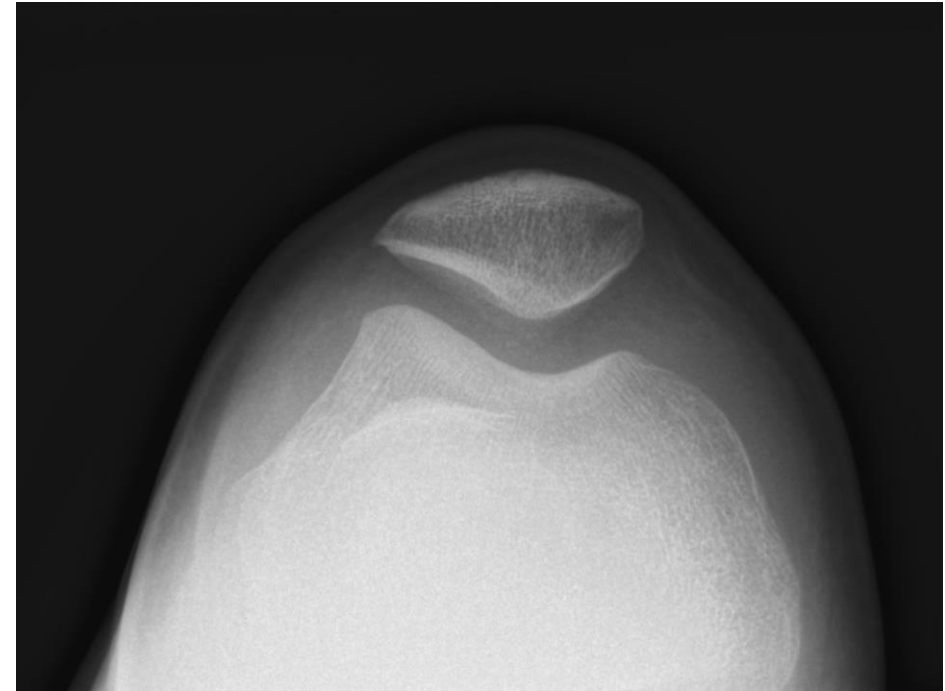
When to refer or fix?

- Acute (Initial instability event)
 - Displaced chondral or osteochondral injury with loose body
 - Irreducible dislocation (rare)
 - Significant risk factors for recurrent instability?
- Chronic (recurrent instability)
 - Multiple instability events despite appropriate NOM
 - Chronic pain/disability associated with instability
 - Associated chondral damage
 - Obligatory dislocations?

My approach... Acute Dislocation

- MRI when large effusion/hemarthrosis or fracture on xray
- Chondral/osteochondral injury with loose body
 - Knee arthroscopy with removal of loose body vs fixation
 - “Typically” no medial repair or reconstruction
 - Assess for additional risk factors
 - Some literature to suggest more aggressive approach?
 - Gurusamy et al AJSM 2021
 - Transition into patellar stabilizing brace when swelling allows
 - Aggressive PT for motion and strengthening (quad/core)

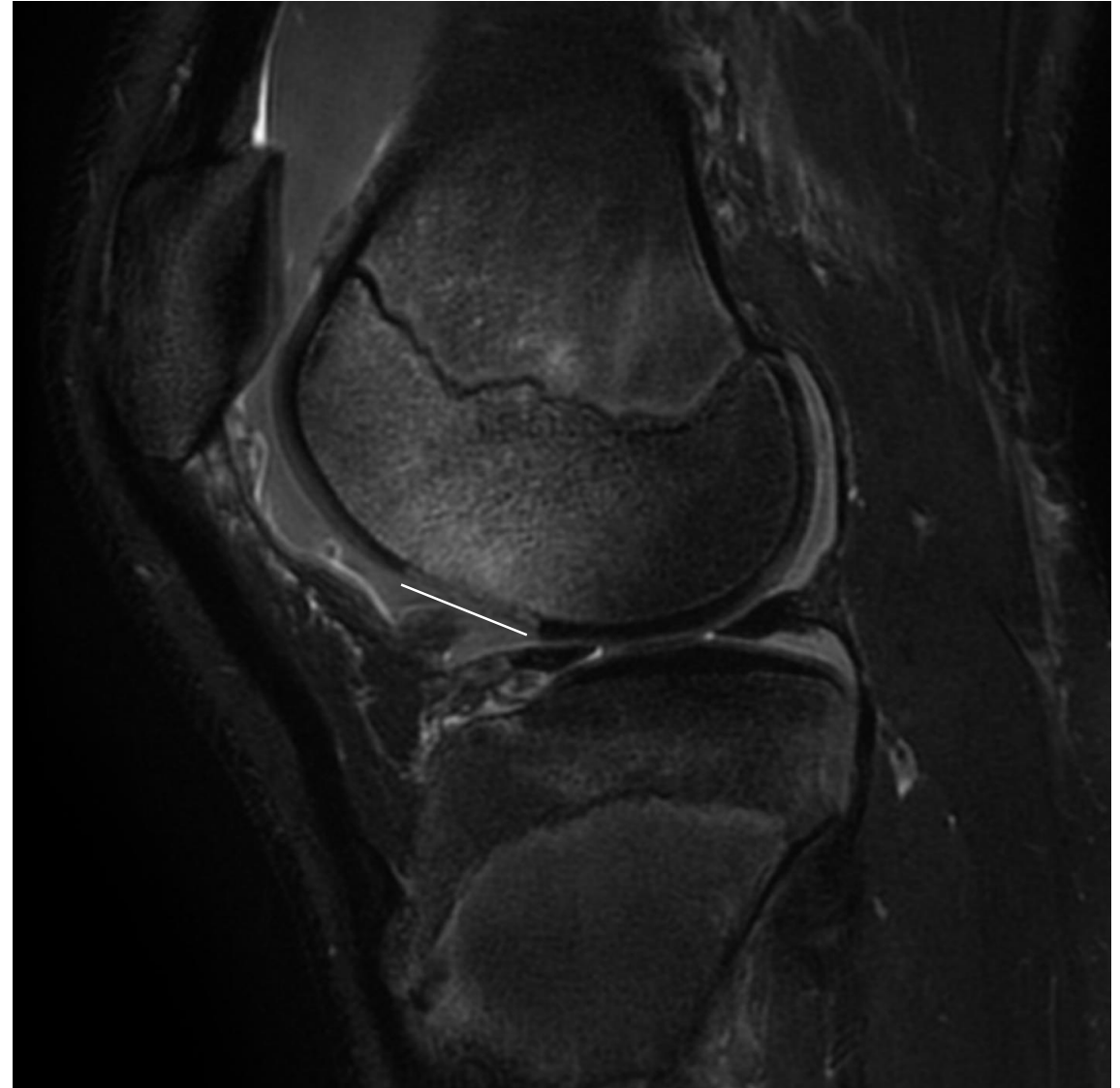
13 yo M right knee injury at trampoline park



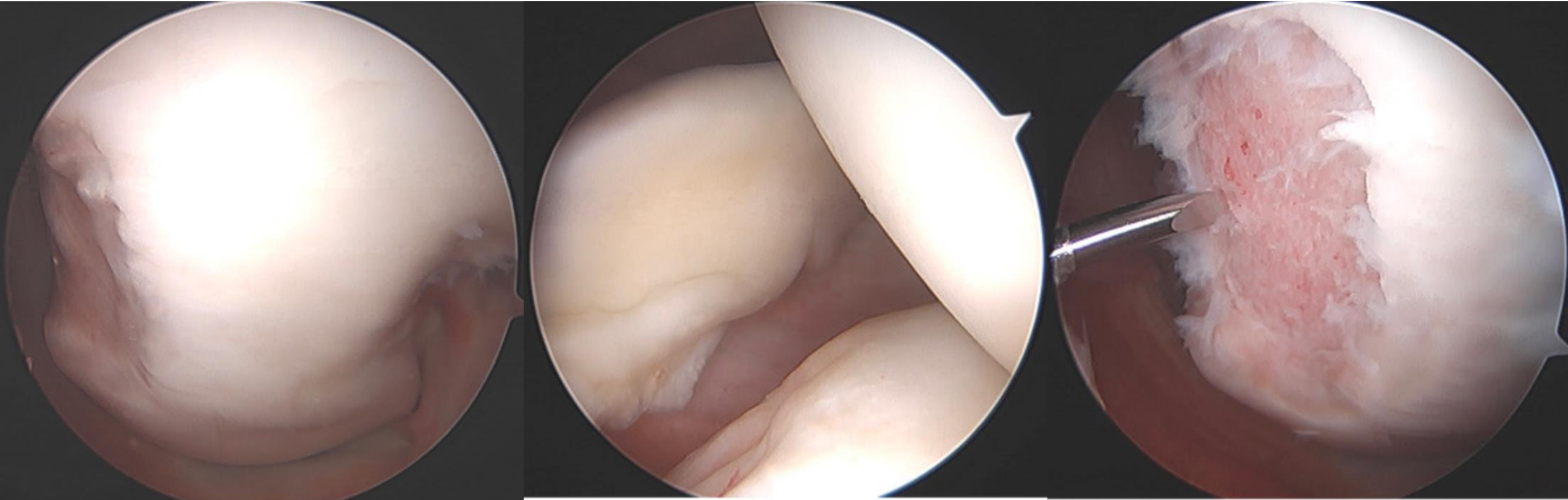
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MRI...



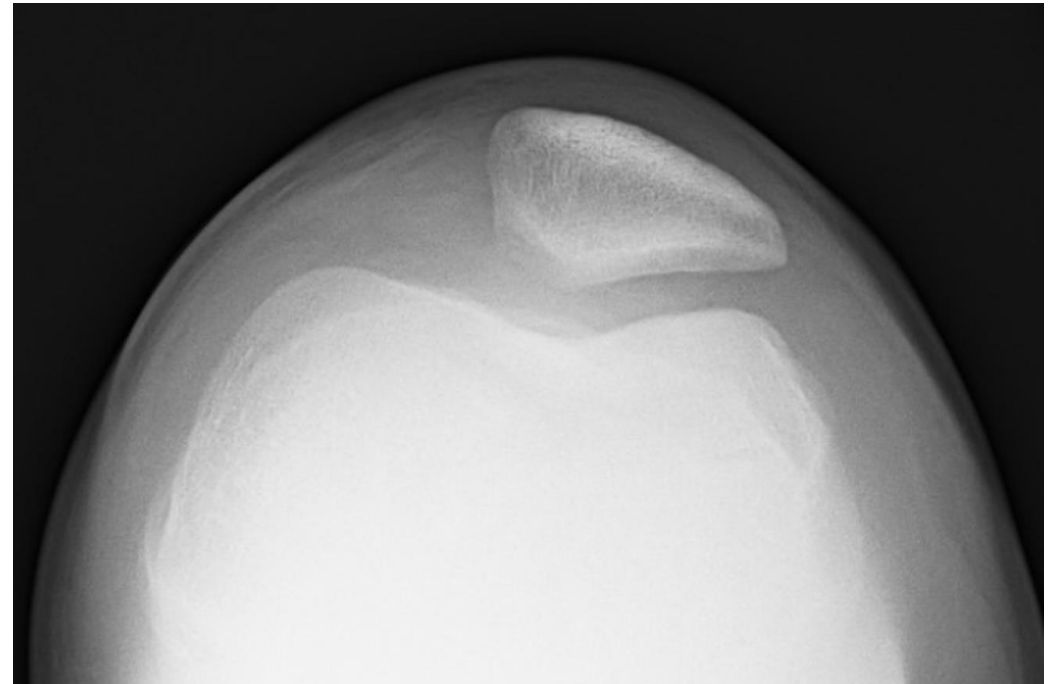
Knee scope...



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 **Children's**
Wisconsin

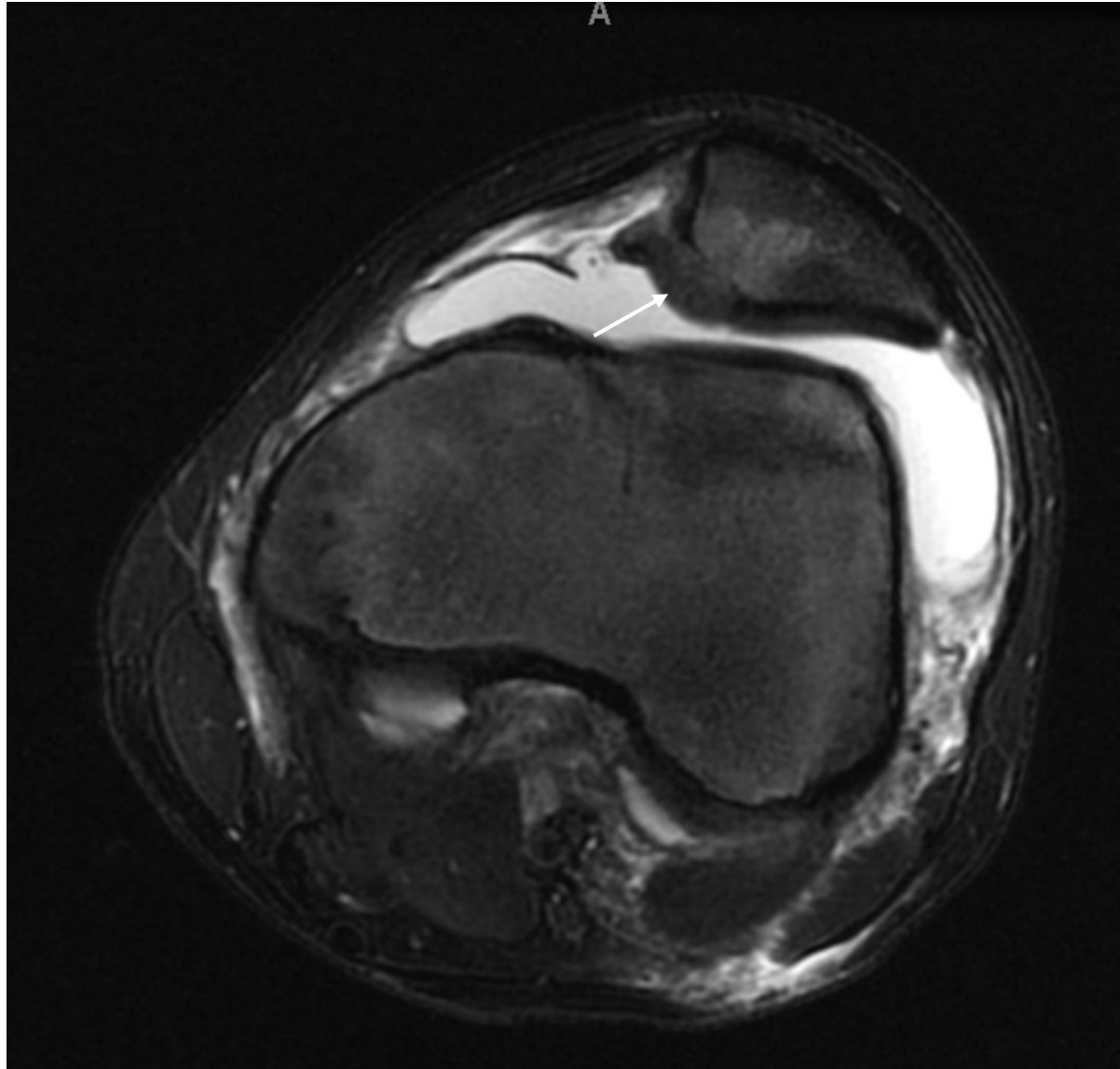
14 yo M injured left knee while starting his snowmobile



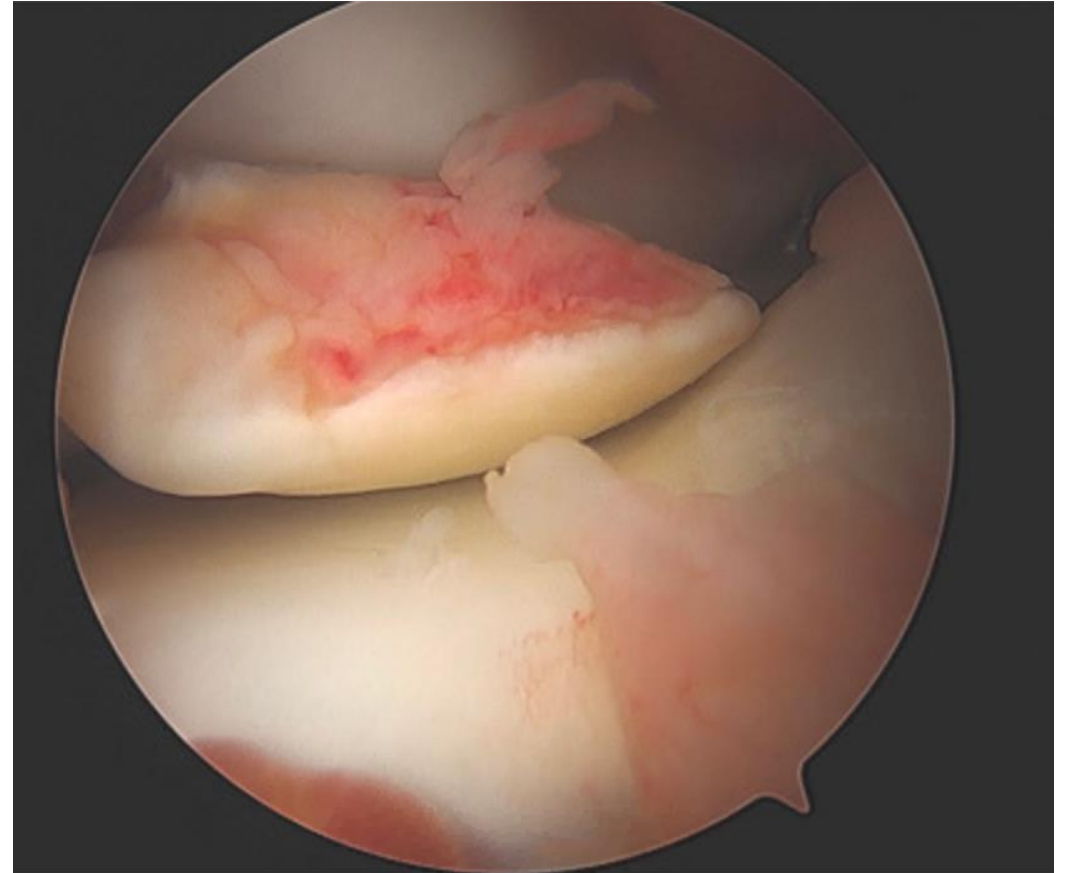
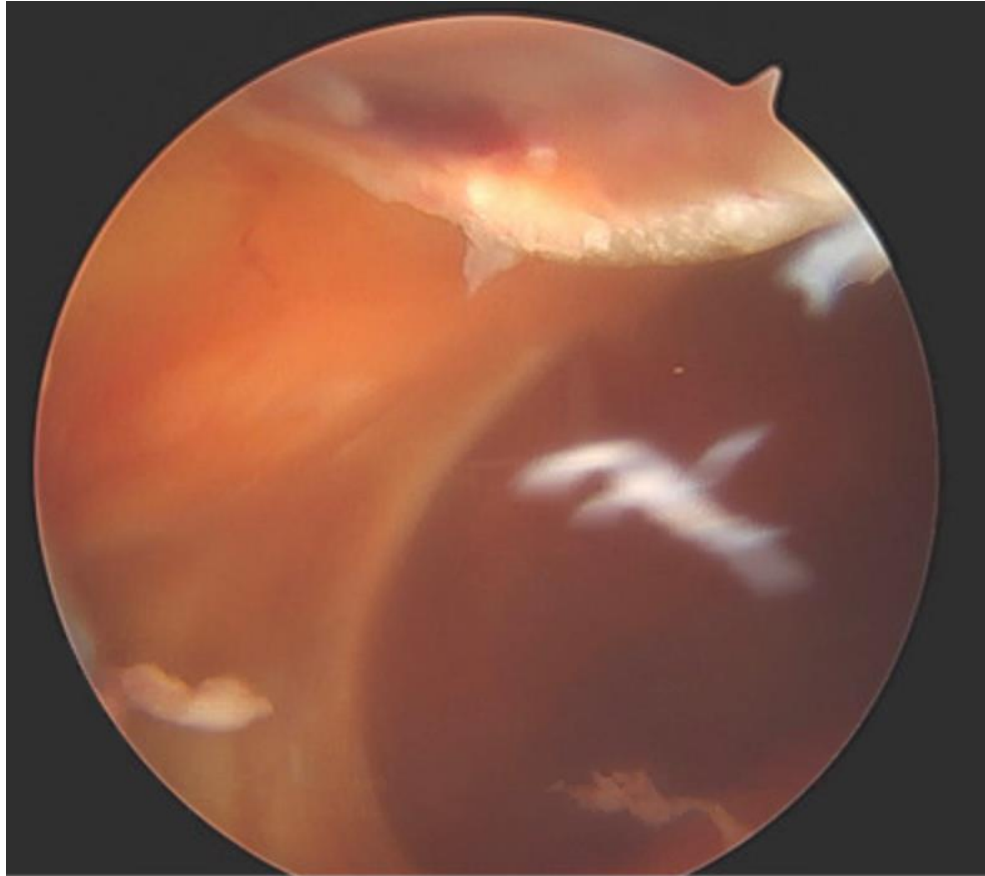
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MRI...



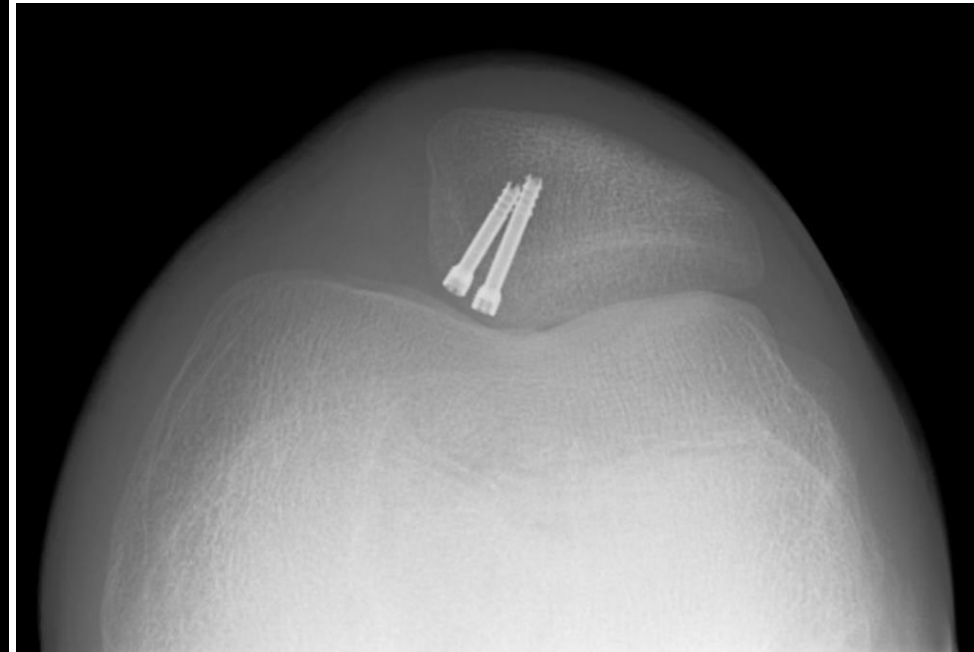
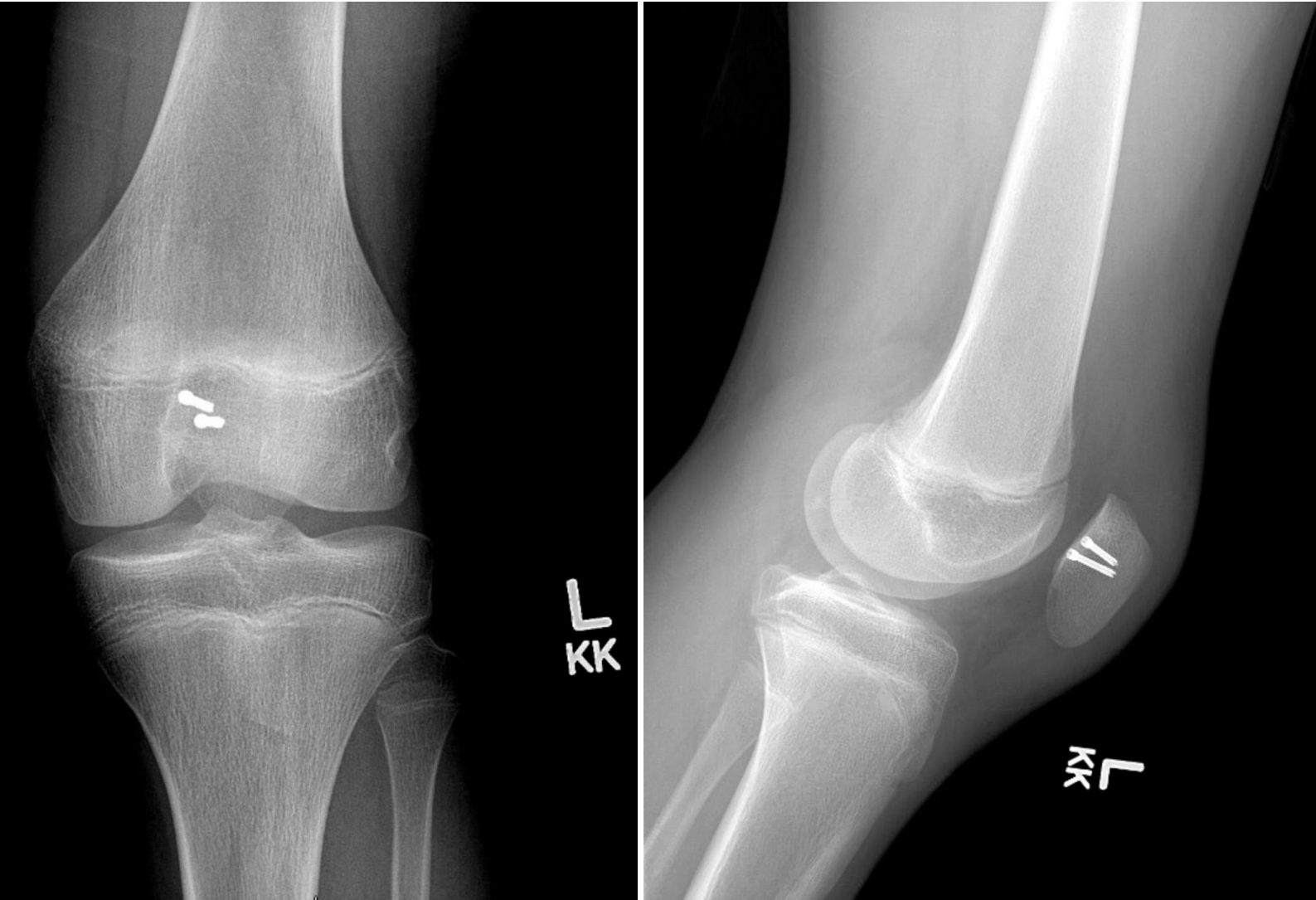
Scope followed by ORIF



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SERIES

 **Children's**
Wisconsin

Scope followed by ORIF



MART SERIES

 Children's
Wisconsin

My approach... Recurrent Instability

- A la carte
- One size does not fit all
- Address all modifiable factors when possible
 - Alignment (Guided growth vs osteotomy)
 - Soft tissues (MPFL- Medial patellofemoral ligament)
 - Patella alta
 - TT-TG (TTO- Tibial tubercle osteotomy)



Summary

- Rarely operate acutely
 - Osteochondral fracture/loose body
- Identify the outliers
- Identify the modifiable factors
- Rehab the full kinetic chain and athlete



Questions?

