Patellar Instability – It's Really Not That Difficult!

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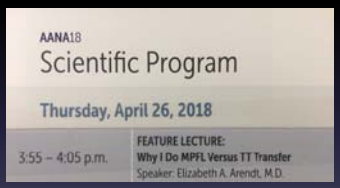
Why does it matter?

- Common
- Poorly taught
- Poorly treated
- Most orthopods are confused
- Lots of bad results

What is the current operation de jour?



What's wrong with that?

- Only one of many factors
- Will fail with dysplasia
- Will fail with Alta
- Will fail with lateral patellar laxity
- Will fail with lateral patellar compression
- Will fail with significant patella surface damage
- Lots of bad positions
- Patella fractures possible if patella drilled

What should we do?

CAPTURE the patella in the trochlea!

- Arthroscopy for accurate assessment
- Center the patella in the trochlea – lateral release
- Realign patellar tendon
- Correct patella alta
- MFPL if medial restraints incompetent
- LPFL if lateral patellar laxity
- Repair lateral release with IT band rotation flap
- Resurface if needed

What I Have Learned?

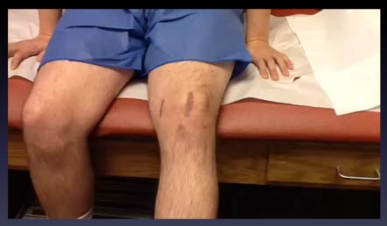
- The lateral side is key to patellar stability
- Medial Patellar Subluxation is real and occurs often without prior surgery
- Patella Alta is underdiagnosed and undertreated
- Trochlea dysplasia is most successfully treated by PatelloFemoral Arthroplasty

Lateral Retinaculum

- The lateral retinaculum pulls the patella posterior in flexion causing pressure symptoms
- Lateral retinaculum can be loose in extension allowing Medial Patellar Subluxation
  - Lateral Patellar Laxity
- Lateral retinaculum can be both loose in extension and tight in flexion

Medial Patellar Subluxation

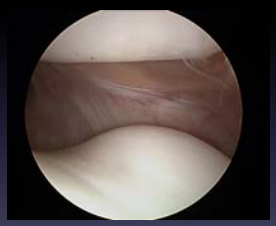
- Lateral patellar laxity allows the patella to rotate up on a longitudinal axis escaping an intact MPFL
- The patella skids across the trochlea and slides over the medial facet which is poorly developed in early flexion
- Medial Patellar Subluxation can be suspected by exam and confirmed by arthroscopy
- Reconstruction of the Lateral PatelloFemoral Ligament with a Quadriceps tendon graft will resolve MPS



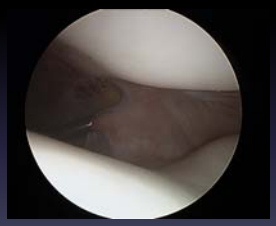
Patient 1

- 26 y/o female
- Multiple surgeries for patellar instability
- LPL with MPS to exam
- LPFL reconstruction with Quad tendon
- Complete resolution of symptoms after multiple surgeries

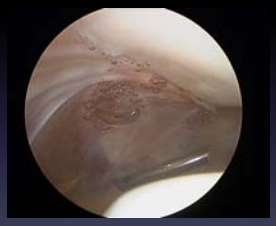
Medial Retinaculum



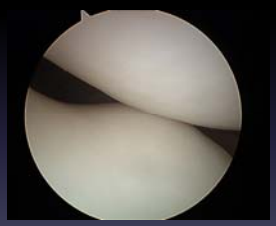
Trochlea



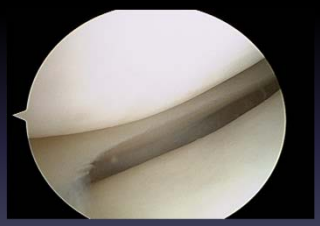
Lateral Retinacular Laxity



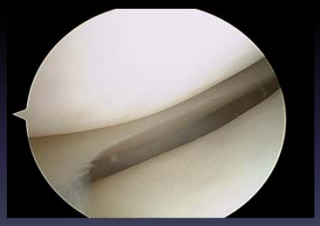
Medial Subluxation



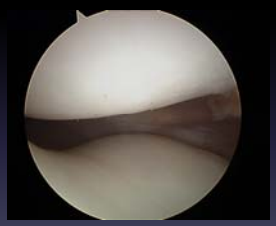
MPS - Video



MPS - Video



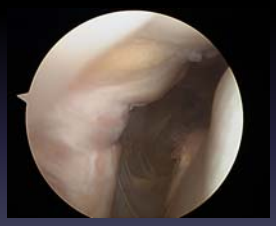
After LPFL – Medial Retinaculum



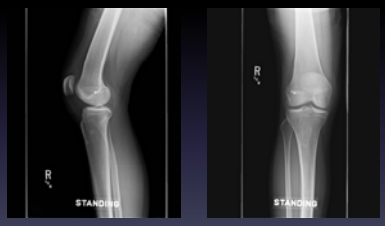
After LPFL – Trochlea

After LPFL – Lateral Patella Parallel to Femur

LPLF Quad Graft under Synovium



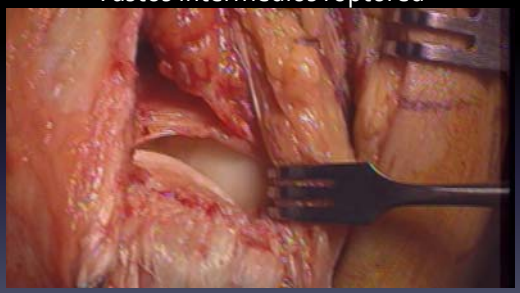
Postop Xrays



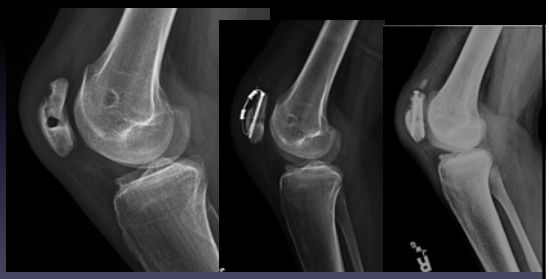
Epiphany

- : a moment in which you suddenly see or understand something in a new or very clear way
- A simple technique for reconstruction of the medial patellofemoral ligament using a quadriceps tendon graft
- Robert N. Steensen, M.D., Ryan M. Dopirak, M.D., Peter B. Maurus, M.D.
- Arthroscopy; March 2005 Volume 21, Issue 3, Pages 365–370

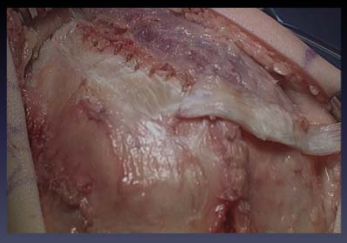
Quad rupture - Rectus intact Vastus intermedius ruptured



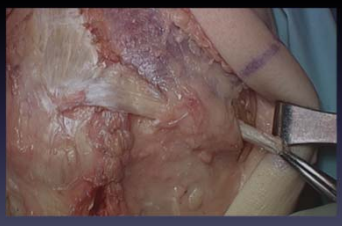
Postop MPFL Patellar Fracture



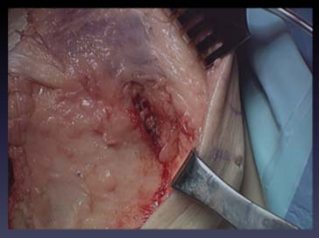
Quad MPFL
Rectus Femoris tendon



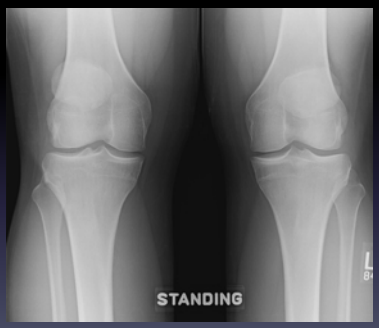
Quad MPFL
Tendon passed to MPFL origin

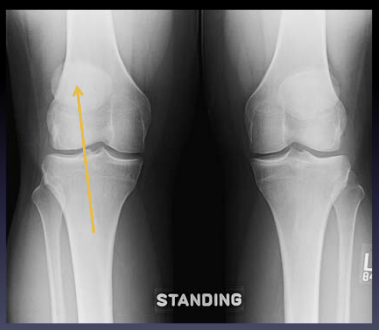


Quad MPFL attached



NFL Lineman





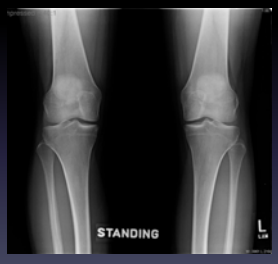
XRAYS

Standing AP with quads tight

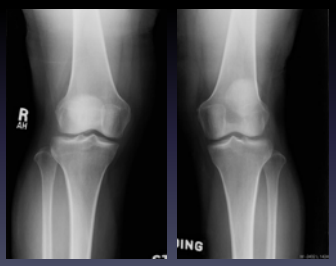
True lateral – condyles overlapped

Merchant view on a frame

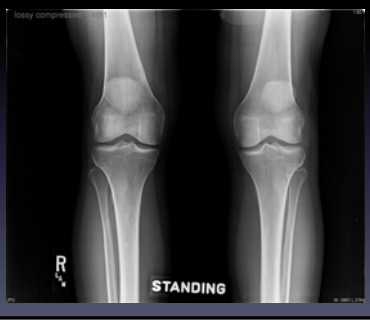
AP STANDING NORMAL



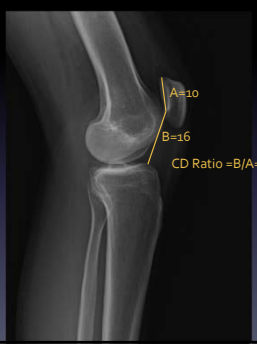
AP quads tight/not tight



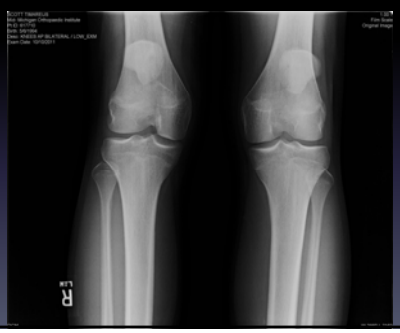
Alta moderate



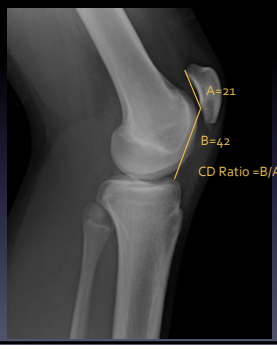
Alta lateral



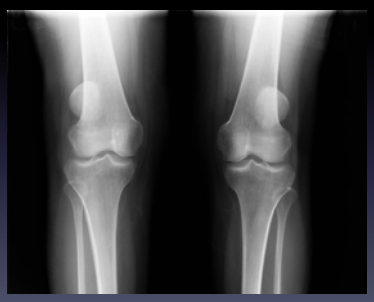
Alta severe



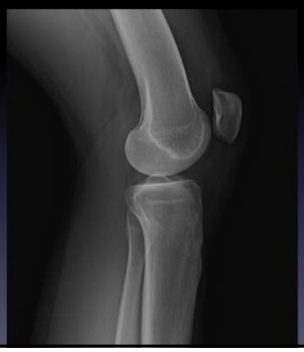
Alta severe



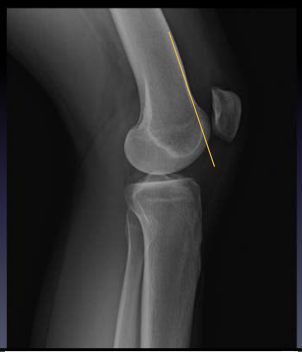
Alta w/ Lateral Position



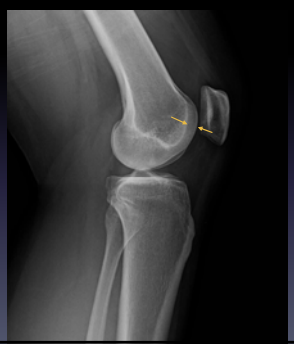
Lateral normal



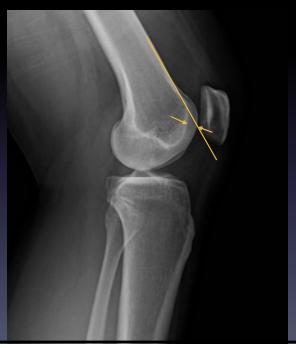
Lateral normal



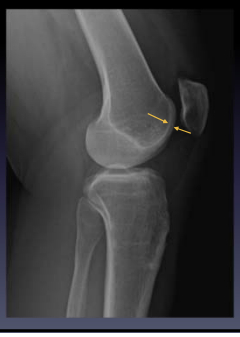
Normal Deep Trochlea



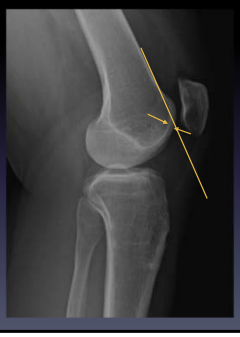
Normal Deep Trochlea



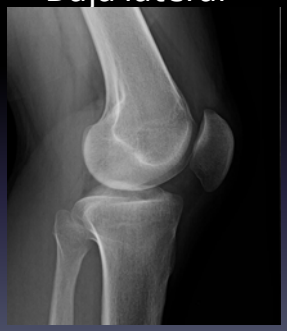
Trochlea Shallow



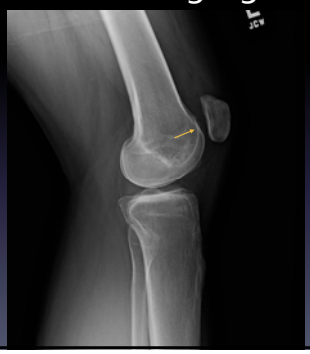
Trochlea Shallow



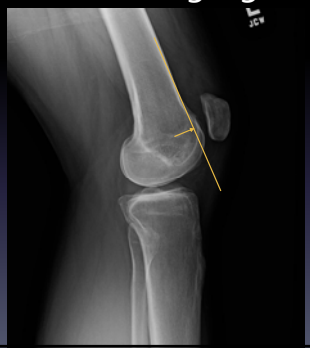
Baja lateral



Crossing sign



Crossing sign



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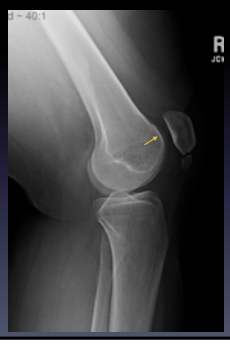

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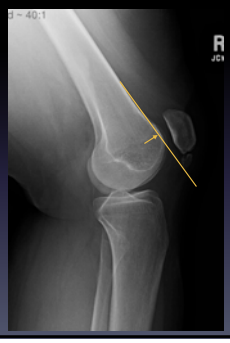
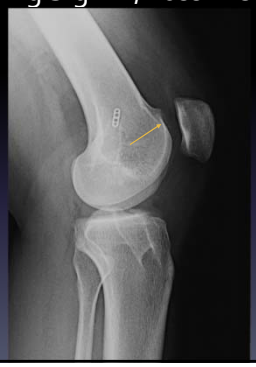
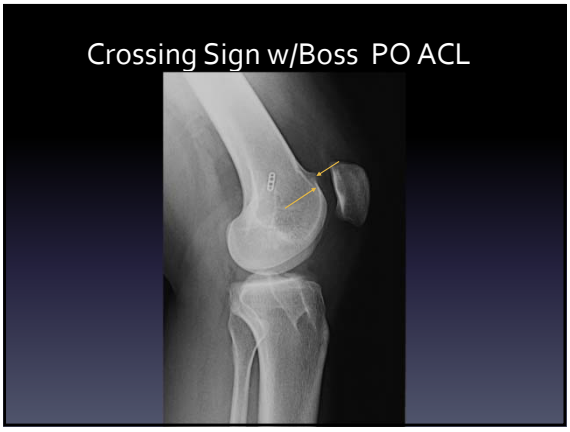


Crossing Sign w/Boss PO ACL

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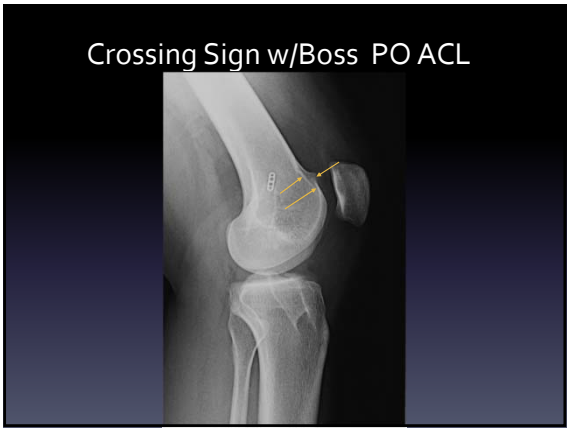
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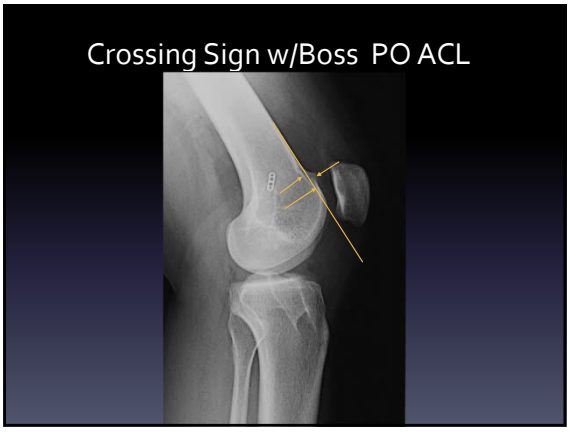
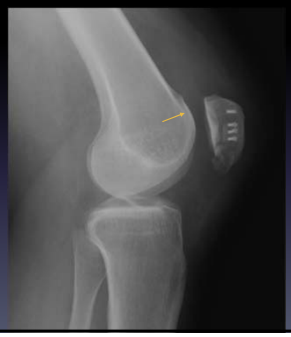
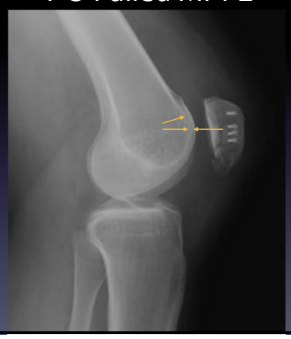

Crossing Sign w/Boss PO ACL

Crossing Sign w/Boss
PO Failed MPFL



Crossing Sign w/Boss
PO Failed MPFL



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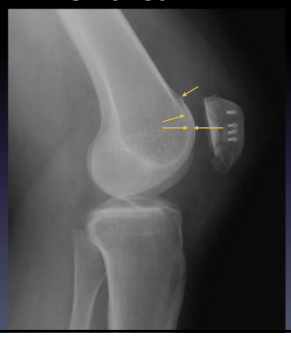

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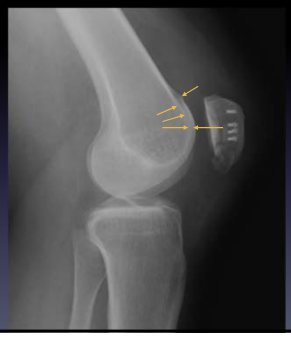

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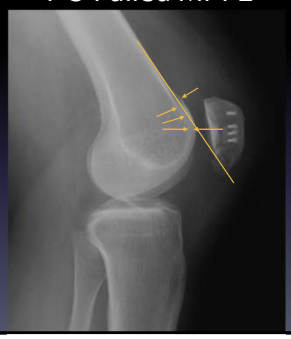
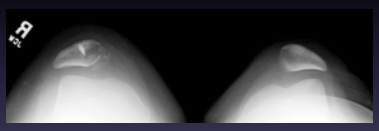
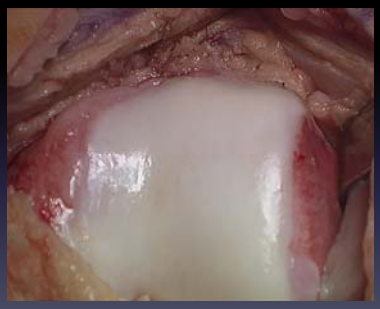


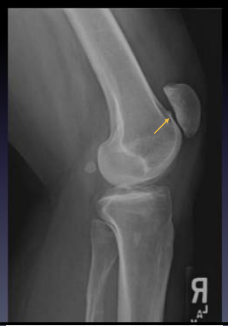
Trochlea flat with subluxation



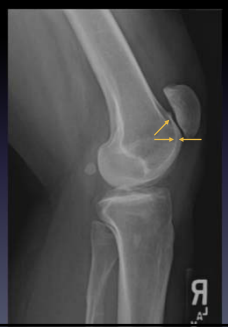
Crossing sign trochlea



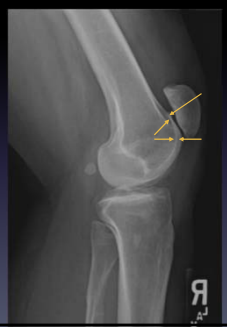
Trochlea Dysplasia Type D - Cliff



Trochlea Dysplasia Type D - Cliff



Trochlea Dysplasia Type D - Cliff



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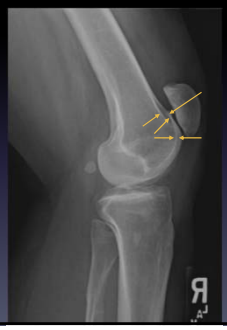
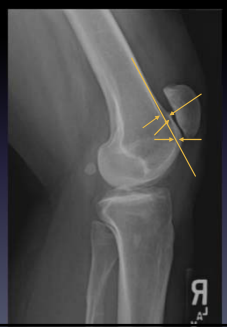
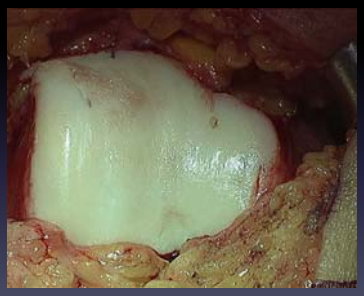


Trochlea Dysplasia Type D - Cliff

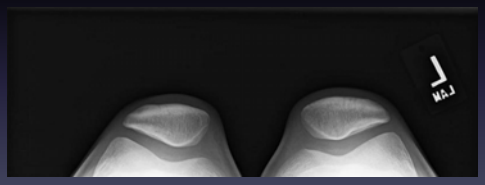


Trochlear Dysplasia Type D - Cliff

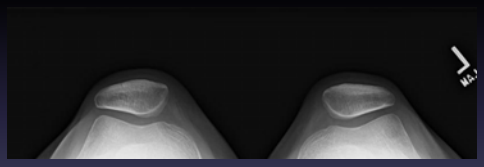


Merchant View Xray Frame

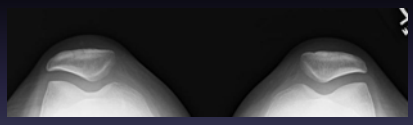
TROCHLEA NORMAL



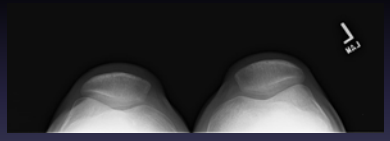
Trochlea shallow and flat



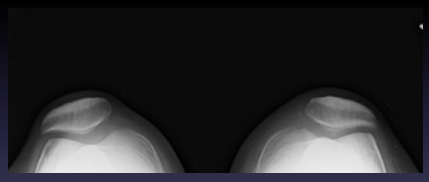
Trochlea deep



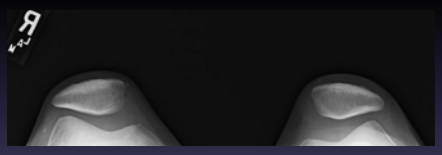
Baja trochlea



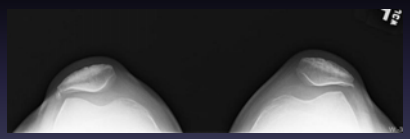
Subluxation Mild



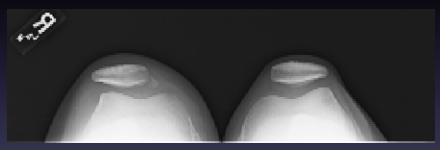
Subluxation moderate w/tilt



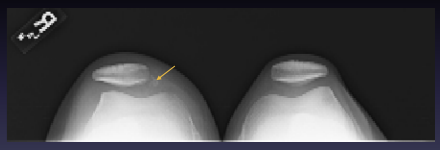
Subluxation – Moderate w/ DA



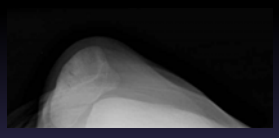
Dislocation – Medial inferior fragment

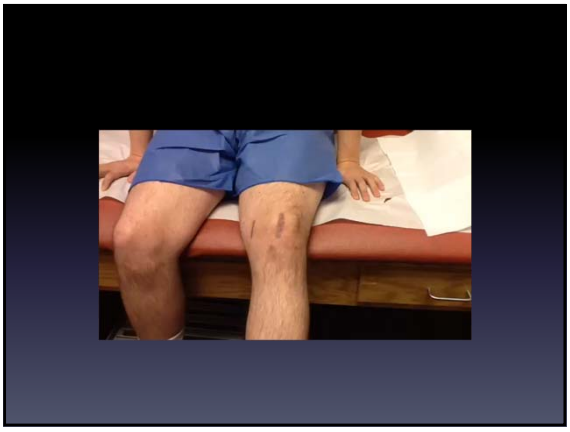


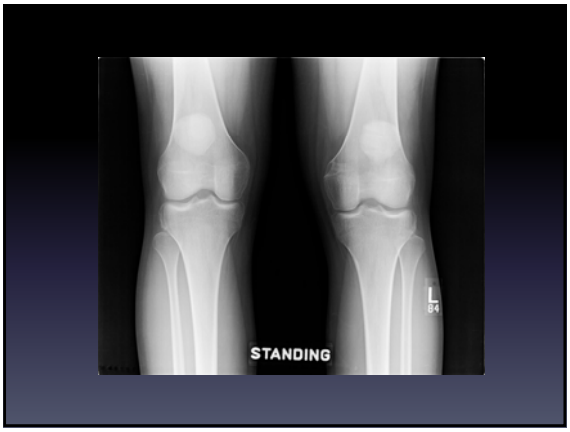
Dislocation – Medial inferior fragment

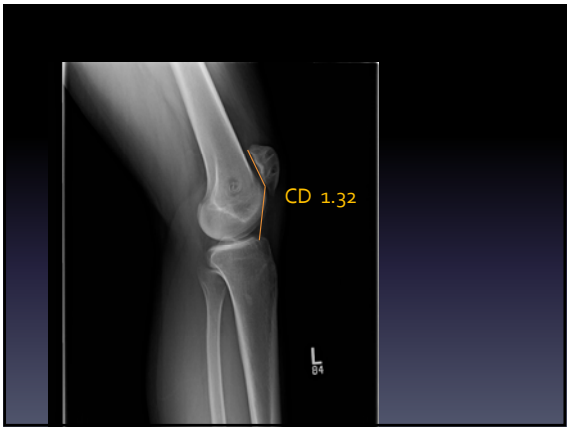


Dislocation congenital






STANDING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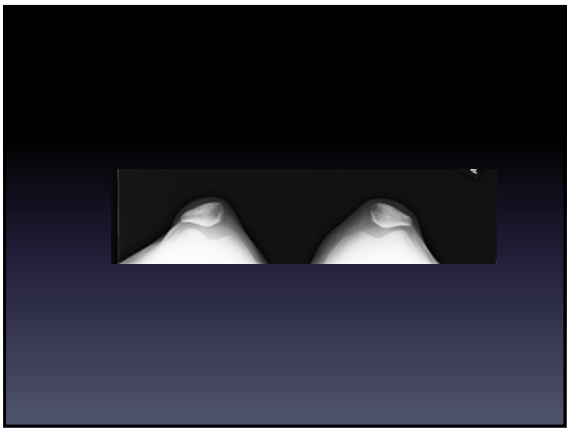

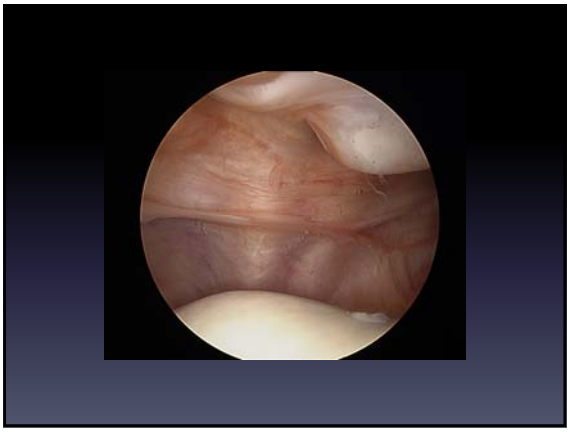

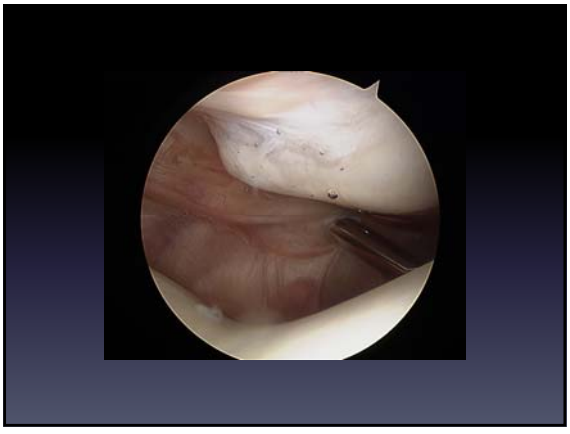

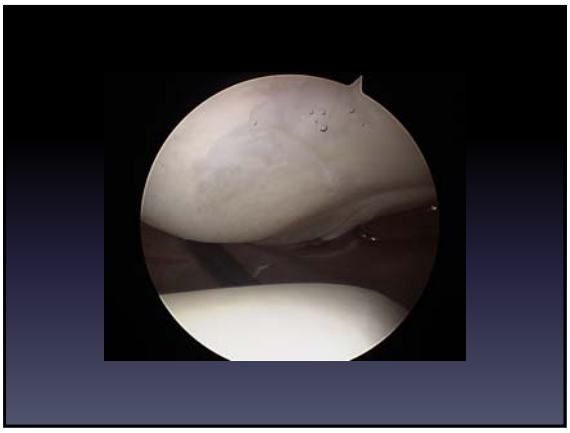

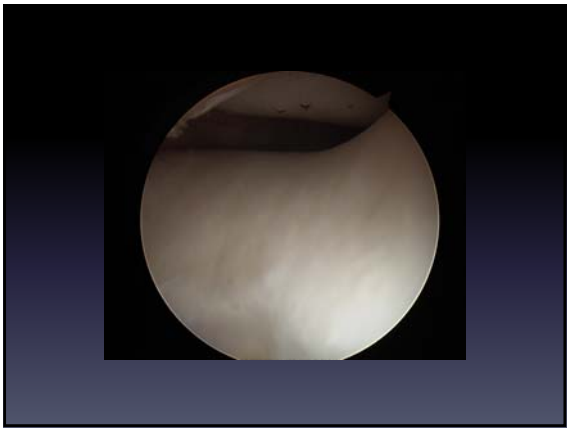

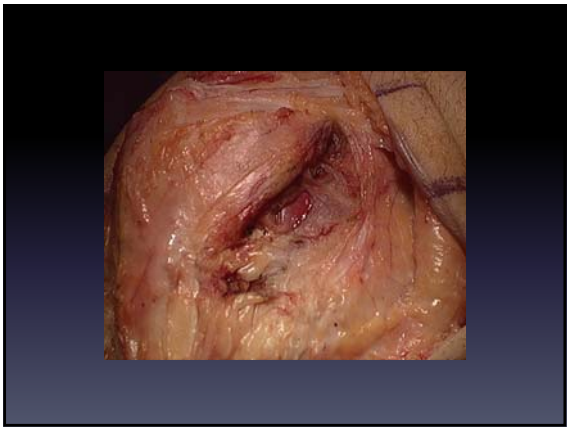

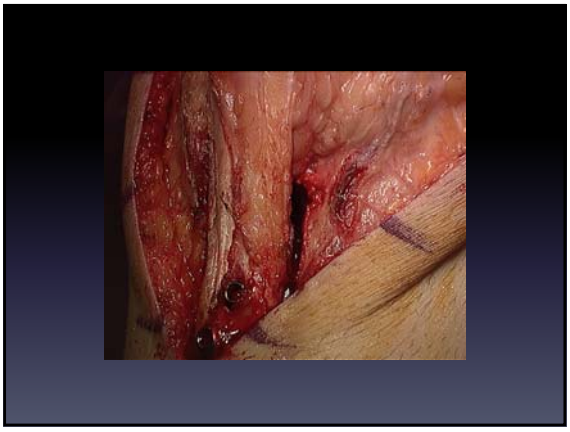

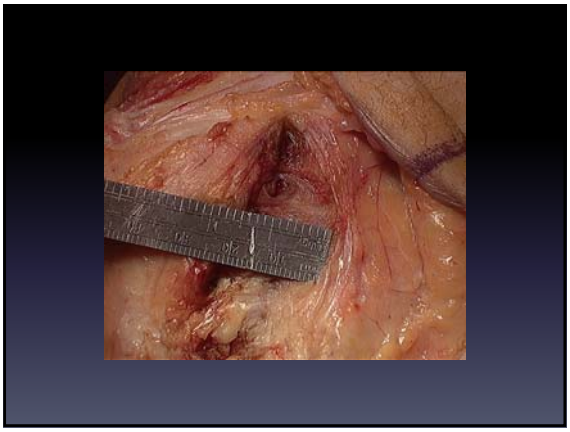

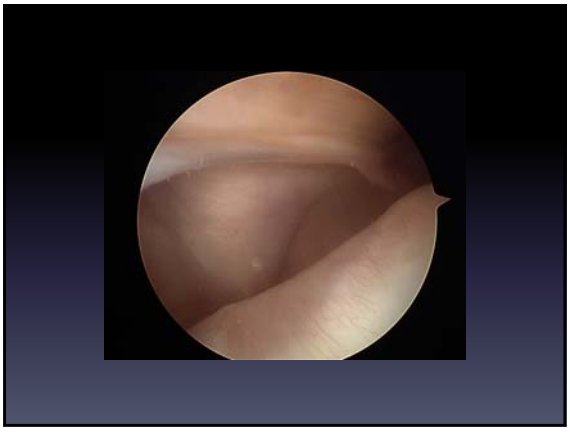

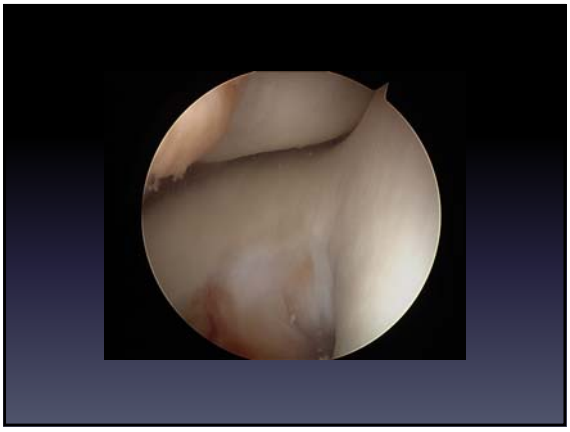

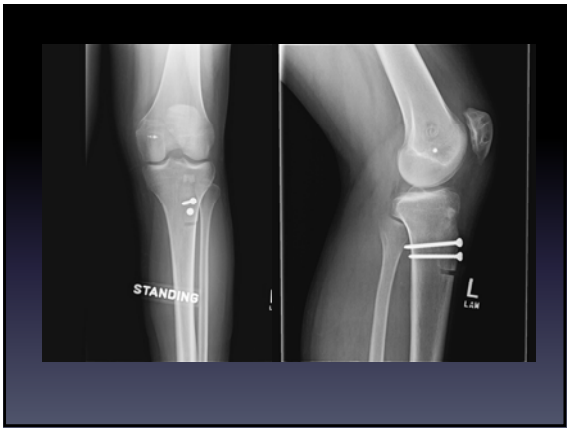
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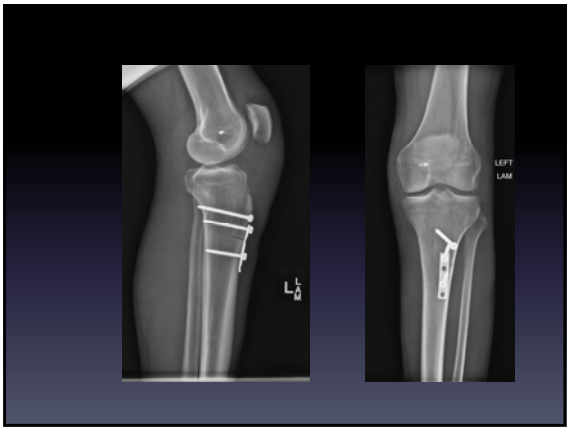
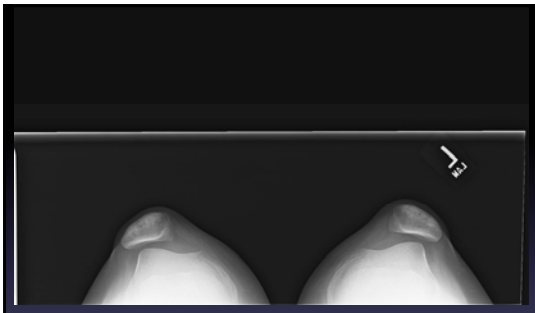
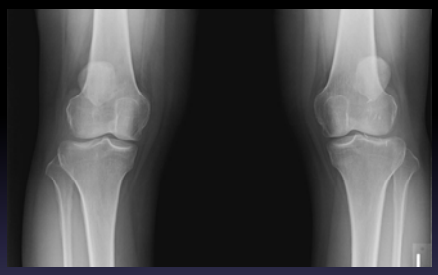
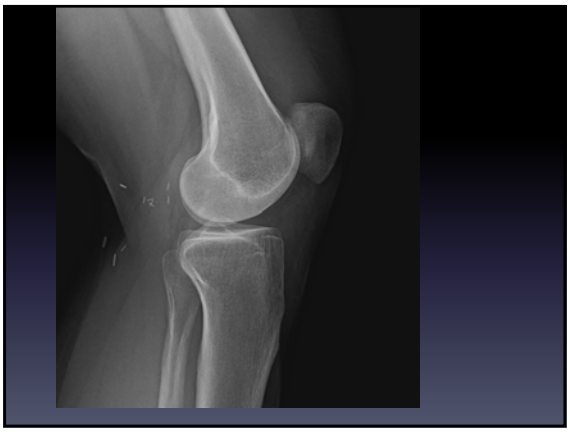

LEFT
LAM

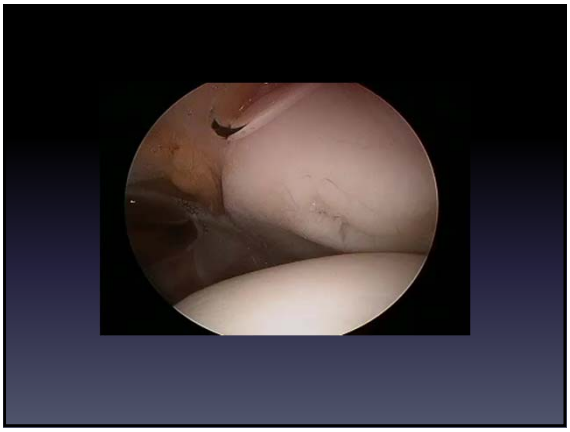
Trochlea Dysplasia

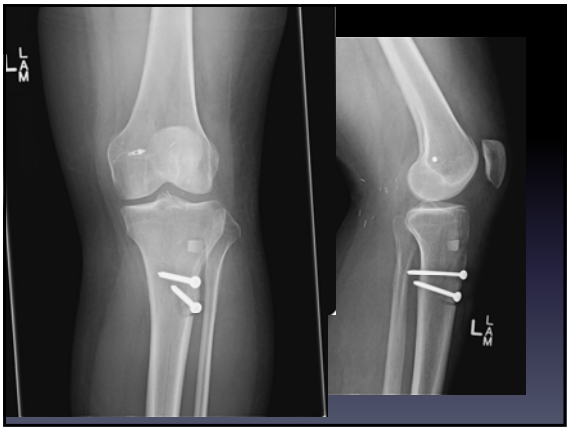
- Dysplasia is really Trochlea AND Patella
- Trochleoplasty does not treat patella
- Trochleoplasty does not restore distal femoral flare so there is no Capture
- Bony and soft tissue procedures will have limited success
- PatelloFemoral Arthroplasty Captures patella







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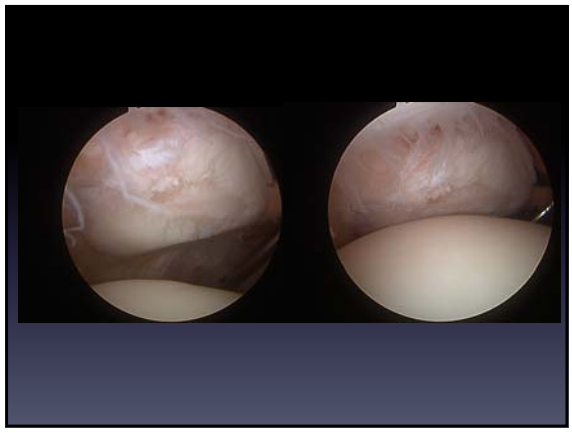

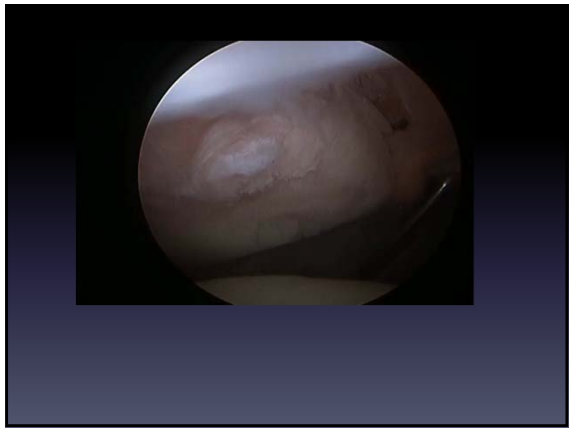

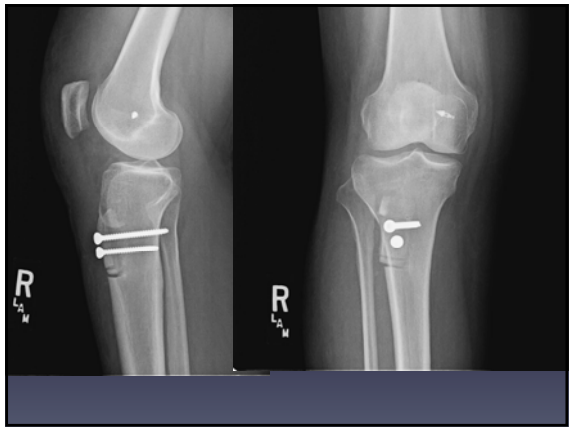
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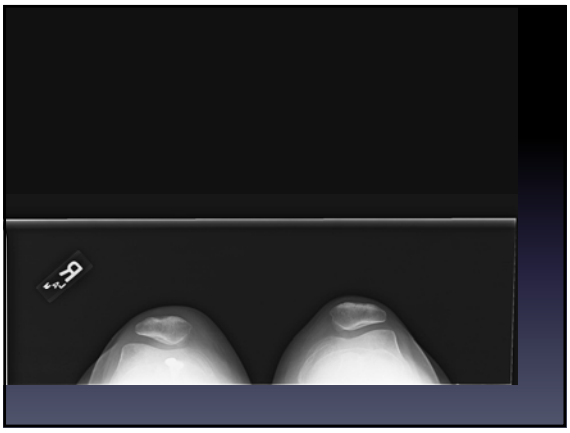
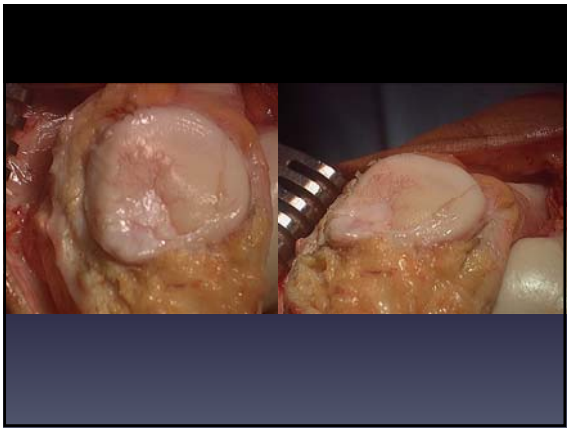
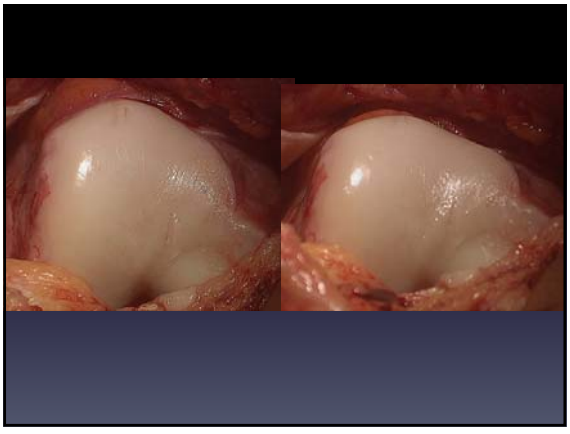
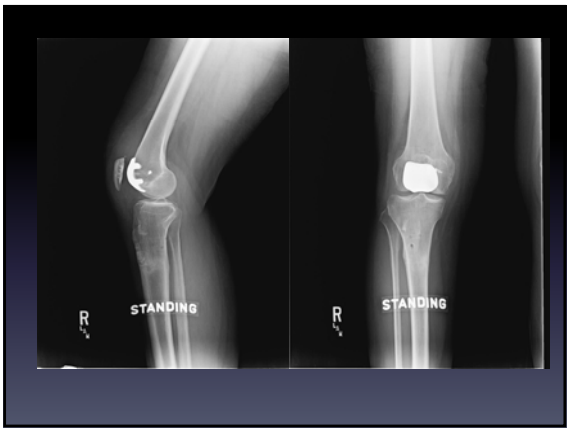
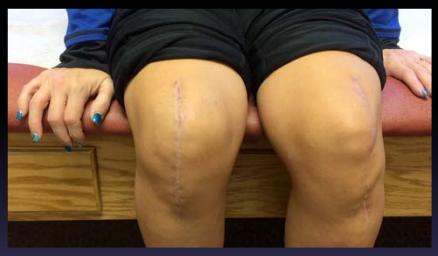








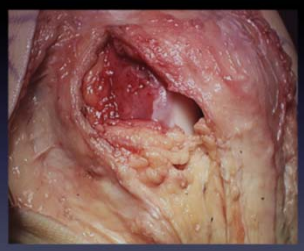


What should we do?

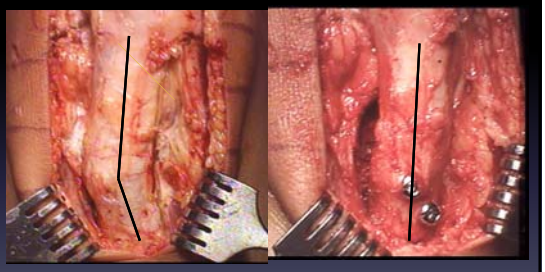
CAPTURE the patella in the trochlea!

- Arthroscopy for accurate assessment
- Center the patella in the trochlea – lateral release
- Realign patellar tendon
- Correct patella alta
- MFPL if medial restraints incompetent
- LPFL if lateral patellar laxity
- Repair lateral release with IT band rotation flap
- Resurface if needed

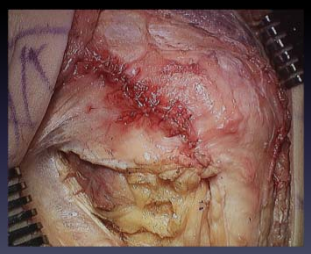
Lateral Release-Patella Centered



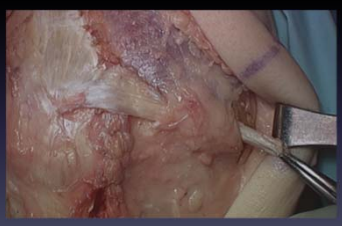
Tibial Tubercle Transfer



IT Band Rotation flap Repair Lateral Release



Quad MPFL
Tendon passed to MPFL origin



What I Have Learned?

- The lateral side is key to patellar stability
- Medial Patellar Subluxation is real and occurs often without prior surgery
- Patella Alta is underdiagnosed and undertreated
- Trochlea dysplasia is best treated by PatelloFemoral Arthroplasty

Thank you for your attention!

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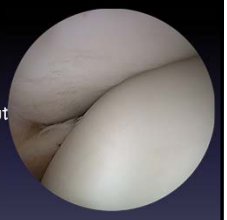
- dshneider@gmail.com
- MidMichigan Orthopaedic Institut
- 830 W. Lake Lansing Rd Ste 190
- East Lansing, MI 48823
- 517-333-3777



mcdonough

INSTABILITY - EXTENSION not FLEXION

- History
- Exam
- Xrays Most Important
  - Standing AP with quads tight
  - True lateral – condyles overlapped
  - Merchant view on a frame

Primary InstabilityFactors

Patella Alta
Trochlear dysplasia
Alignment

Secondary Instability factors

Soft tissue restraints
Tissue type

Basic Treatment Goals

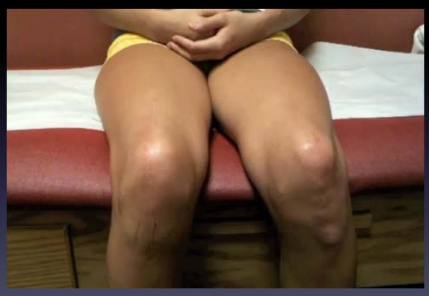
- Capture the Patella in Trochlea
  - Center the patella
  - Correct patella alta
- Restore medial and lateral stability
  - Restore Lateral Side Stability
  - Recognize Medial Subluxation

Exam

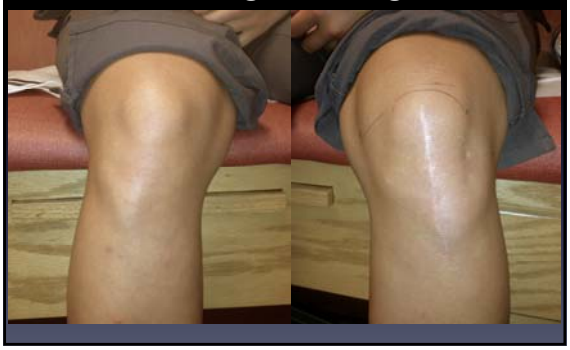
- Patient sitting
- Alignment
- Tissue type
- Range of motion
- Q Angle sitting
- J sign
- **Test both lateral and medial patellar subluxation at 20-30° flexion**

J Sign

J sign dislocates



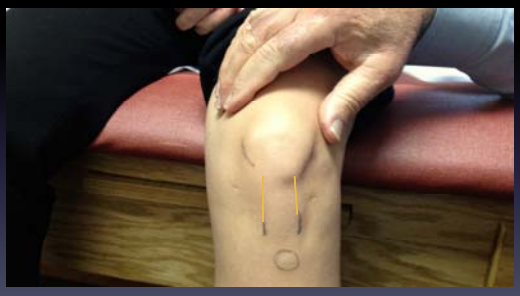
Q Angle Sitting



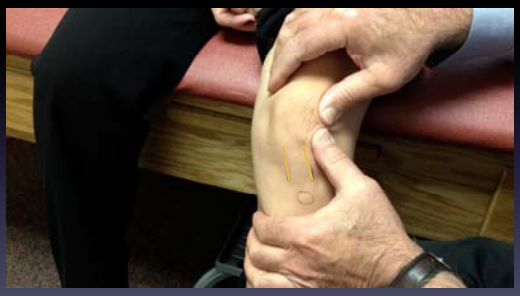
LPS Lateral Centering Test 30°

Medial Patellar Subluxation 30°

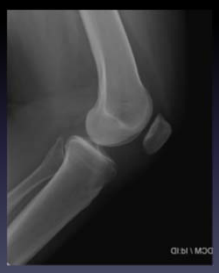
Q Angle at rest



Q Angle with patella centered



Lateral angled



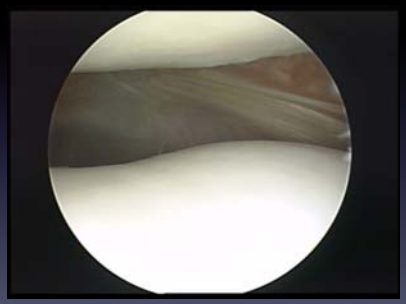
HISTORY

EXAM

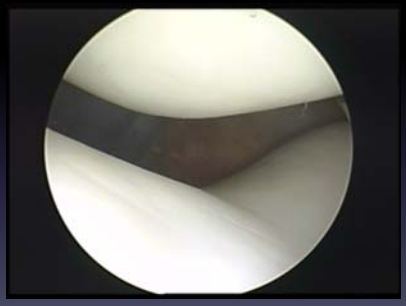
XRAYS

ARTHROSCOPY

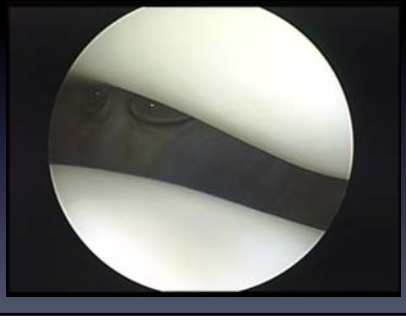
Normal Medial Retinaculum



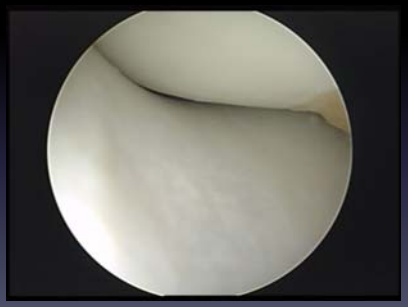
Normal trochlea



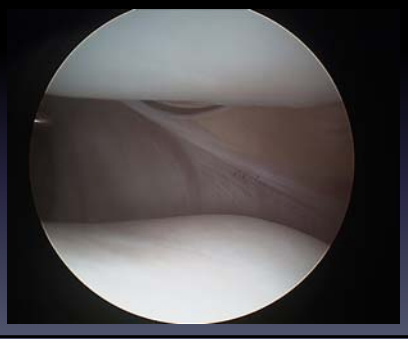
Normal lateral facet - parallel



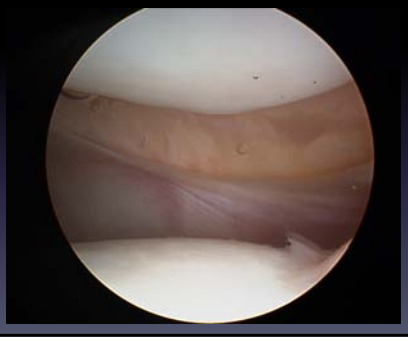
Full center in flexion



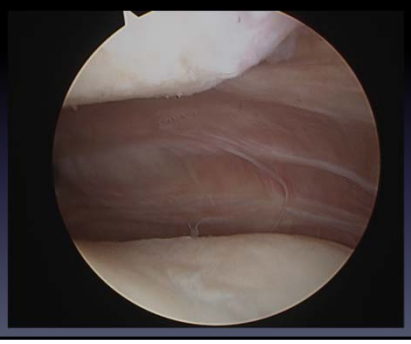
Medial Lax – Flat Trochlea



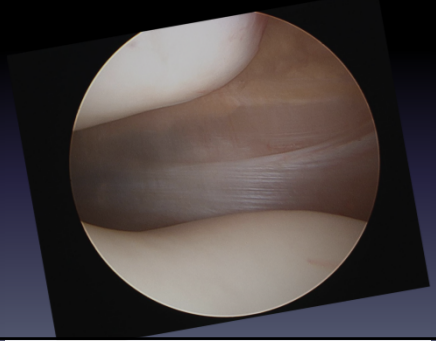
Medial Laxity - Moderate



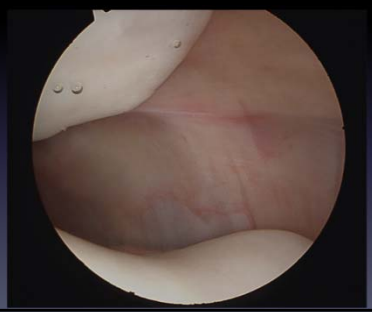
Medial Laxity - Severe



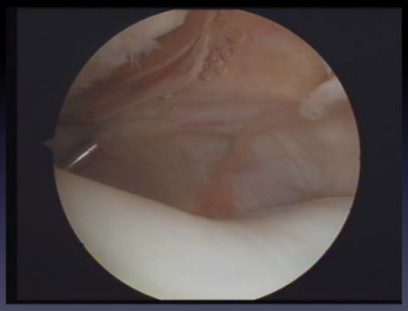
Medial Laxity w/ Subluxation



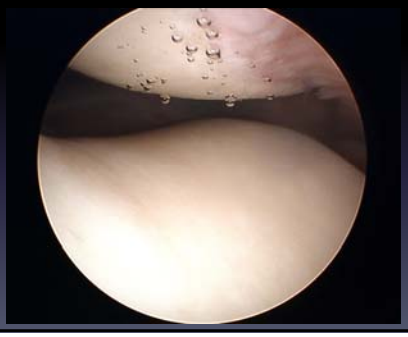
Medial Laxity - Severe



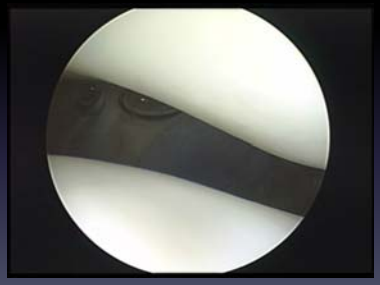
Medial Laxity - Dislocations



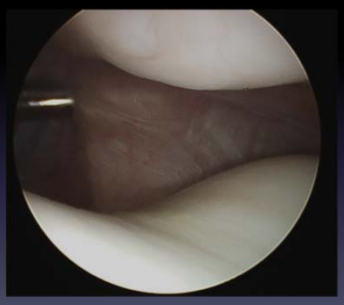
Tight medial



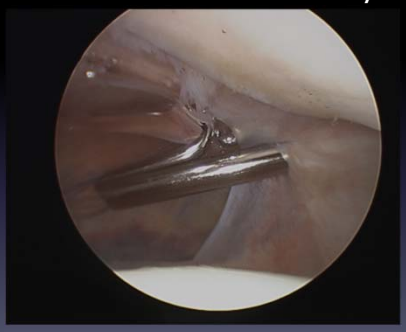
Normal lateral facet parallel



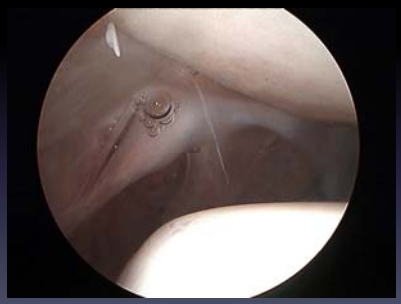
Lateral Patellar Laxity



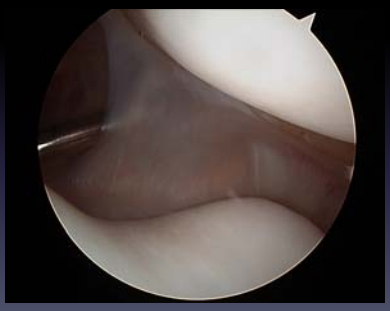
Lateral Patellar Laxity



Lateral Patellar Laxity



LPL WITH MEDIAL SUBLUXATION



Treatment Algorithm

- Arthroscopic evaluation and debridement
- Lateral release (open) to center patella in trochlea
- Tibial tubercle transfer – medial with Alta/Baja
- Medial stabilization for lateral subluxation - MPFL
- Lateral stabilization for medial subluxation - LPFL Quadriceps or Allograft (No patellar drilling)
- Repair lateral release with IT band rotation flap
- Resurface for significant arthrosis - PFA

Treatment Algorithm

- Lateral release to center the patella in the trochlea
- Tibial tubercle transfer to align tendon with new patellar position and correct alta/baja
- Stabilize medial and/or lateral with quad/allograft tendon
- Repair lateral release to prevent lateral laxity
- Resurface with PFA if significant arthrosis

Lateral Quad Graft Movie

Lateral Release, TTT, Repair LR

Lateral Patellar Pressure in Flexion

Treatment – What Works!

- Center patella in trochlea by lateral release
- Reduce lateral pull of patellar tendon by TTT
- Move tibial tubercle medial and anterior
- Stabilize as necessary
- Repair lateral release to prevent lateral side instability

HISTORY

EXAM

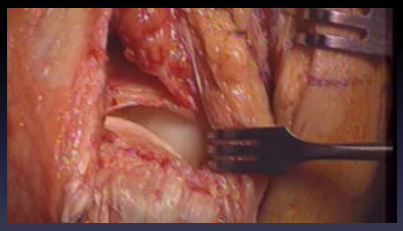
XRAYS

ARTHROSCOPY

Surgery 12-16-2010
Email 4-11-2011
Age 16

"I have recently joined a dance group at my school in the last month. The knee is beautiful. It is absolutely amazing that I can dance again. I also have joined a women's league soccer team. I am having so much fun!! I never thought that I would be able to run or enjoy my life again. "

Quad Rupture w/ Rectus Intact



Spectrum of Patellar Problems

Pressure — Instability

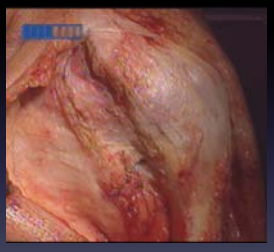
Normal

Normalize pressure and/or instability

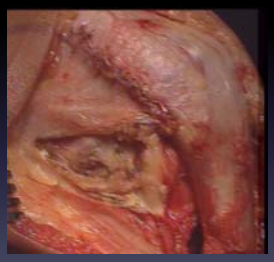
If pressure – Reduce pressure

If Instability – stabilize

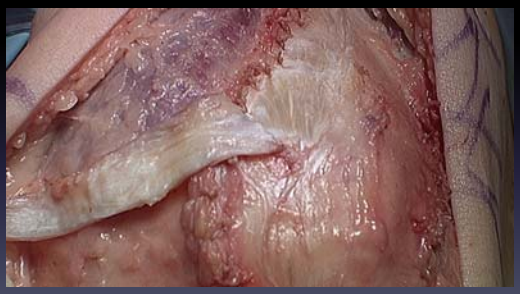
Lateral Release Complete
Tibial tubercle to Vastus Lateralis



Repair Lateral Release
IT Band Rotation Flap

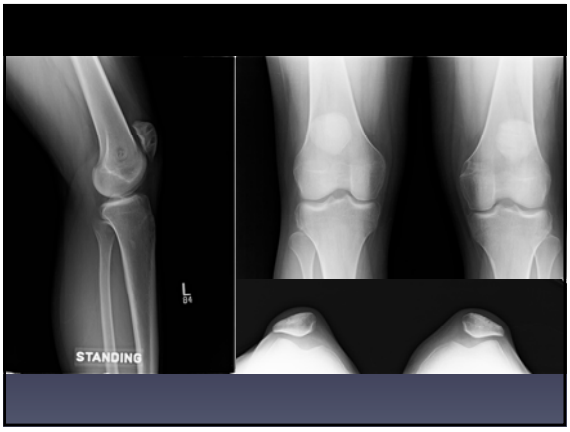


MPFL w quad pics

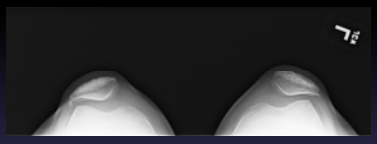


Lateral ~~Patellar~~ Pressure in Flexion
➡ LPIF

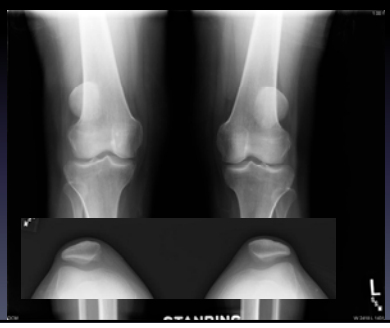
- Descriptive term to eliminate confusion in diagnosis
- Treatment objectives
  - Center patella in trochlea
  - Align bony tubercle and patellar tendon
  - Restore lateral soft tissue stability
  - Restore soft tissue balance



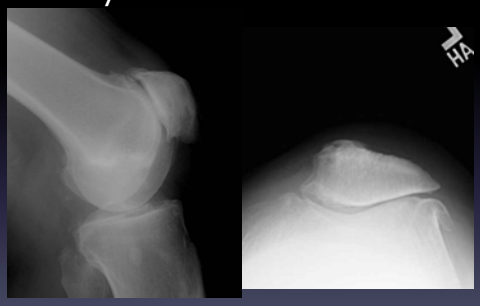
Merchant sublux min, mild, sev



Alta w/ Lateral Position



Primary PF DA No subluxation

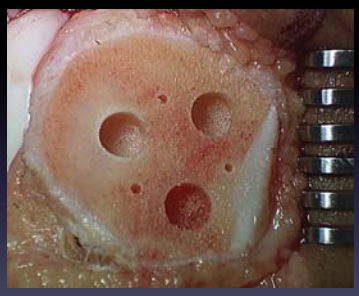


Pain in Flexion is due to Lateral Patellar Pressure

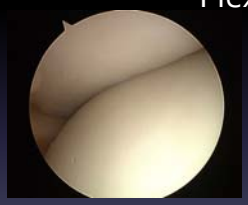
- Pressure occurs as the lateral patellar facet is compressed over the lateral femoral condyle as the knee flexes
- With flexion, the tibia externally rotates as the center of rotation is in the medial compartment
- Tibial tubercle rotates lateral increasing Q angle and lateral pull on the patella

John Fulkerson - AAOS ICL 2016

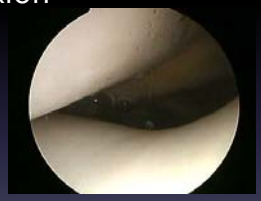
- Anterior or anteromedial tibial tubercle transfer reduces distal patella articular loads while balancing patella tracking . This is important because the distal pole can become severely overloaded and is often a source of pain related to this recurrent and damaging overload in PF malalignment patients.
- **The distal pole is exposed to recurrent excesses of point loading and shear stresses when the patella tracks on the lateral trochlea facet excessively.**



Arthroscopic Evaluation Anterior Medial Portal 90° Flexion



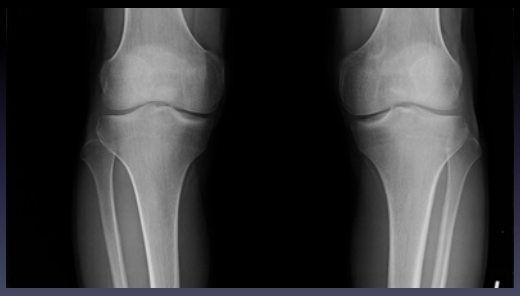
Lateral facet patella compressed over lateral femur



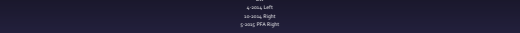
Patella not centered in trochlea

Arthroscopic Evaluation Anterior Medial Portal

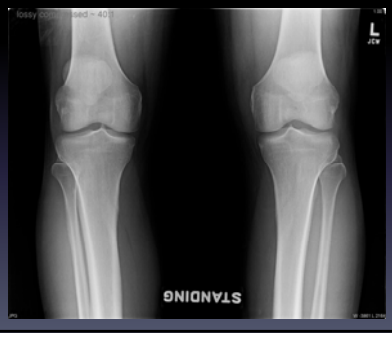
Baja AP



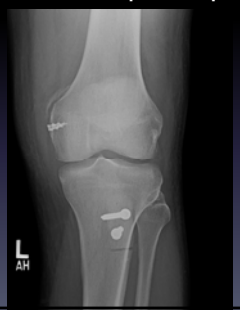
PFA for Instability



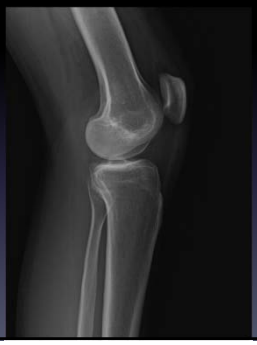
Acute Patellar Dislocation



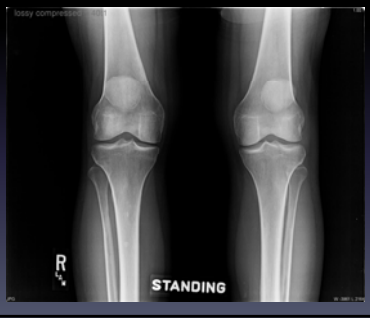
Acute Patellar Dislocation
3 months postop



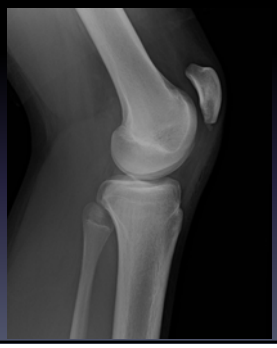
Alta lateral



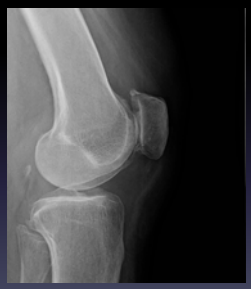
Alta moderate



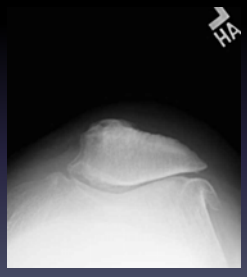
Alta severe



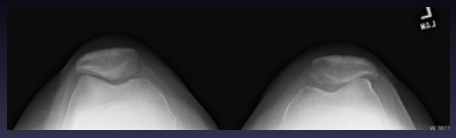
DA lateral



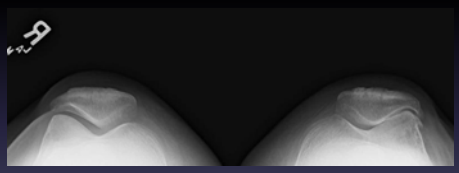
Primary PF DA No subluxation



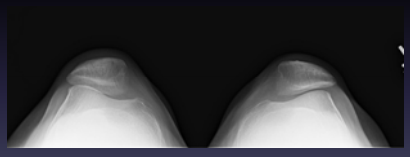
DA Lateral facet with LPIF



DA Primary with LPIF

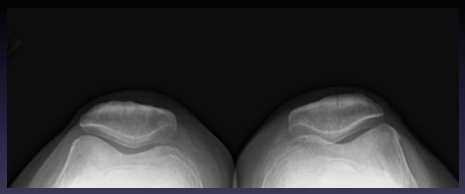


DA with flat trochlea

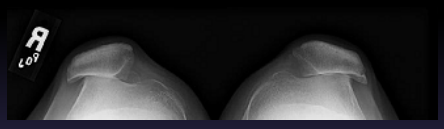


Medial Facet DA with Varus Knee

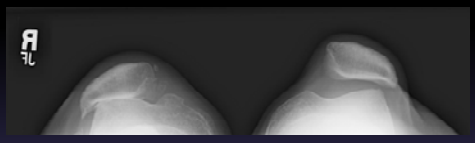
DA medial facet post TTT



DA with Subluxation



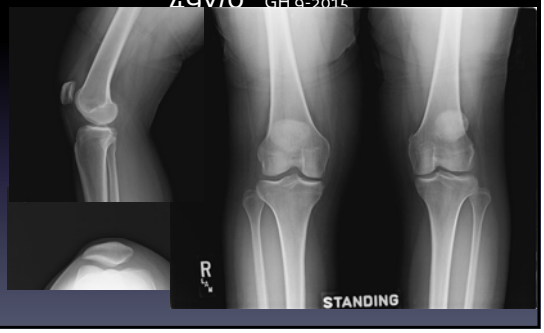
Severe DA and instability

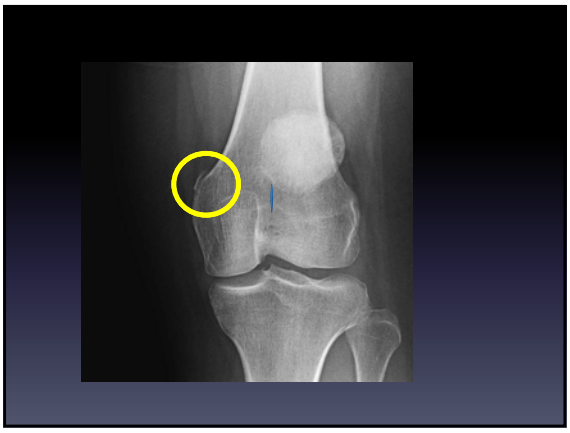


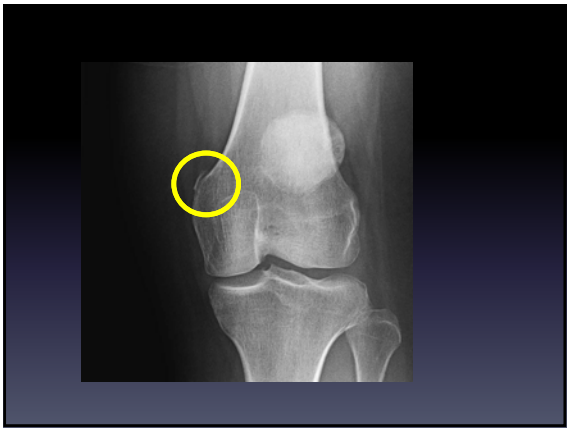
capture

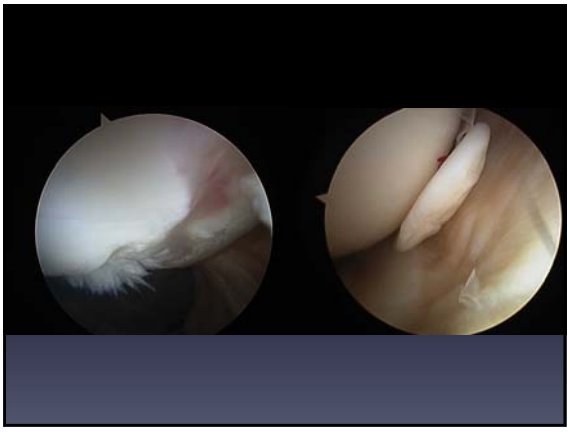
Patella Dislocation Acute

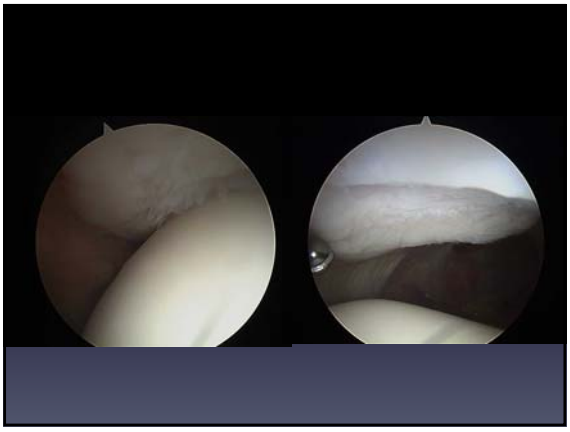
49y/o GH 9-2015

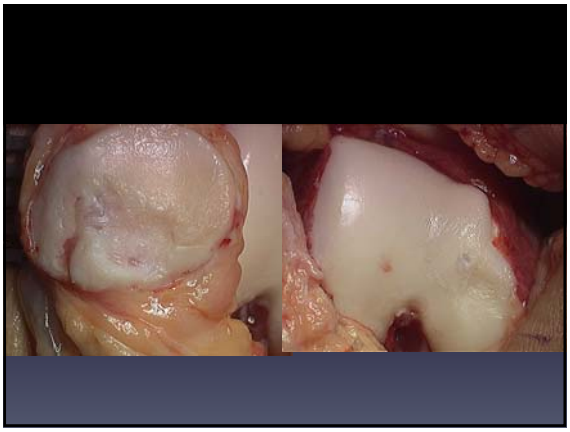


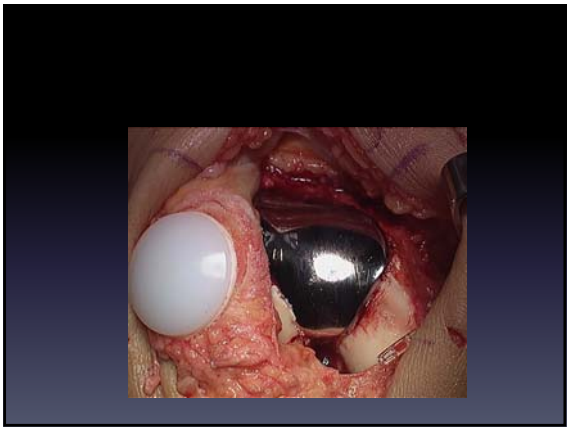


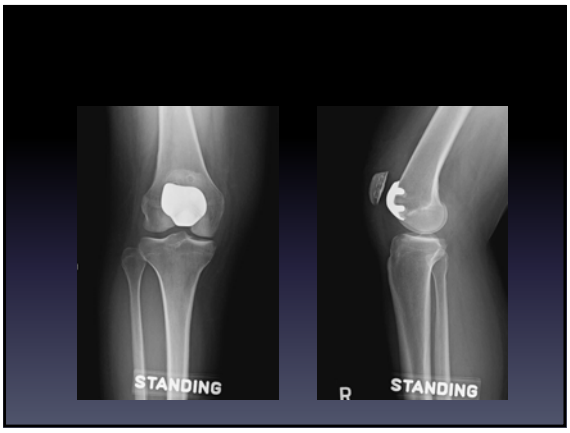












Mpfl failure

Spectrum of Patellar Problems

Pressure — Normal — Instability

Articular surface injury

Pressure – Reduce pressure

Instability – stabilize

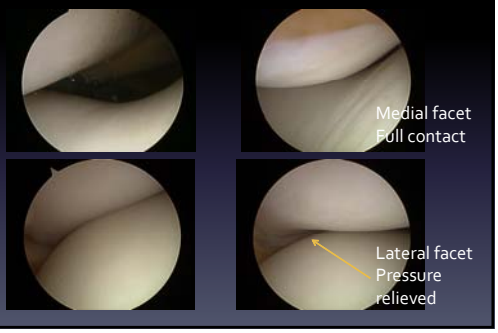
Articular injury – debride or resurface

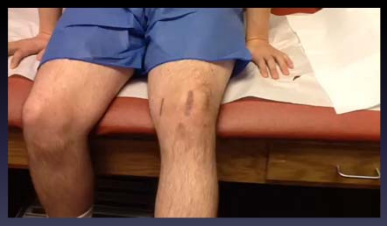
PAIN – Pressure in FLEXION

- **Pain out of proportion to physical findings is patellar until proven otherwise!**
  - Constant
  - Sitting
  - Stairs – down>up
  - Rising from a chair

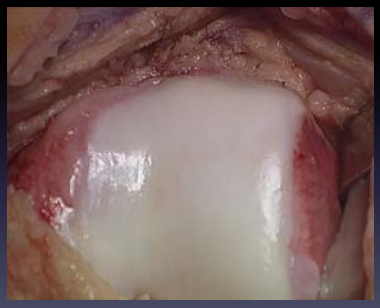
Anterior Medial Portal

Preop 90° Flexion Postop





Crossing sign trochlea



Isolated Lateral Release Doesn't Work!

- Destabilizes lateral side of patella – worsens instability
- Creates lateral patellar laxity
- Only effects extension, not flexion
- Must be repaired to restore lateral side stability
- Occasionally useful in pressure with degenerative arthritis to avoid more extensive procedure