

Patellofemoral Disorders

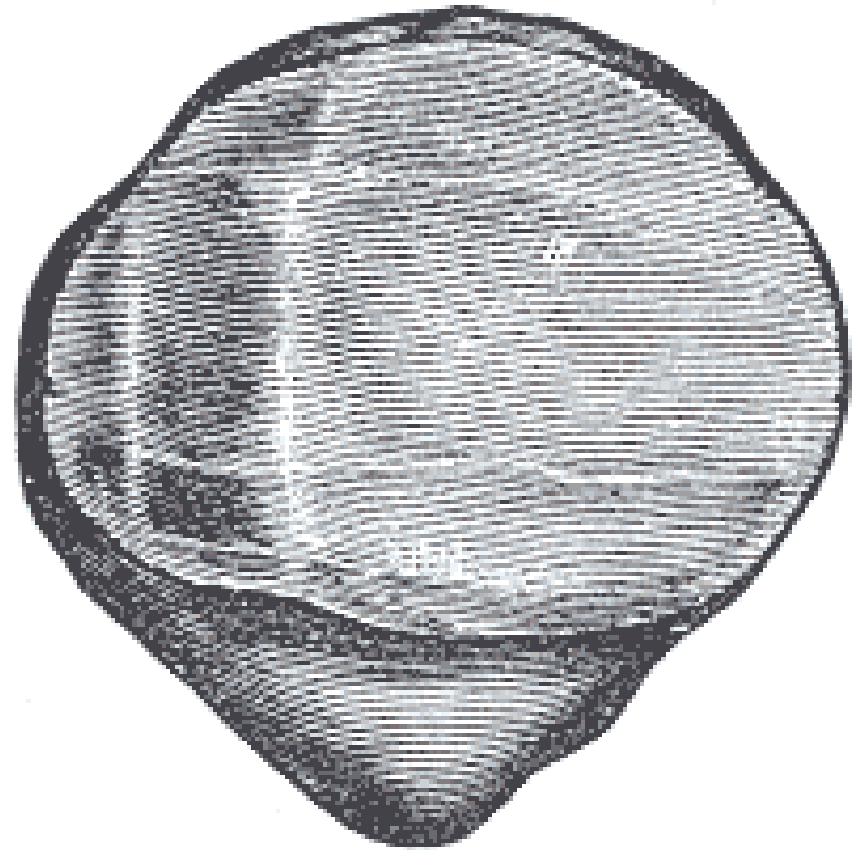
Timothy J. Juelson



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Patella

- Largest sesamoid bone
- Thickest articular cartilage
 - Up to 6 mm

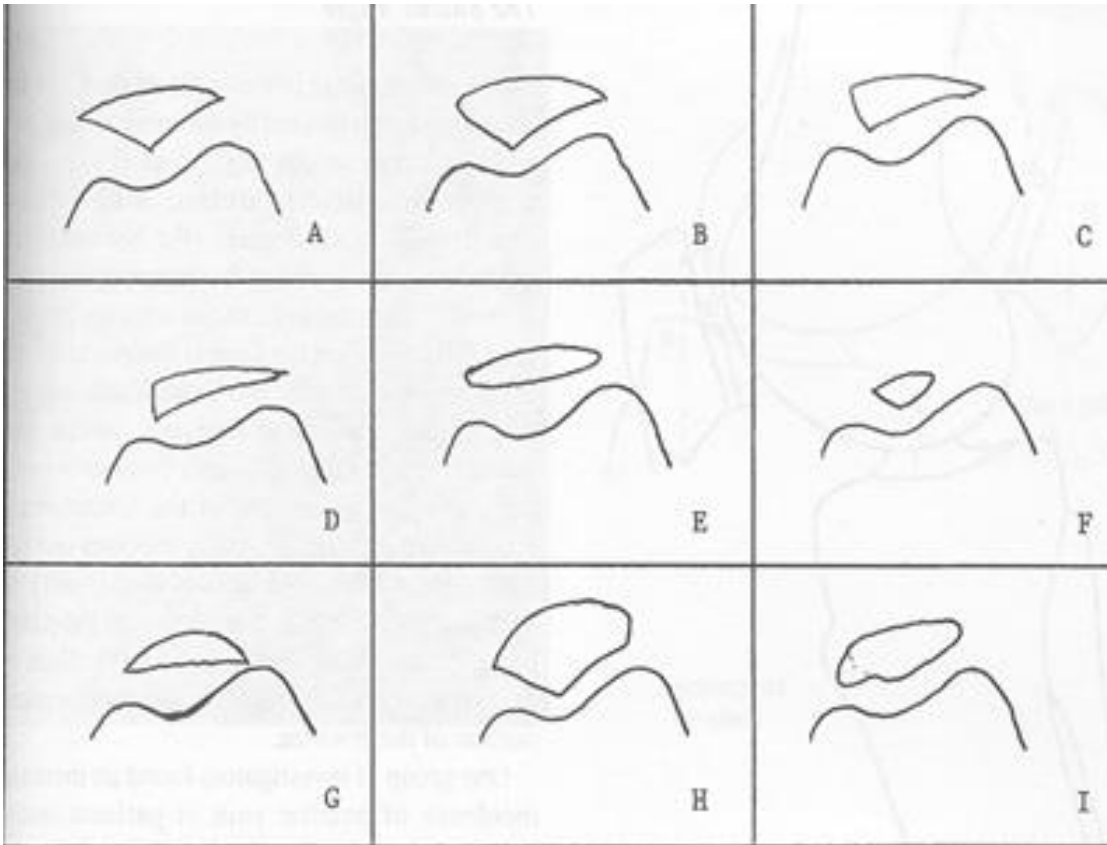


Patella

- The patella has 7 facets
 - medial and lateral facets are divided into = 1/3 sections superiorly and inferiorly, with the 7th facet being the most medial portion called the odd facet
 - Medial facet is most often injured with lateral



All shapes....



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Wiberg

- Type I = medial/lateral facets
- Type II medial facet $\frac{1}{2}$ size lateral
- Type III medial facet further medialized no central ridge

Trochlea

- Lateral femoral condyle is smaller than medial, creating valgus alignment of knee
- Lateral wall of the trochlea more anterior than the medial.
- Provides bony restraint to lateral subluxation
- Significant variation –
DEJOUR CLASSIFICATION

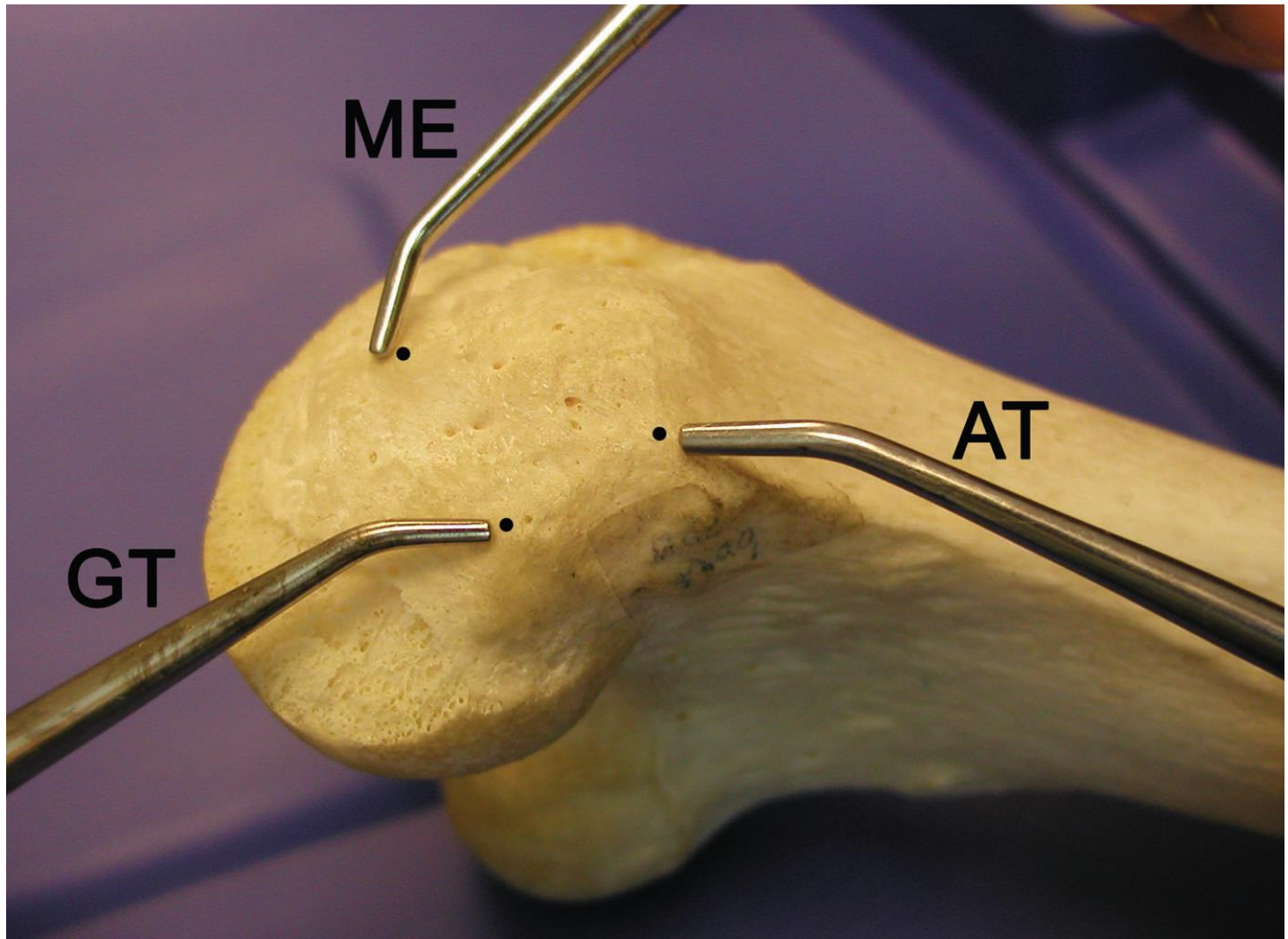


Trochlea

- Does the patella articulate with the trochlea?
- Trochlea articulate with the patella?

Lateral Retinaculum

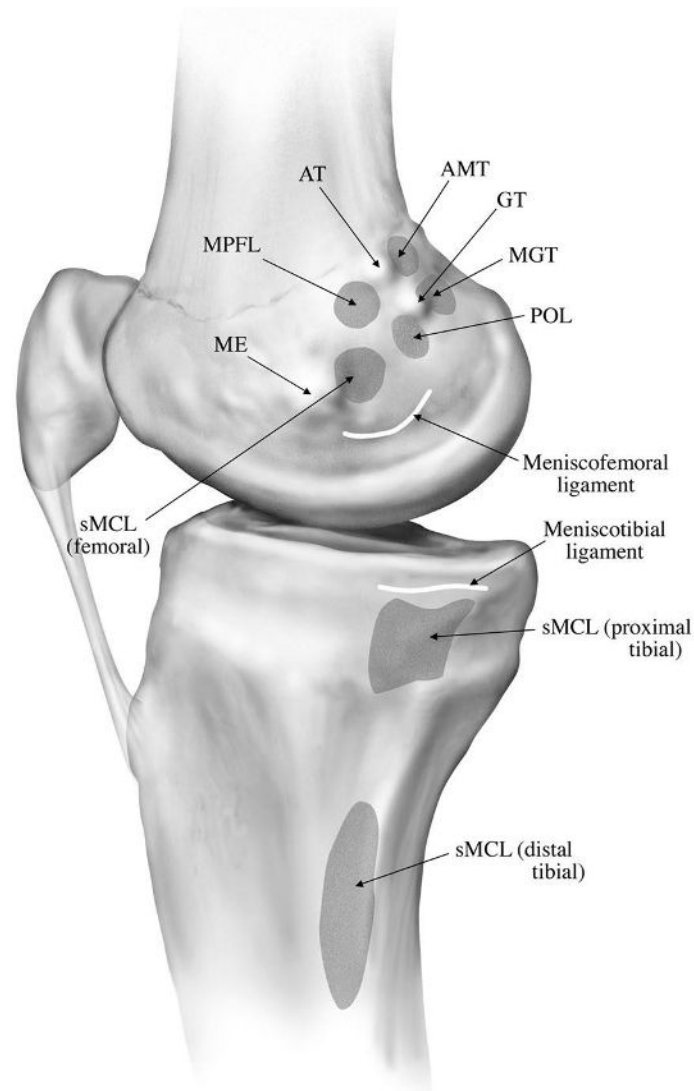
- Christoforkis et. al. 2006
- Cadaveric study
- Release results in 16-19% less force to translate patella laterally just 10 mm



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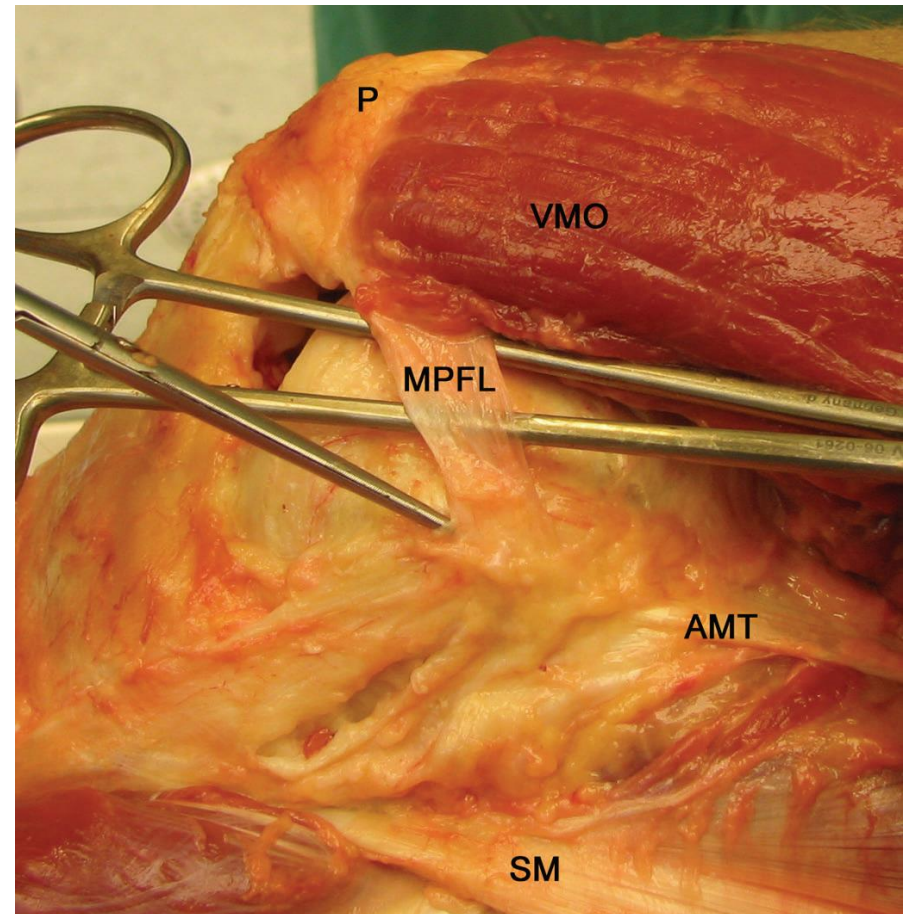
Medial Patellofemoral Ligament

- Patellar attachment
 - MPFL was located 41.4% of the length from the proximal tip of the patella along the total patellar length (proximal to distal).
- Femur attachment
 - MPFL was 10.6 mm (range, 8.0 to 13.4 mm) **proximal** and 8.8 mm (range, 6.7 to 10.3 mm) **posterior** to the medial epicondyle
 - 1.9 mm (range, 1.3 to 3.2 mm) **anterior** and 3.8 mm (range, 2.1 to 6.3 mm) **distal**



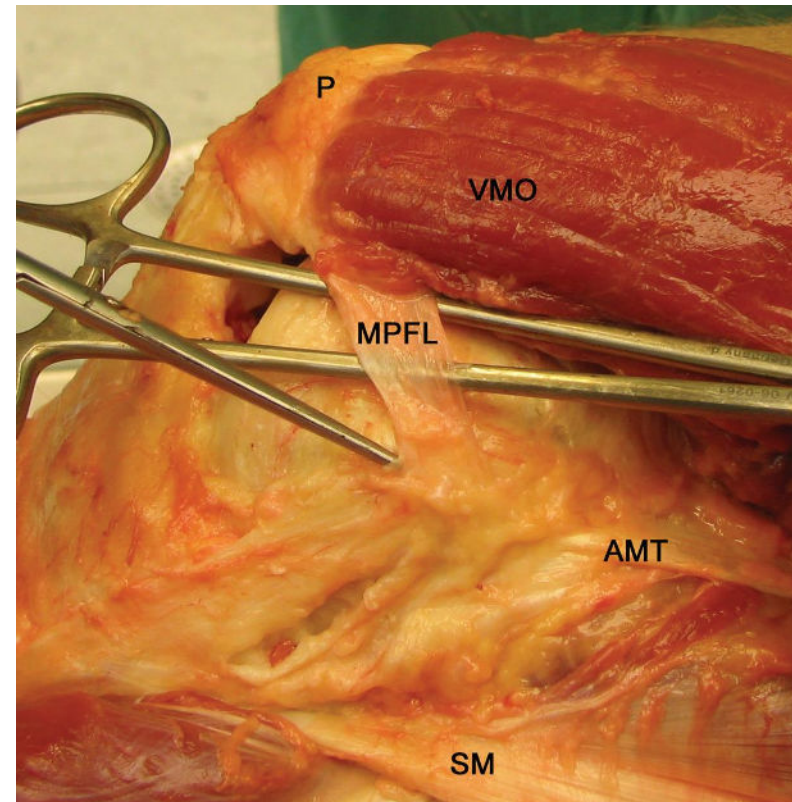
MPFL

- Avg. length 65 mm
- MRI FINDINGS
 - 3-4.5MM MRI CUTS
 - X-SECTIONAL AREA SMALL



Dynamic Stabilizers – INFAMOUS VMO

- VMO is approximately 30 percent of the cross section of the vastus medialis complex.
- It is thought to be the main active medial patellar stabilizer.
- VMO has an approximately 50- to 55-degree angle inserting on the superior margins of the patella
- It has an intimate relationship with the medial patellofemoral ligament.

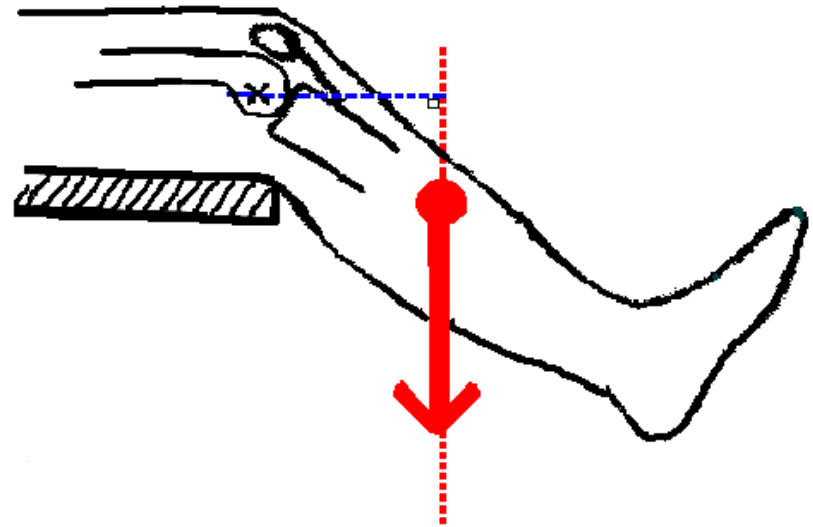


VMO

- Strengthen selectively?
 - Innervation femoral nerve
 - Evidence? 1 study
 - Substantial evidence that extensor mechanism stimulated together
 - EMG, anatomic – FEMORAL NERVE

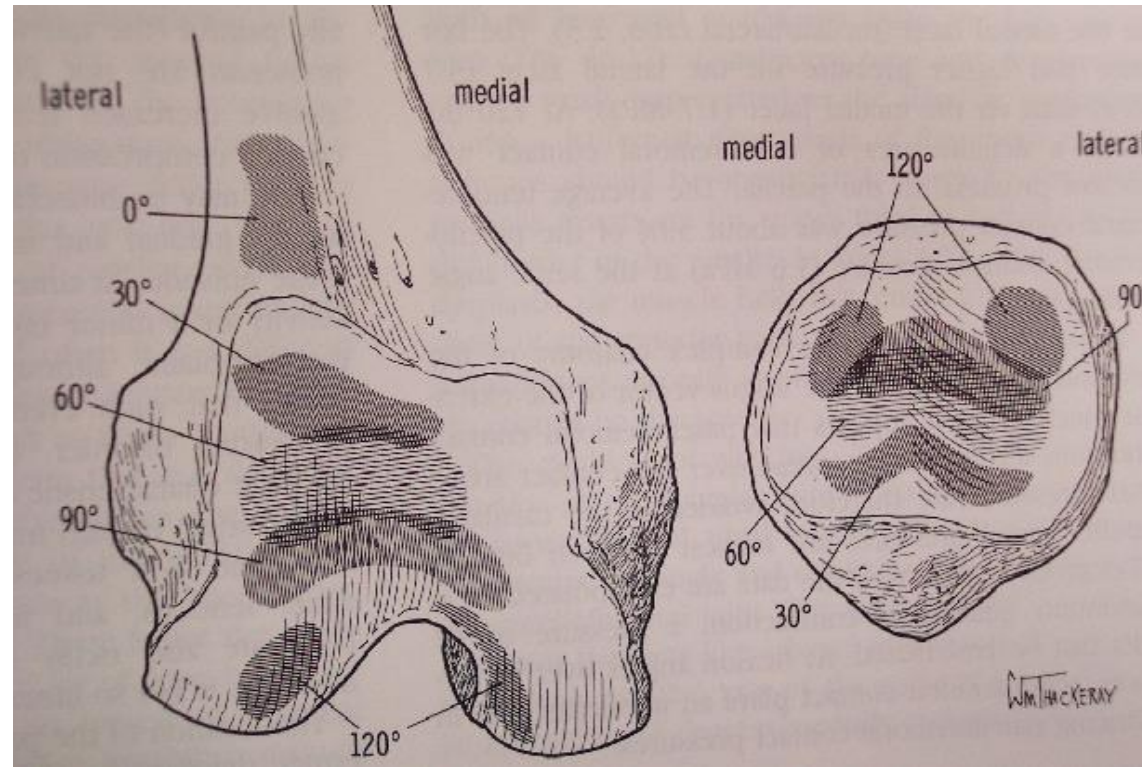
Function Patella

- Function of the patella
 - patella increases the mechanical advantage of extensor muscles
90 deg flexion (patella within the notch) - lever arm increased 10 %
- Coming into ext, the lever arm increases:
at 45deg -> 30 %



Articulation

- Lateral and inferior surfaces articulate with the trochlea @ 10-20° of flexion
- As flexion increases, contact moves distal on the femur and proximal on the patella



PFJ Articulation

- Patella alta
- Patella Baja
- TT-TG



Joint Reactive Forces

- Patello-femoral joint reaction force determined by quads force and amount of knee flexion
 - Normal walking -> joint compressive forces = half bodyweight
 - Up stairs -> 2.5 - 3.3 times body wt
 - **Deep knee bends -> 7-8 x body wt**



Excessive Femoral Anteversion



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Evaluation PFJ

- Patella mobility
- LATERAL APPREHENSION
 - 0 AND 20 DEGREES
- Trochlear stability
 - How much flexion
- Q-Angle (clinical significance?)
- LE Flexibility
 - IT Band, HS, Quads
- ROM
 - Knee ,Hip, Ankle



History

- Anterior knee pain
- Instability?
 - Number of occurrences
- Family History – frequently one parent
- Other joint laxity/instability
- Contact vs noncontact dislocation

Rehab

- Traumatic first time lateral dislocation
 - Without substantial articular cartilage damage
 - PT, brace, rehab, time, gym
- Anterior knee pain
 - Patella protection protocol
 - Gym
 - Details in Kevin Axtman talk



Surgical Options

- Instability
 - FIRST OR Second time patella dislocators
 - Articular cartilage problems
 - Loose bodies
- First time dislocators – Surgery?
 - Hypermobility, malalignment, family history, ANATOMY



Surgical Options

- Anterior knee pain without traumatic event
 - Must exhaust all non-op measures
 - Marginal outcomes for degenerative related pain

Lateral Release....

- Paulos et. al 1990, AJSM
 - Malalignment, hypermobility
 - Poor outcomes
- Unpredictable results
- Not indicated in any setting with instability
- RARELY indicated as stand-alone procedure

Summary

- Rehab for anterior knee pain
 - Focus on hip/pelvis musculature
 - Quads innervated by the same nerve
 - VMO specific is not supported in literature
- MRI – ALTA/TTG/CHONDROMALACIA
 - SURGICAL OPTIONS

Instability

- Evaluate individually
- First time dislocators – EVAL BIG PICTURE
 - MRI
 - ANATOMY
 - DO not return to play until adequate attempt at rehab >4 weeks
 - SURGICAL CONSIDERATION
- Malaligned/hypermobility
 - Surgery may be an option in first time dislocators
- 2nd dislocation
 - Realignment and/or reconstruction



Cases

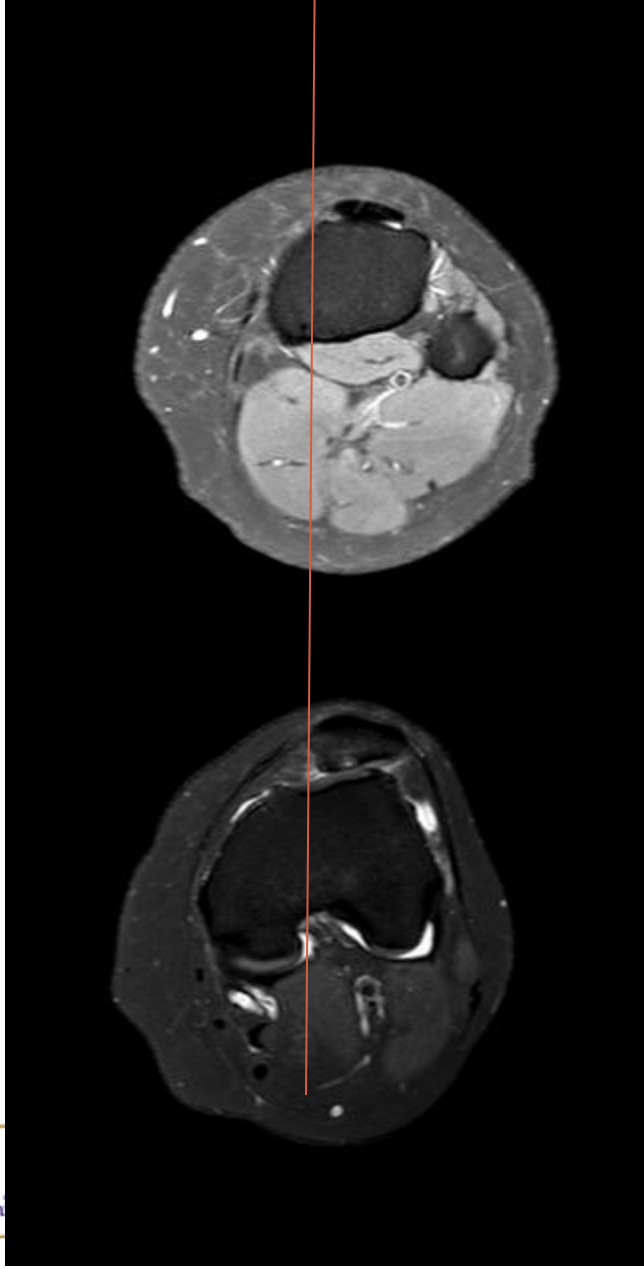
- Questions
- FRESH OC GRAFT VS MACI
 - RECOVERY TIMELINE AND COST CONSIDERATIONS

18 yo female

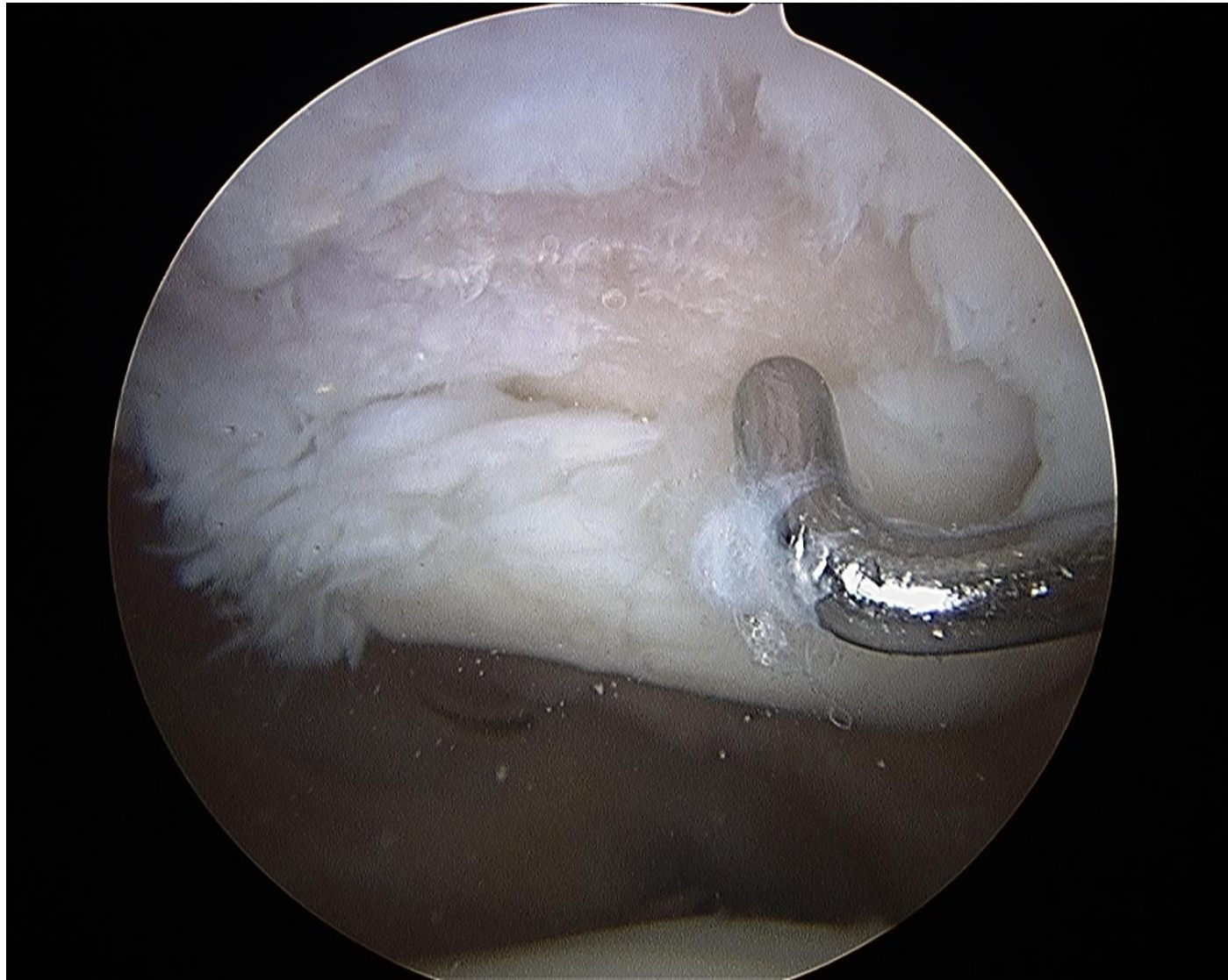
- Unstable
- Malaligned
- Multiple Patella Dislocations
- Patella Alta



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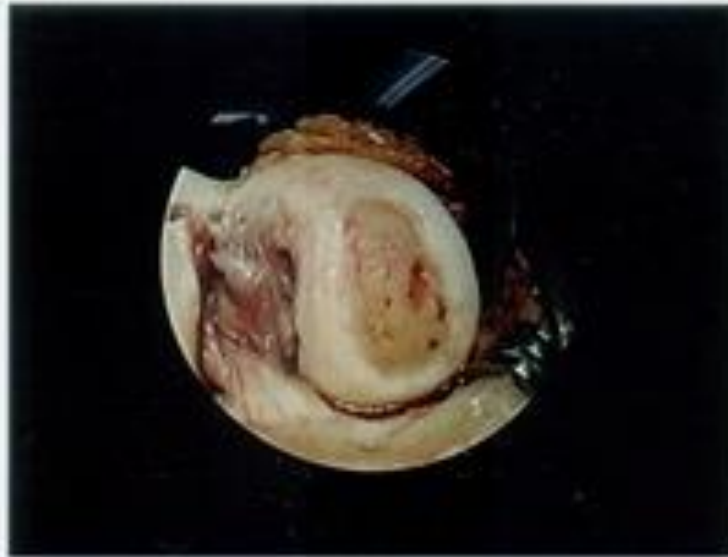


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MPFL/TTO/ACI

- Triplanar tibial tubercle osteotomy
- MPFL reconstruction
- ACI full thickness patella defect 3 square centimeters



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MPFL/TTO

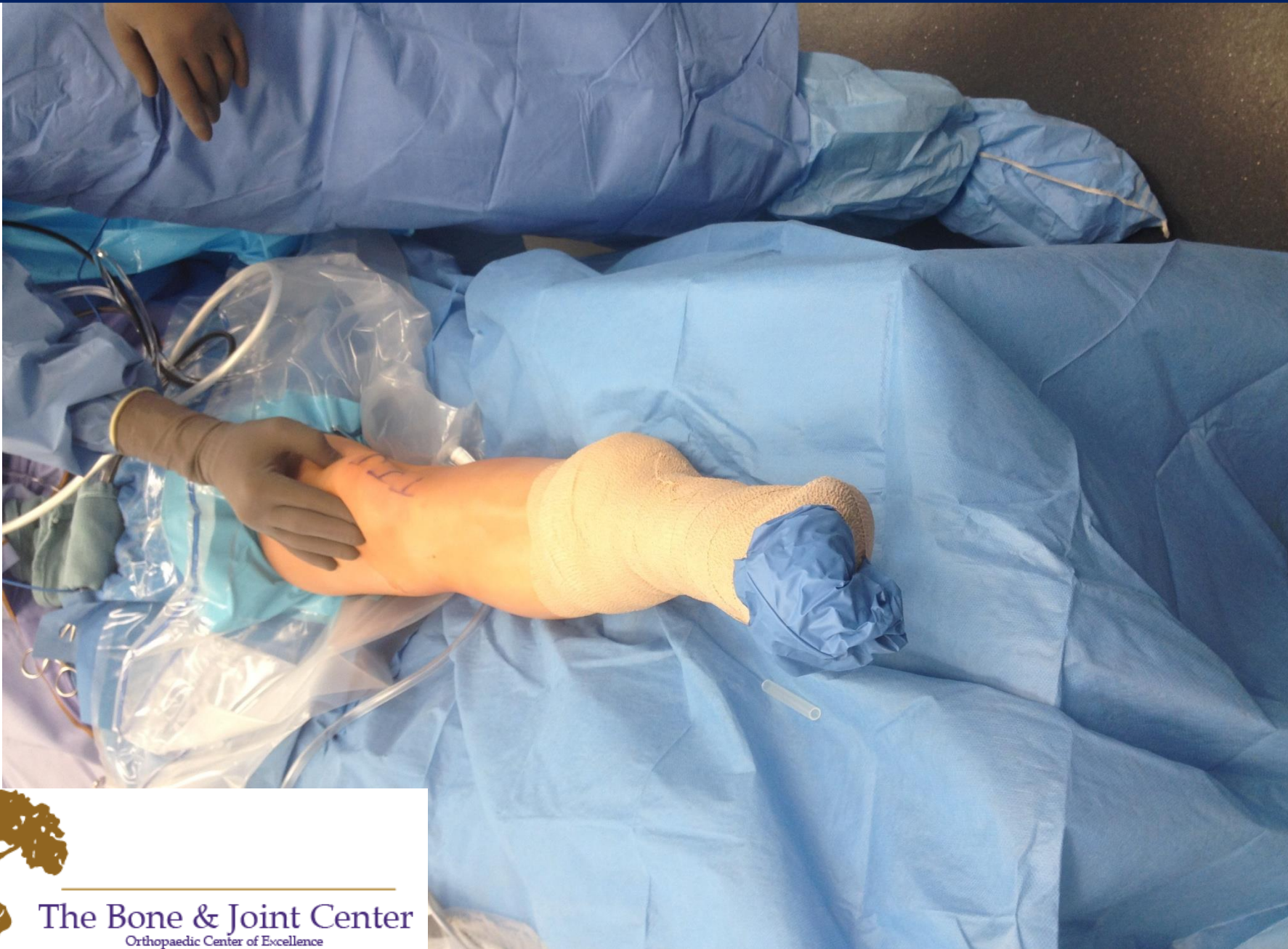
- 1 lateral patella dislocation
- Elevated Q and tuber sulcus angle
- Started around age 8 years contralateral knee
- Many episodes lateral subluxation/microinstability
- >1 year PT
- Dislocated in patella braces



MPFL/TTO

- Contralateral knee 3 patella instability surgeries
 - Lateral release, failed, worsened
 - Quads transfer, failed
 - MPFL reconstruction – obtained stability
- 2 in ND, one at Mayo Clinic
- Now problem on 'good' side
- Hypermobility, malaligned, very apprehensive
- TTG 18-19 mm
- Options?





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MPFL/TTO

- Minimal cartilage damage medial facet
 - Laxity can be advantage
- 10 months post-op back to sports and full activity
- Feels more stable than her other knee
 - Mechanical realignment

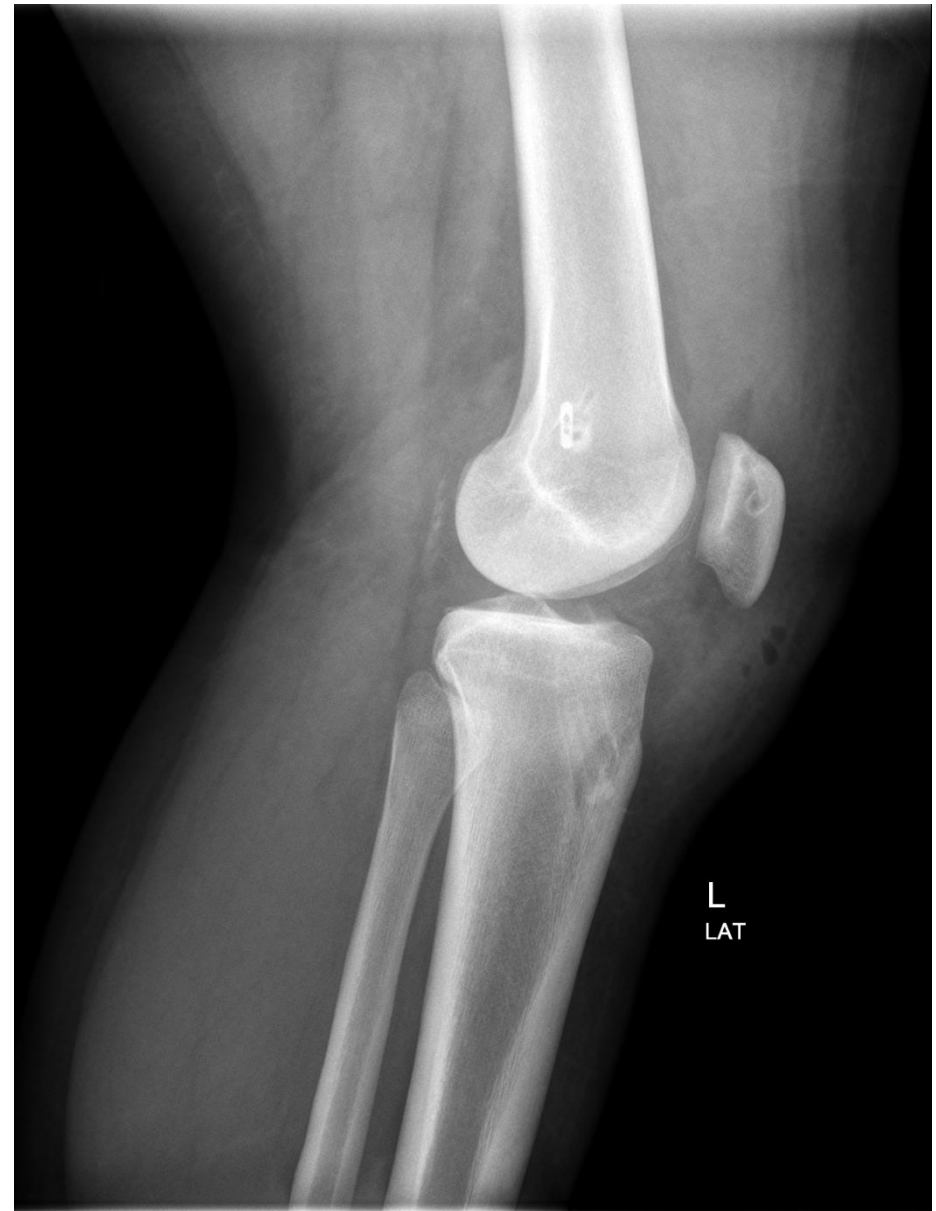
ACL/MPFL

- 16 yo male high level athlete
- Football and wrestling
- Sustained first patella dislocation at state wrestling, was cleared to compete the next day
- Repeat dislocation



ACL/MPFL

- Aggressive rehab
- Took 4-5 months for return to activity
- ACL tear football season
 - Persistent patella instability symptoms also



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Principles

- Extensive Non-op treatment
- Mechanical realignment
- Stability
- Address articular cartilage when large full thickness defects in young patients
- Caution with isolated lateral release, quads transfer, historical procedures