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Medial PatelloFemoral (MPFL) And AnteroLateral Ligament (ALL) Reconstruction

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Anterolateral Ligament

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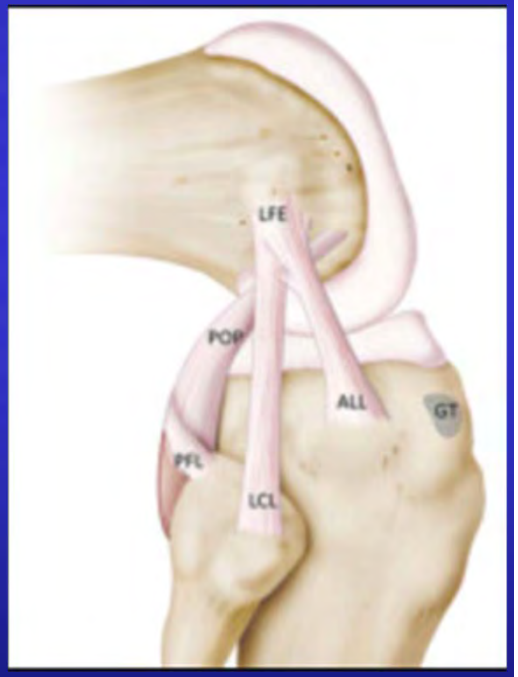
What is the ALL?

- Band of tissue running from lateral epicondyle to anterolateral tibia
  - Inserts midway between Gerdy's tubercle and fibula head
  - Not part of the ITB
- Important rotatory stabiliser of the between 30 -90^0



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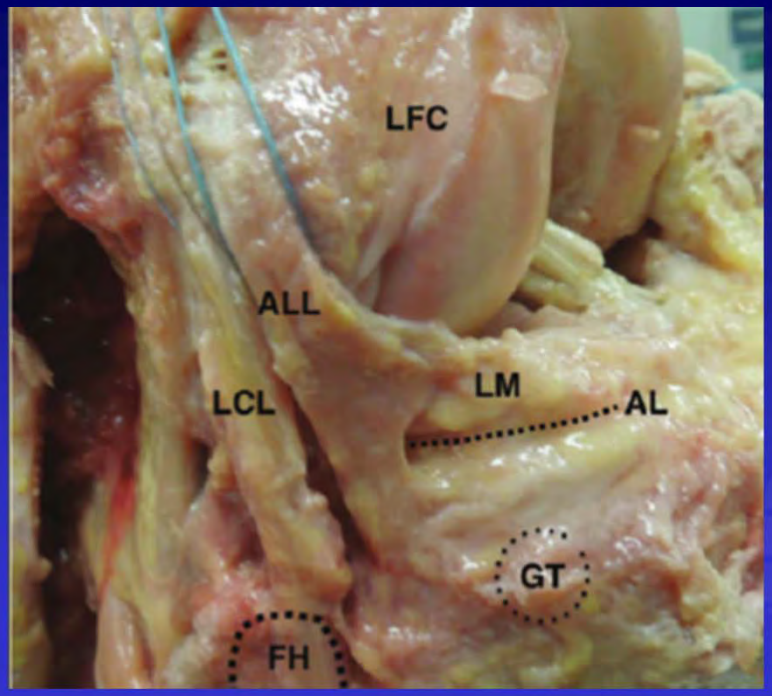

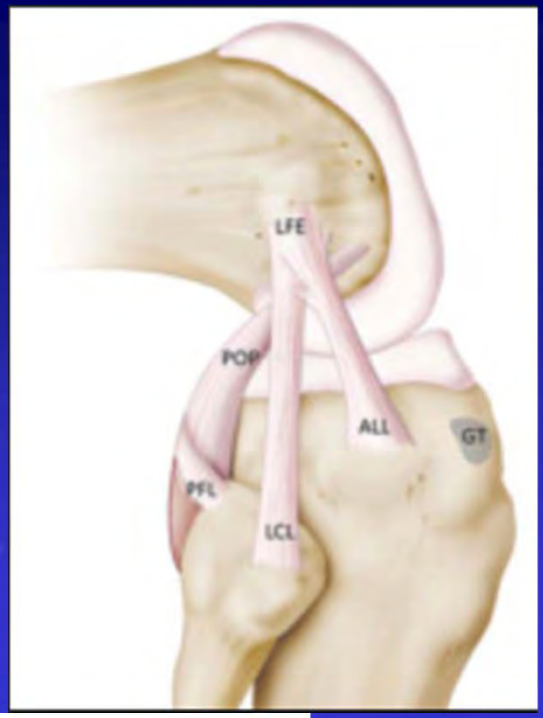

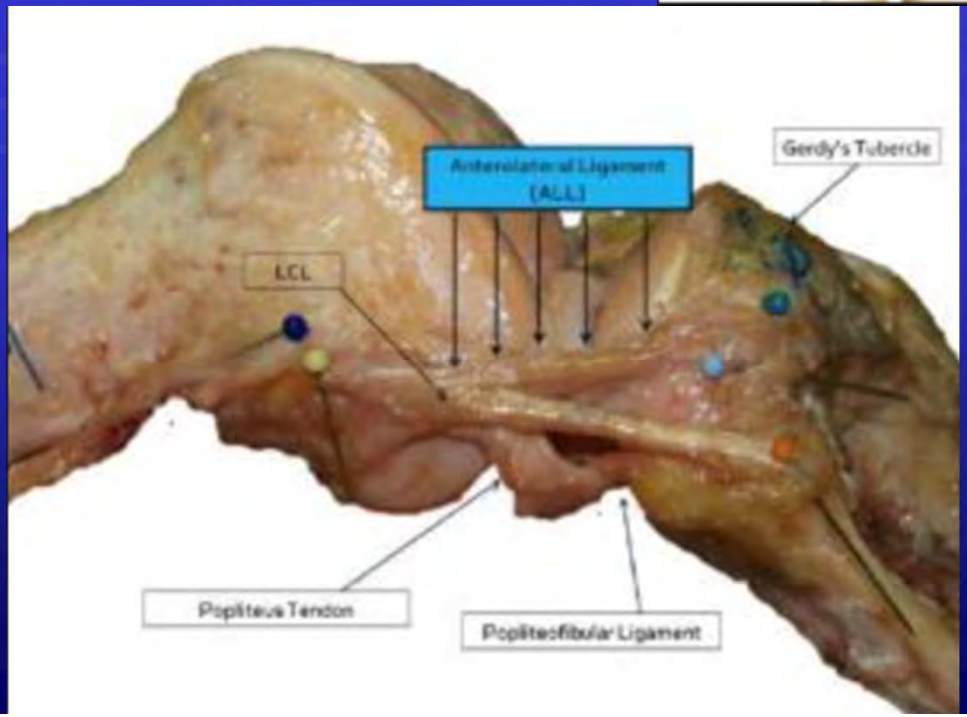

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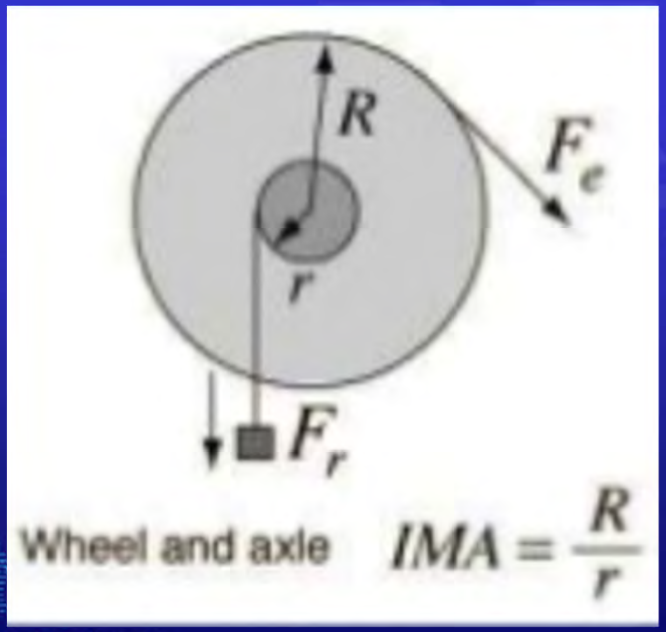
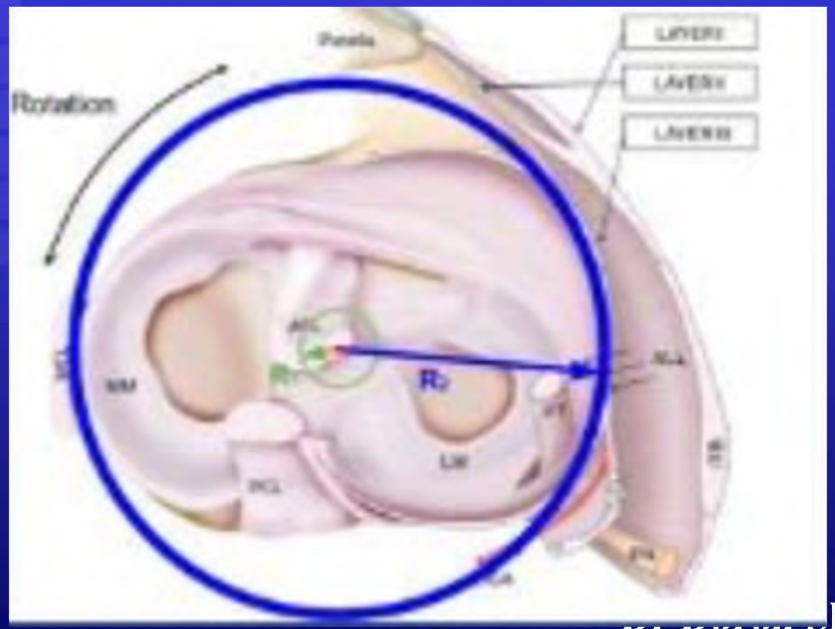
Rotational Control



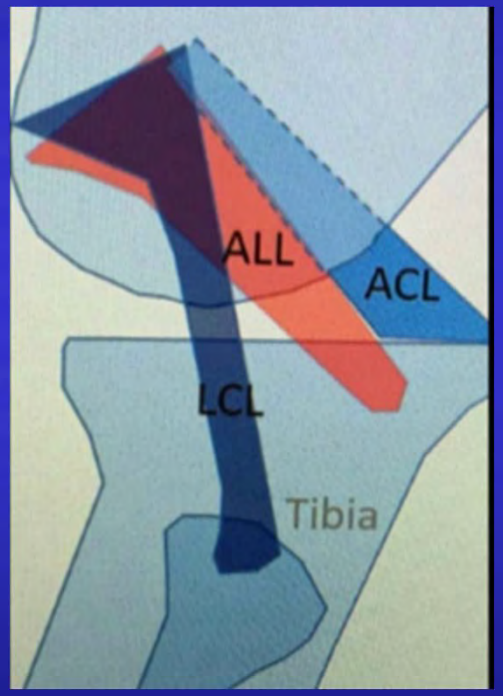


Anterolateral Ligament

- Affects the pivot shift
  - Which is the most specific test for ACL injury
  - Correlates best with functional instability
    - Some patients have a pivot after ACL recon
- Controls internal rotation of the tibia

Explains why:

- Pivot shift gets worse with time
- Reconstructed knees can still have a pivot
  - Even with good tunnel position



ALL injury pattern

- I – stretching of anterolateral capsule
- II – Haemorrhagic injury of both anterolateral and posterolateral capsule
- III – Complete rupture of ALL
- IV – Segond Fracture

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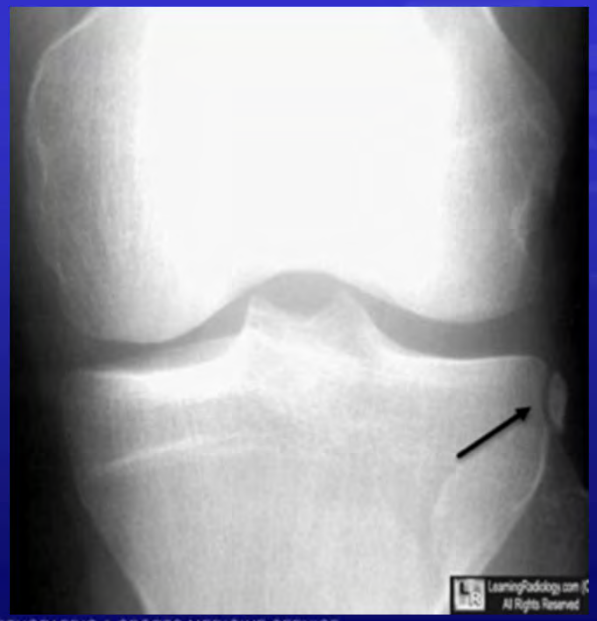
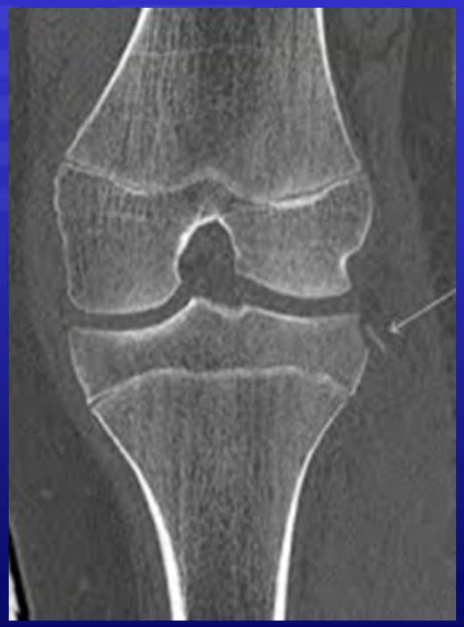
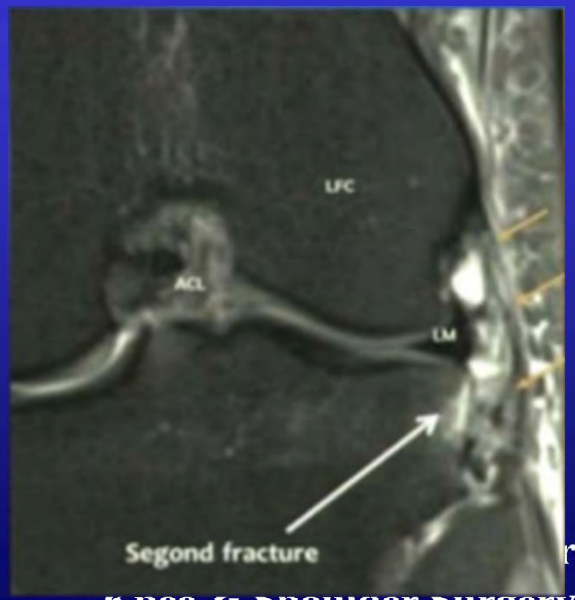
Paul Segond 1879 (1851-1912)

- Pathognomic of ACL injury
  - <1% of other injuries



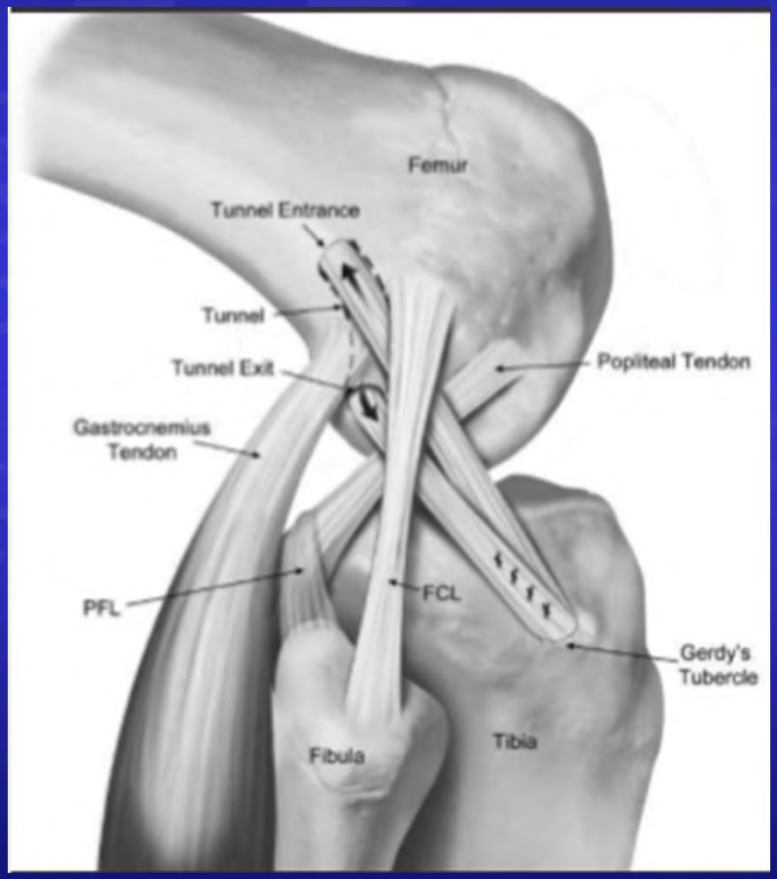




Extra-articular reconstruction

- Lemaire 1967
- MacIntosh 1976
- Losee 1978
- Arnold & Cocker 1979
- Ellison 1979
- Wilson & Scranton, Zarins & Rowe, Andrews, Benam, Muller, Maracci & Zaffagnini

Lemaire



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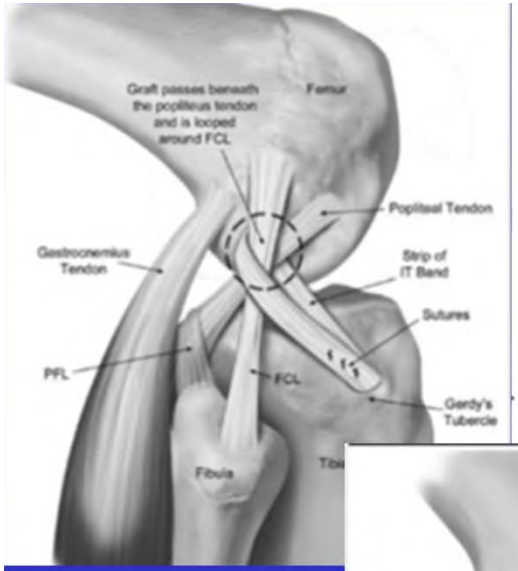
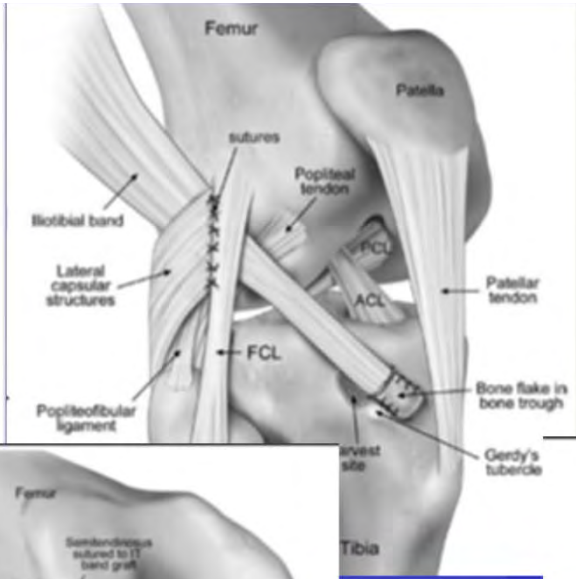
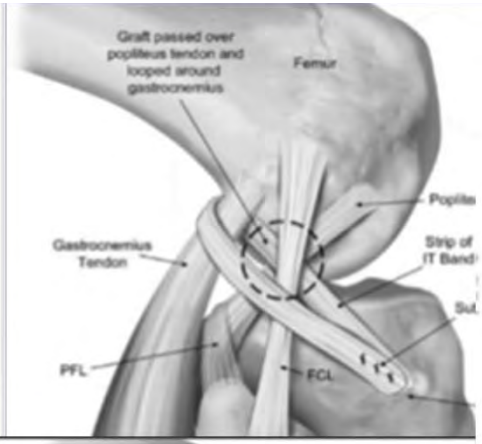
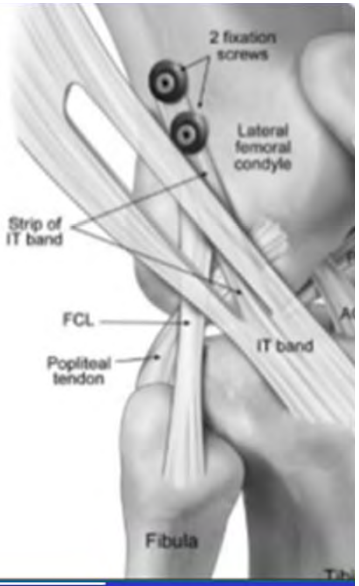
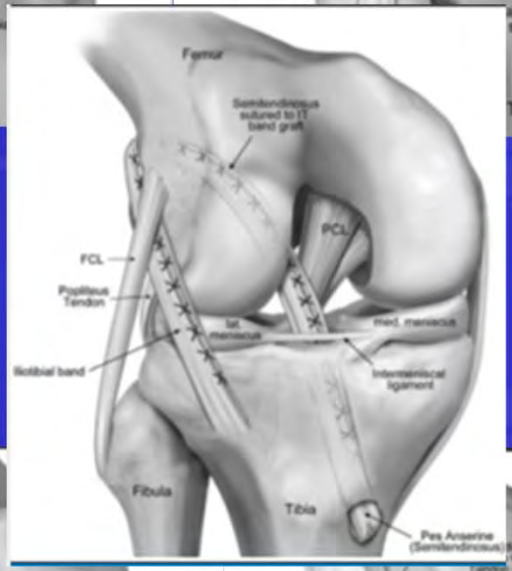
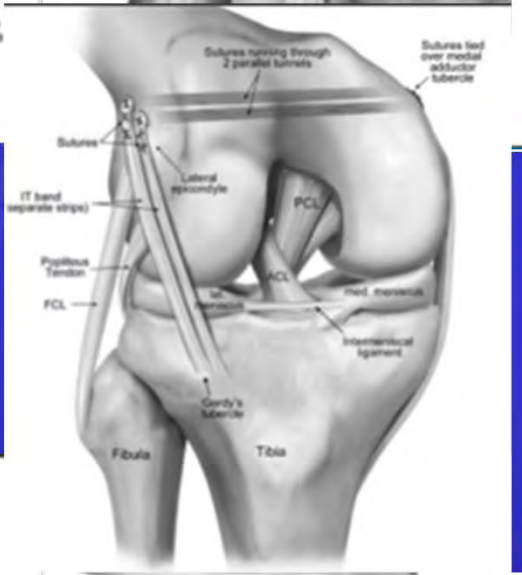

Graft passes beneath the popliteus tendon and is looped around FCL
Femur
Popliteal Tendon
Gastrocnemius Tendon
Strip of IT Band
Sutures
PFL
FCL
Gerdy's Tubercle
Fibula

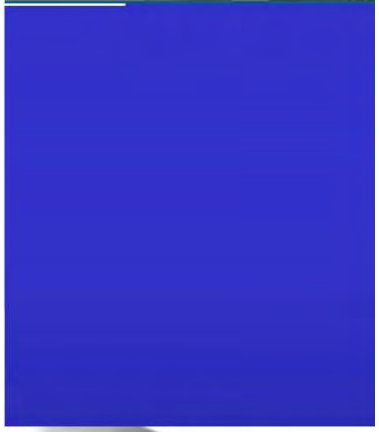

Femur
Patella
sutures
Popliteal tendon
Iliotibial band
Lateral capsular structures
FCL
ACL
Patellar tendon
Bone flake in bone trough
Popliteofibular ligament
Gerdy's tubercle
Tibia

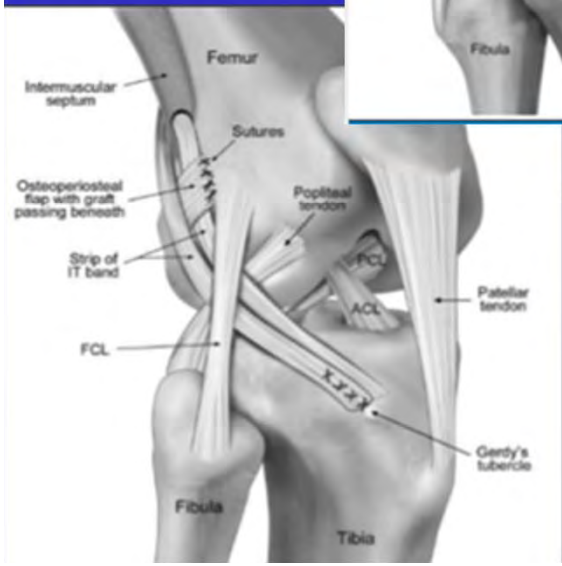

Graft passed over popliteus tendon and looped around gastrocnemius
Femur
Gastrocnemius Tendon
Strip of IT Band
PFL
FCL

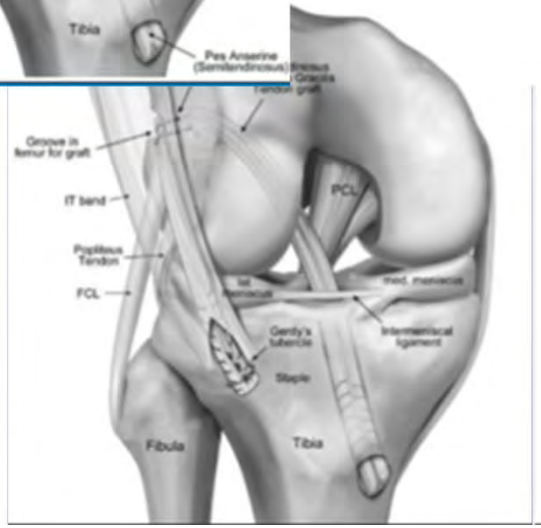

2 fixation screws
Lateral femoral condyle
Strip of IT band
FCL
Popliteal tendon
IT band
Fibula

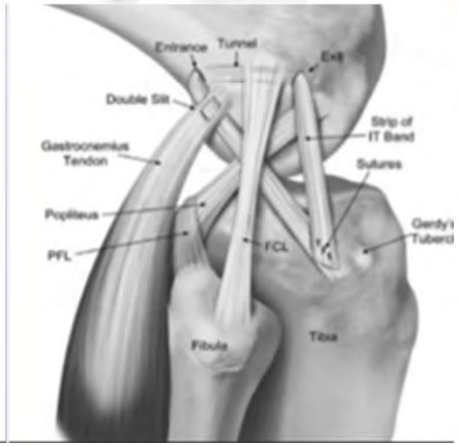

Femur
Semitendinosus sutured to IT band graft
FCL
PCL
Popliteus Tendon
lat. meniscus
med. meniscus
Iliotibial band
Interosseous ligament
Fibula
Tibia
Pes Anserine (Semitendinosus)

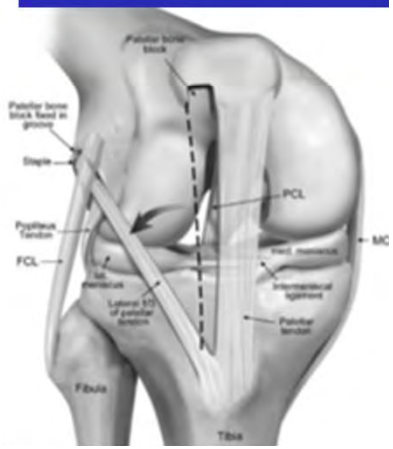

Sutures running through 2 parallel tunnels
Sutures tied over medial adductor tubercle
Sutures
Lateral epicondyle
IT band (separate strips)
PCL
Popliteus Tendon
FCL
ACL
lat. meniscus
med. meniscus
Interosseous ligament
Gerdy's tubercle
Fibula
Tibia




Femur
Intermuscular septum
Sutures
Osteoperiosteal flap with graft passing beneath
Popliteal tendon
Strip of IT band
PCL
ACL
Patellar tendon
FCL
Gerdy's tubercle
Fibula
Tibia

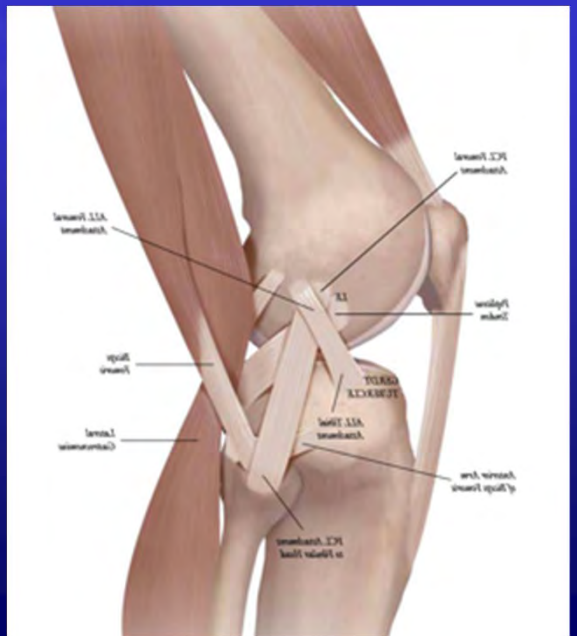

Groove in femur for graft
Gracilis tendon graft
IT band
PCL
Popliteus Tendon
FCL
lat. meniscus
med. meniscus
Gerdy's tubercle
Interosseous ligament
Staple
Fibula
Tibia


Entrance
Tunnel
Exit
Double Slit
Strip of IT Band
Gastrocnemius Tendon
Sutures
Popliteus
PFL
FCL
Fibula
Tibia


Patellar bone block
Patellar bone block fixed in groove
Staple
PCL
Popliteus Tendon
FCL
lat. meniscus
med. meniscus
Interosseous ligament
Lateral 1/3 of patellar tendon
Patellar tendon
Fibula
Tibia

Current ALL recon

- Anatomical socket placement
  - Reproduces original function
- Gracillis / Allograft / ITB
- Fixation to allow early movement



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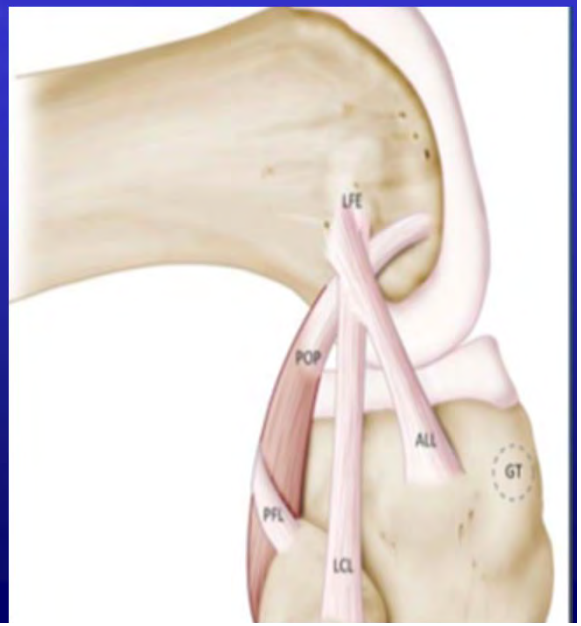
Socket placement

- FEMUR
  8mm proximal and 4mm posterior to lateral epicondyle

- TIBIA
  - Between mid Gerdy and fibula head
    - 10mm from joint line



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REHAB

- Accelerated ACL rehab programme

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‘Indications’ for adding ALL surgery to ACL surgery

- 1.Injury to the ALL substance seen on MRI
- 2. Segond fracture
- 3.Pivot-shift grade III
- 4. Lateral femoral notch sign
- 5. Ongoing instability with a technically successful ACL reconstruction
- 6. Hyperlaxity
- 7. Revision surgery

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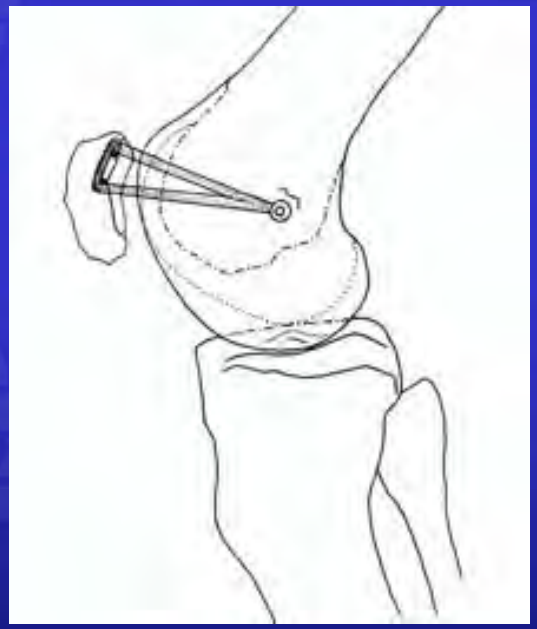
MPFL Reconstruction



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What is the MPFL?

- Condensation of the medial retinaculum

- Vertically oriented
- Extracapsular
- Found in layer 2/3
  - Outside synovium
  - Under muscle

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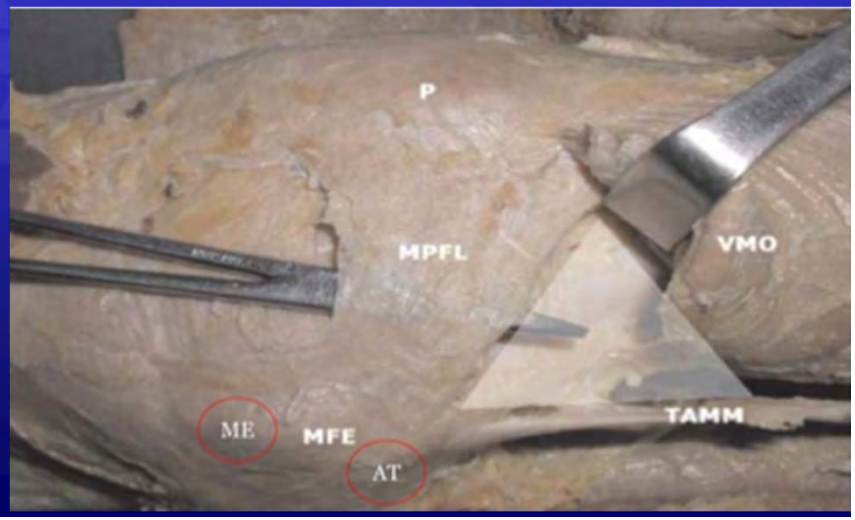
What does the MPFL do?

- Primary medial restraint to lateral displacement of the patella
  - Up to 80% of the medial restraining forces
- Limited ability to lengthen
- Limited capacity to heal



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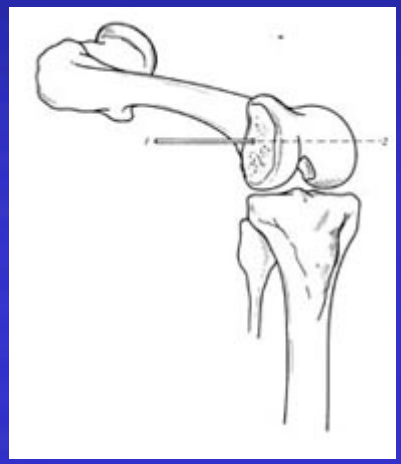
Etiology of Patella Instability

- Patella alta
- Trochlear dysplasia
- Dysplasia of lateral femoral condyle
- Defective lateral trochlear margin
- Shallow trochlear groove
- VMO insufficiency
- Joint laxity
- Trauma
- Previous surgery
- Tight lateral structures (lateral retinaculum and ITB)
- Femoral and tibial torsion



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Classification 1 - 5

- 1 - Simple (traumatic) dislocation without maltracking / instability
  - Low risk of re-dislocation

- 2 - Same as 1 but high risk of re-dislocation

2. Acute dislocation in normal knee

- No previous malalignment
  - Medial structures tear
  - Symmetric skyline patella
  - ↓ Swelling, regain ROM and strength
  - Brace in extension ~3 weeks

- High level athlete with medial retinacular tear on MRI - consider early surgery

Classification (cont)

- 3 - Both instability and maltracking
  - (a) soft tissue contracture
  - (b) patella alta
  - (c) pathological TT-TG distance
  - (d) valgus alignment
  - (e) Rotational deformities.

Osseous corrective surgeries possibly required

BUT

MPFL alone might be enough

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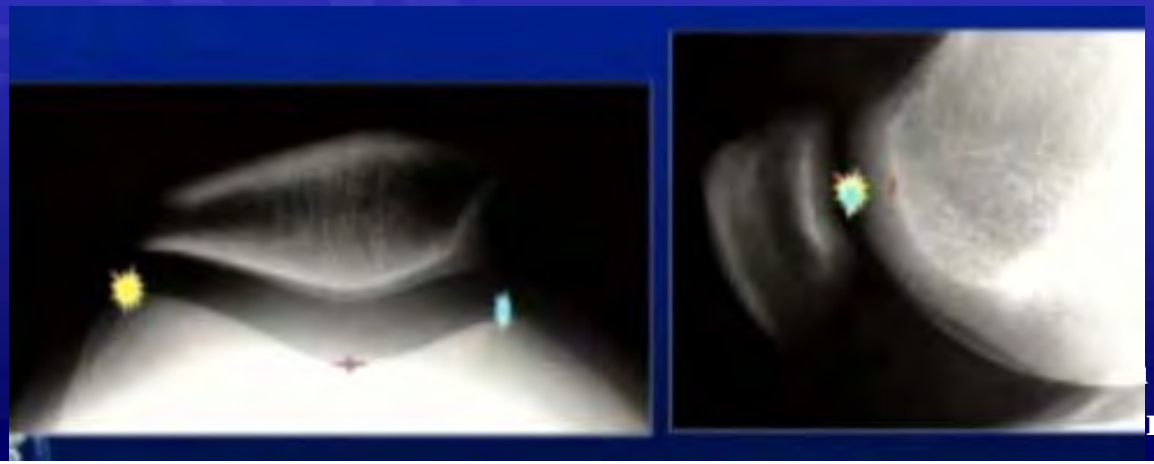
Classification (cont)

- 4 –”Floating patella" - highly unstable
  - Complete loss of tracking caused by severe trochlear dysplasia
  - Trochleoplasty +/- bony and soft-tissue procedures

- 5 - Patellar maltracking without instability
  - Can only be fixed by means of corrective osteotomy

Anatomy

- Passive Elements most important
  - Trochlear Constraint
    - Depth, Length, Height
    - Patella Engagement
  - Soft tissue tethers like MPFL
  - Muscle activation doesn't help much



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Examination

- Height of patella
  (also checked on xray)
- Integrity of medial structures
- Length of PT
- Apprehension sign
- Look for predisposing factors
- Patella trochlear alignment

Always check the other knee
(rarely normal if congenital problems)

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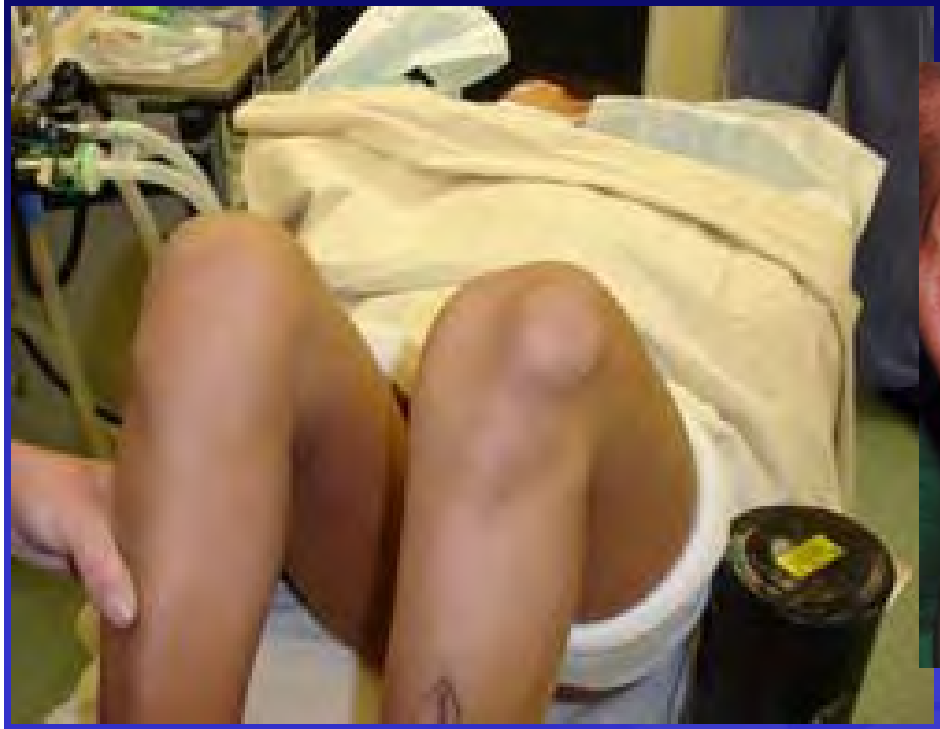

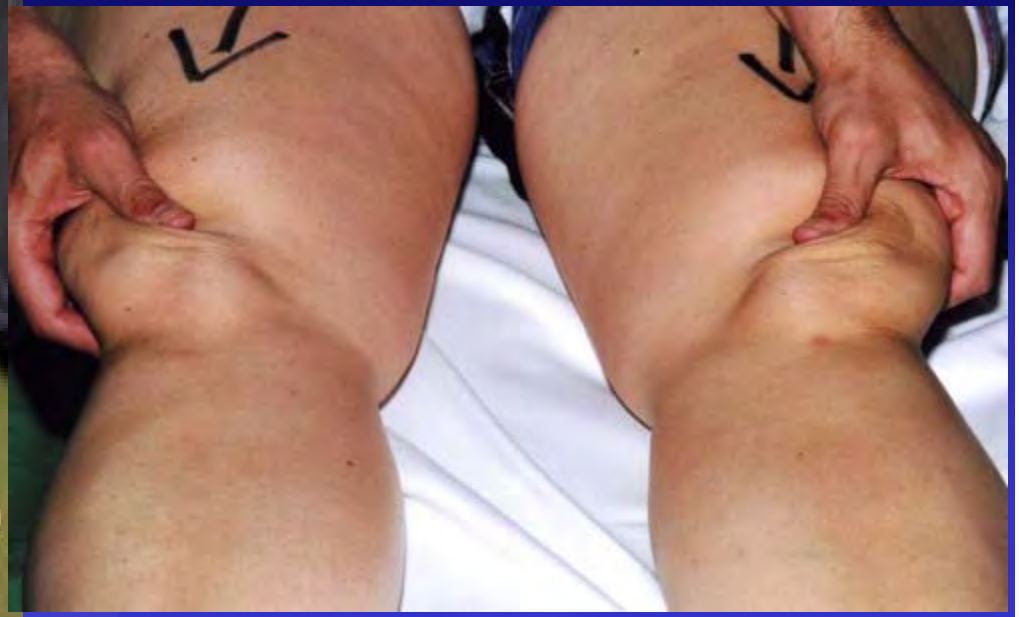

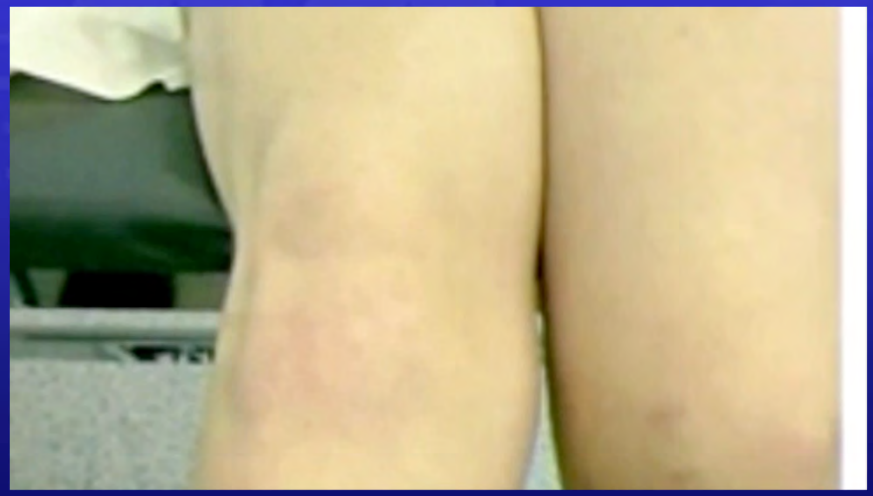

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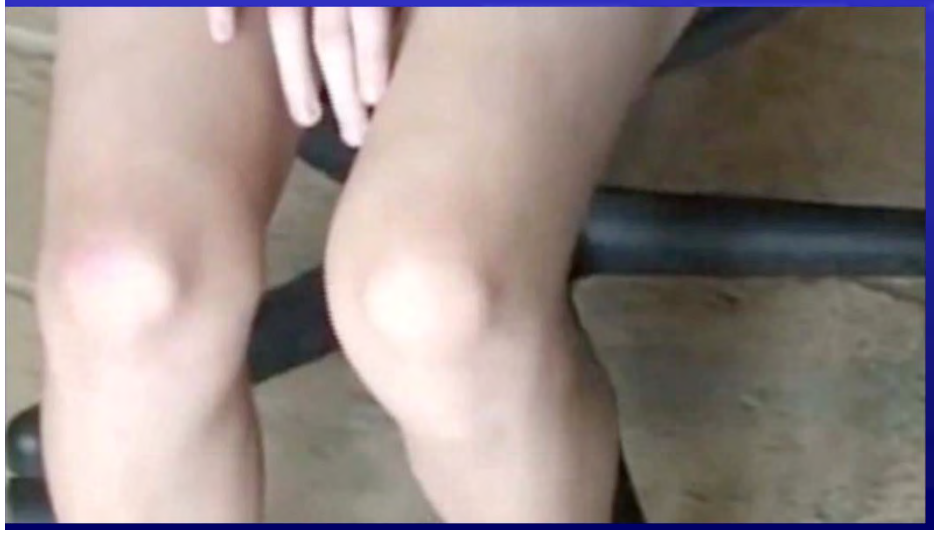
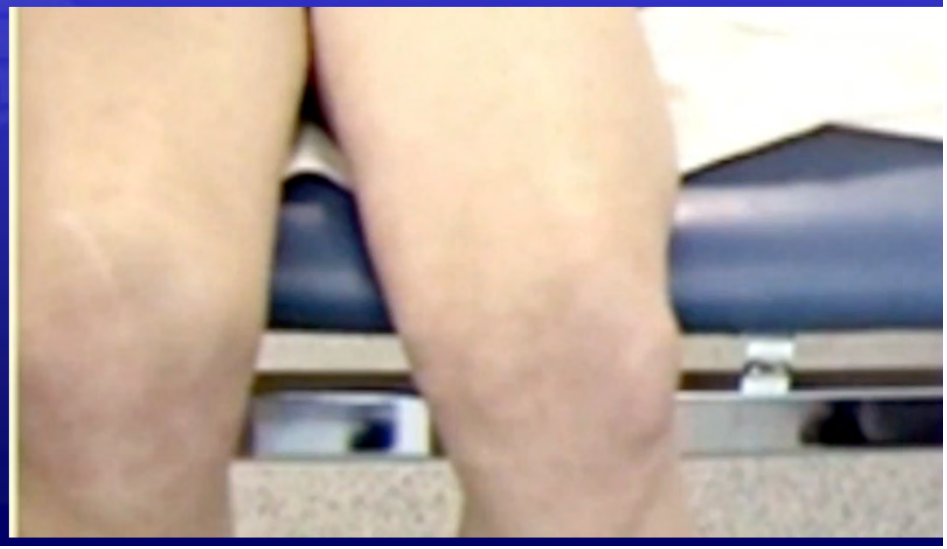
Examination - J Sign

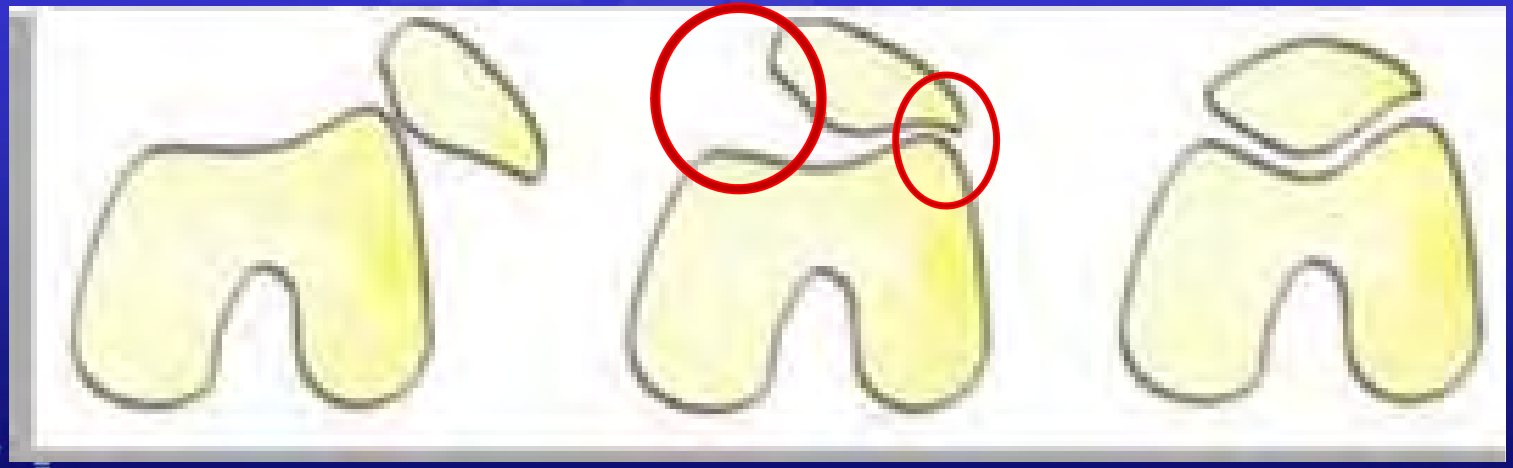
- Patella moves out of the trochlear as the knee reaches full extension
- Patella engaged in flexion but subluxable in extension
  - Medial structures intact

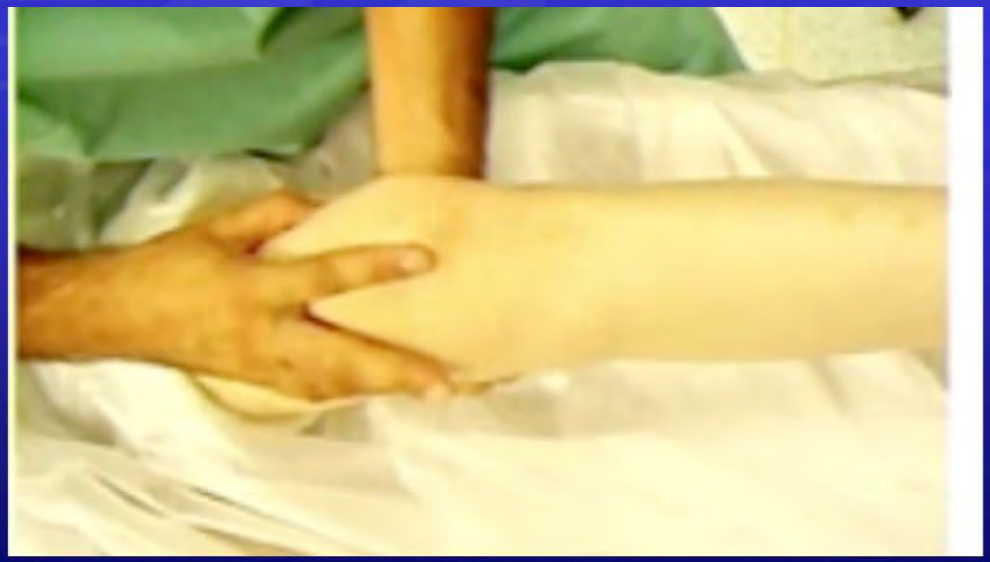




Patella Tilt

- Does not equal tight lateral structures
- Usually loose medial tissue
- Check if patella can be made ‘horizontal’





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Investigations

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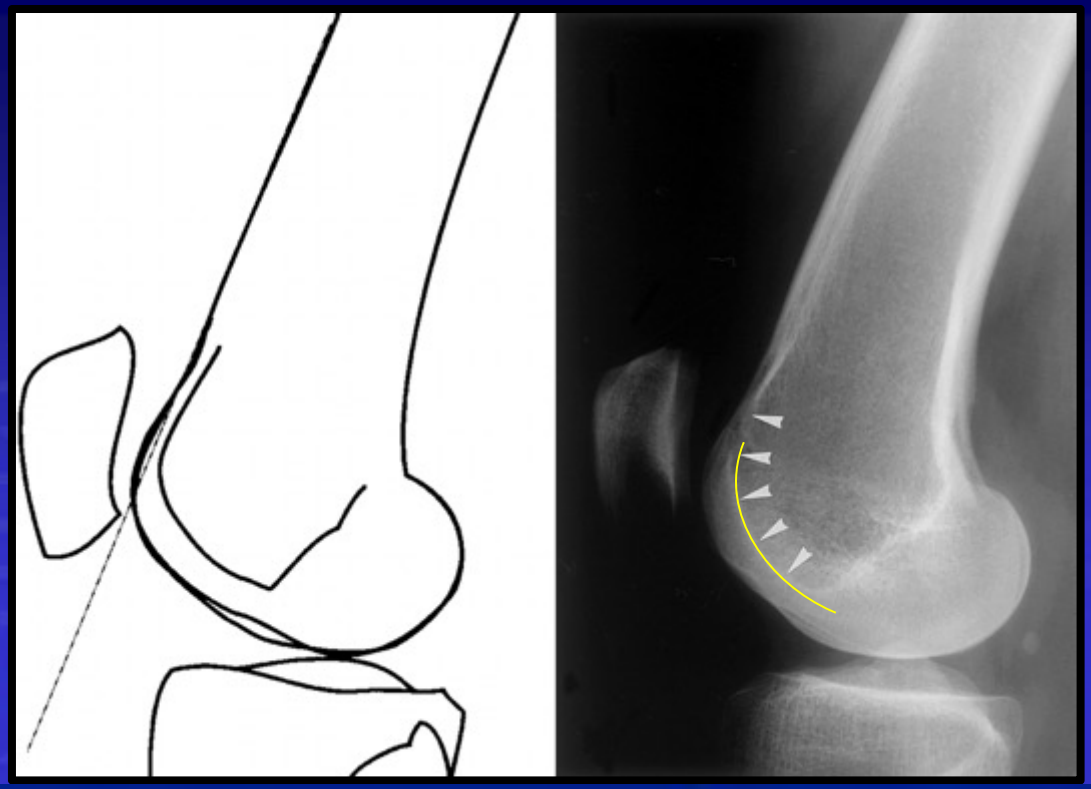
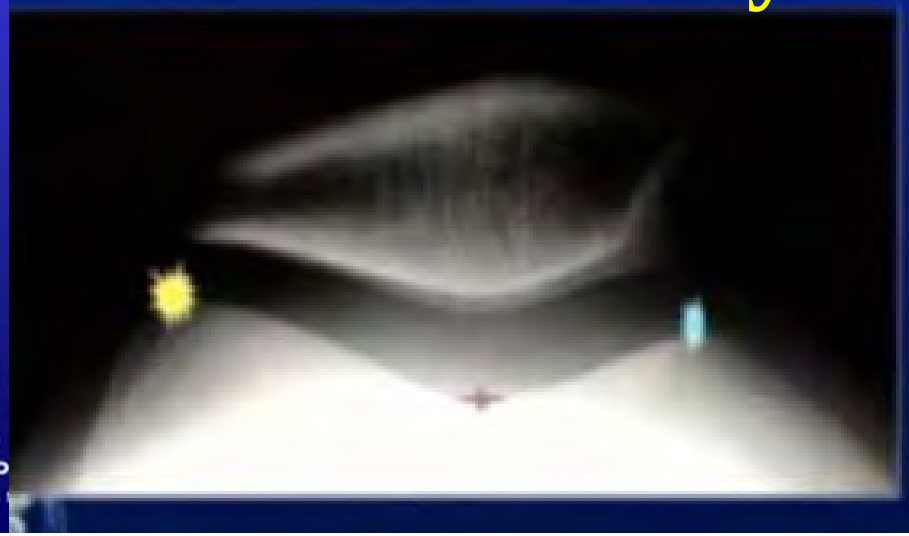
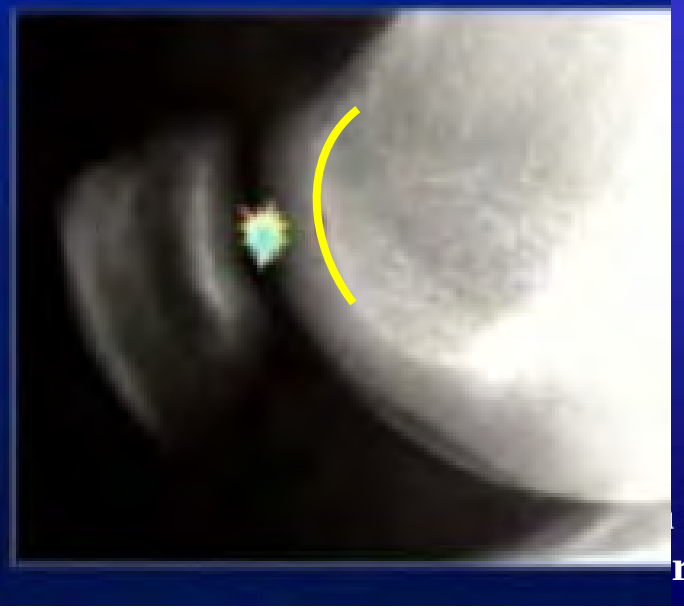


Normal XRay





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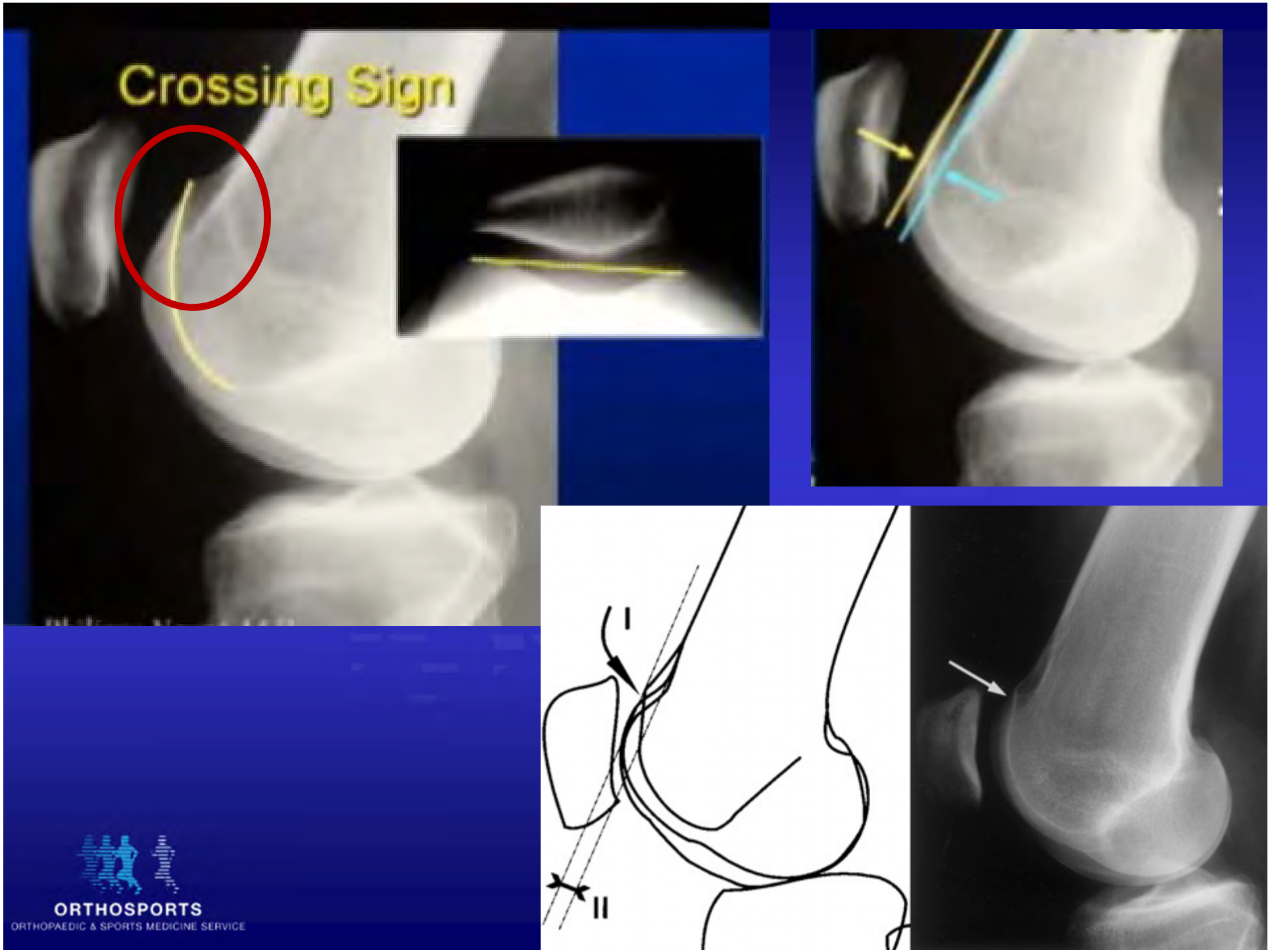
Crossing Sign
I
II
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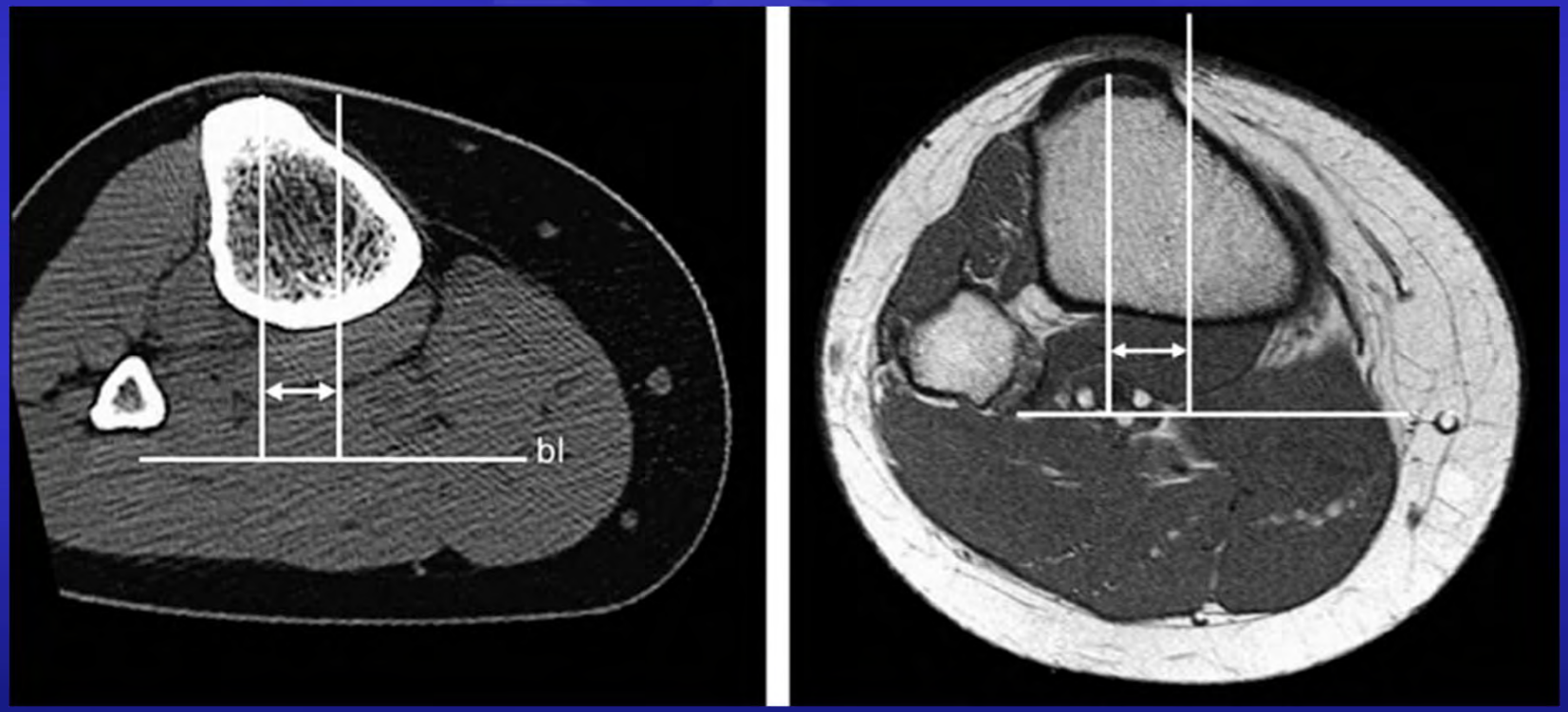
CT or MRI – TT-TG



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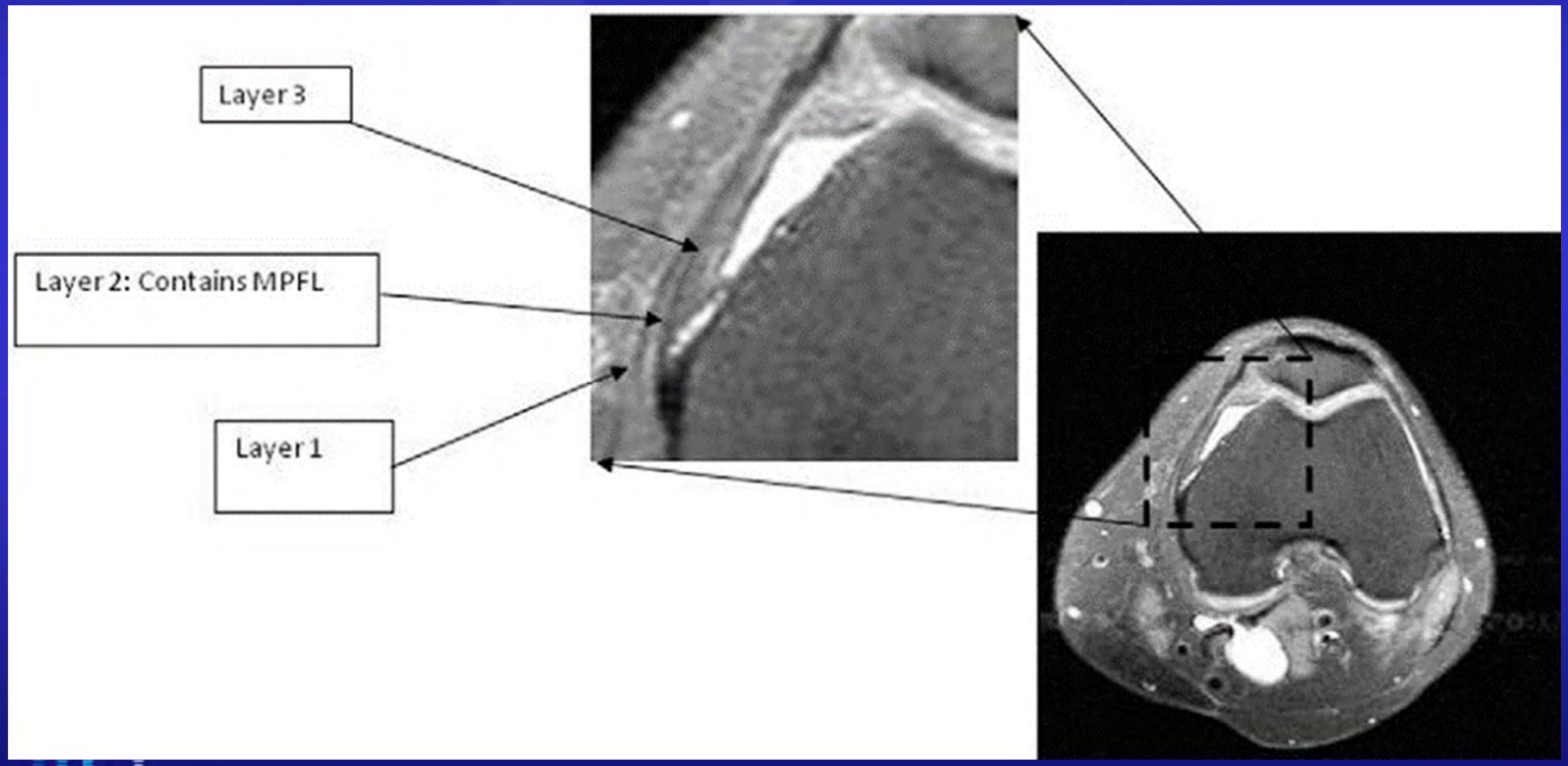
Knee & Shoulder Surgery

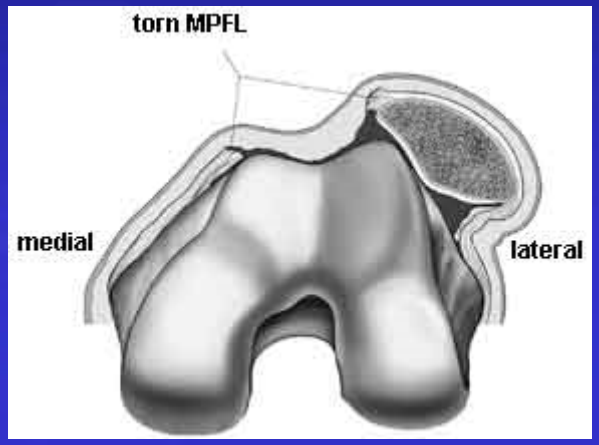
MRI

- Looks at medial retinaculum and articular cartilage



Contraindications to MPFL

- No medial laxity
- Chronic pain
- PF OA
- Chronically dislocated patella



- It is strictly to re-establish the normal constraints to stop the patella escaping its groove

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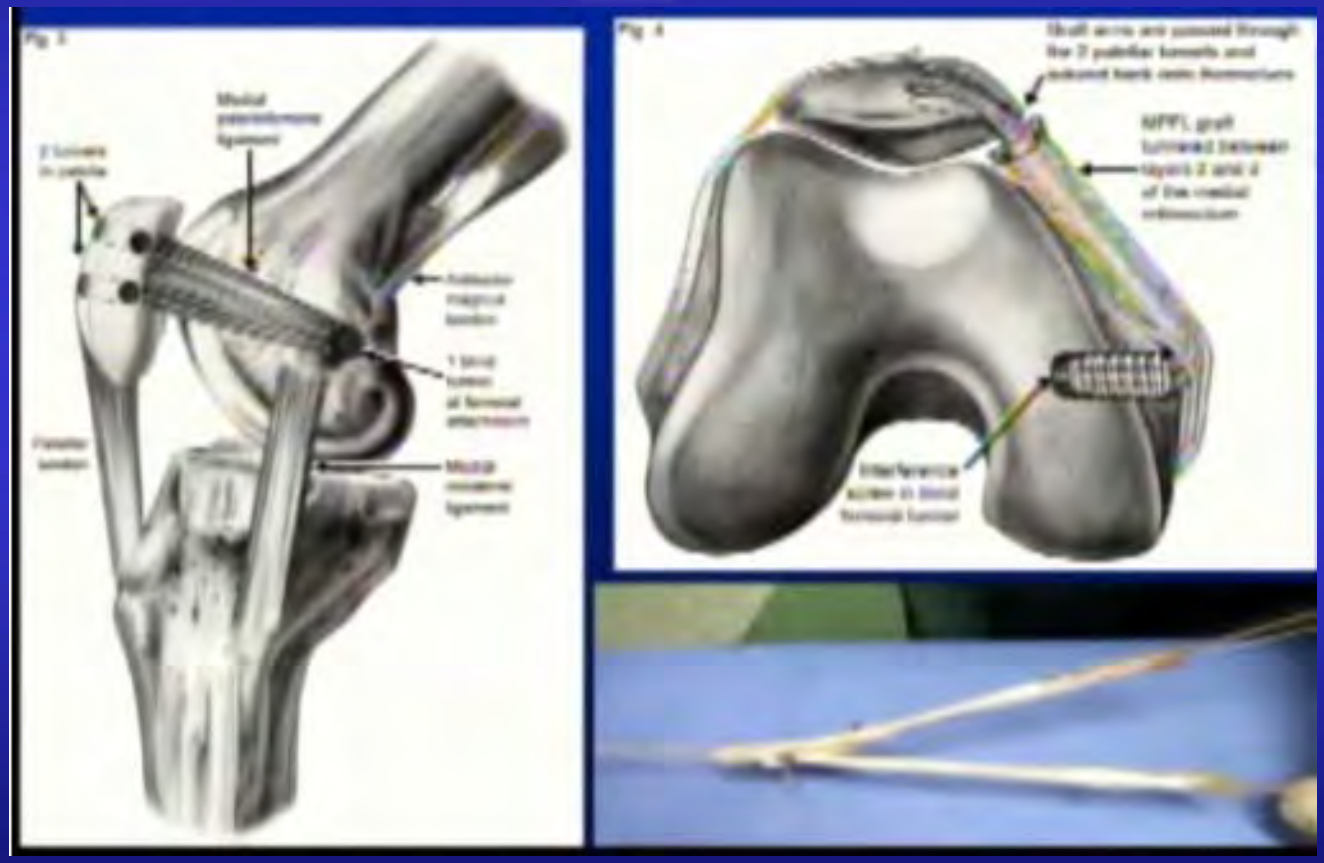
MPFL Reconstruction



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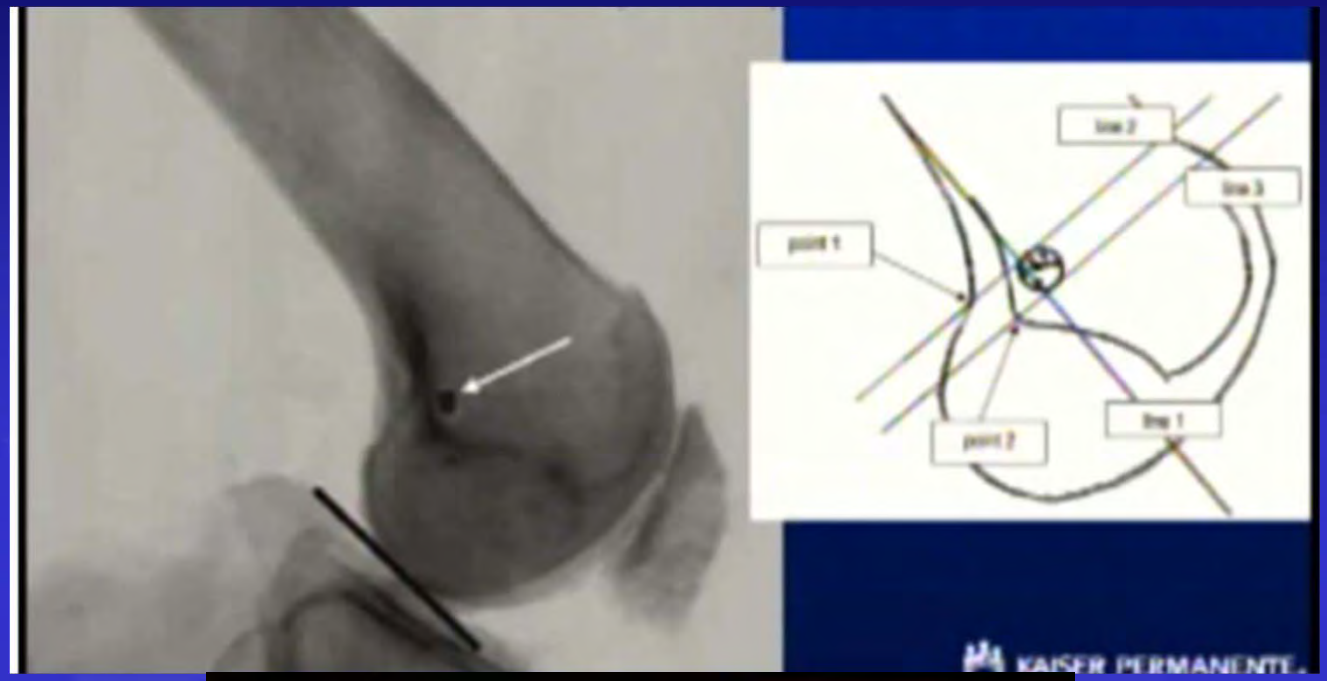
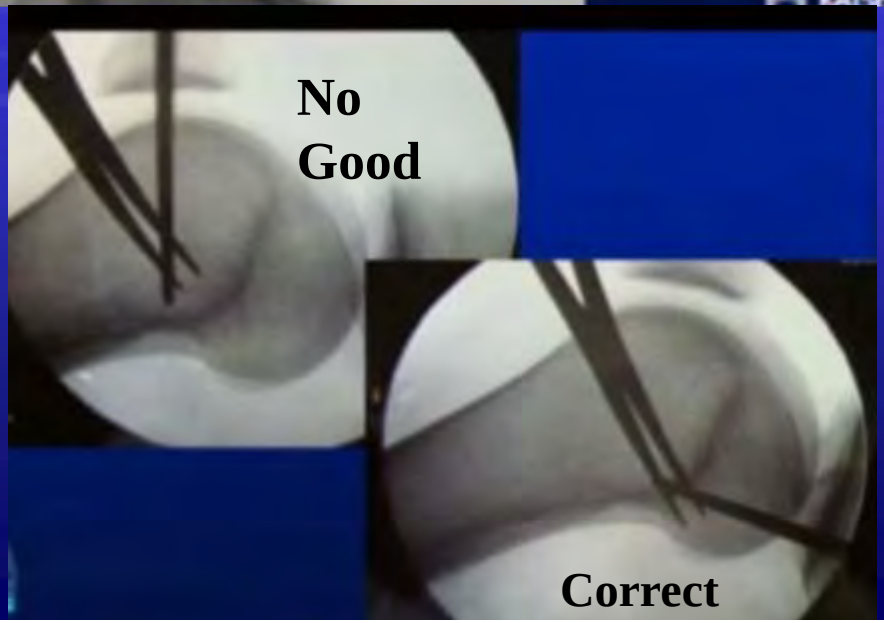
Correct entry point





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Who to refer:

- Recurrent patella dislocation
- Acute dislocation with:
  - Osteochondral injury
  - Failure to improve with non-op mx
  - Gross instability
  - High level athletes (50% fail to return to sport)

Rehab

- Very variable
  - Rom brace 2-6 weeks
  - Range 0-60 degrees
  - TWB to FWB
- Exercises modified according to location of cartilage lesions
  - No Early flexion activities – distal damage
  - ~ 90^0 flexion avoided - proximal lesions
- Coordination of muscle activity is as important as strength training

My protocol:

- 0-2 weeks
  - AROM 0-90
  - FWB on crutches
  - Static and inner range quads
- 2-6 weeks
  - Eccentric WB quads sets (hip neutral and IR only)
  - Stationary bike
  - Leg press 0-45
  - Gait retraining (Heel strike and toe off)
  - Aim for full ROM in patella brace

- 6-12 weeks
  - PF glides
  - ITB etc releases
  - Leg press 0-60
  - Proprioceptive retraining
  - PF taping
  - Elliptical trainer

  - NO open chain, lunges

- 12+ weeks
  - Gym
  - No brace for ADL's
  - Jogging
  - Swimming with flippers
  - Proprioceptive retraining
  - Single leg hops and landing

- MUA if ROM <90^0 in 6 weeks

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