MENISCUS TEARS

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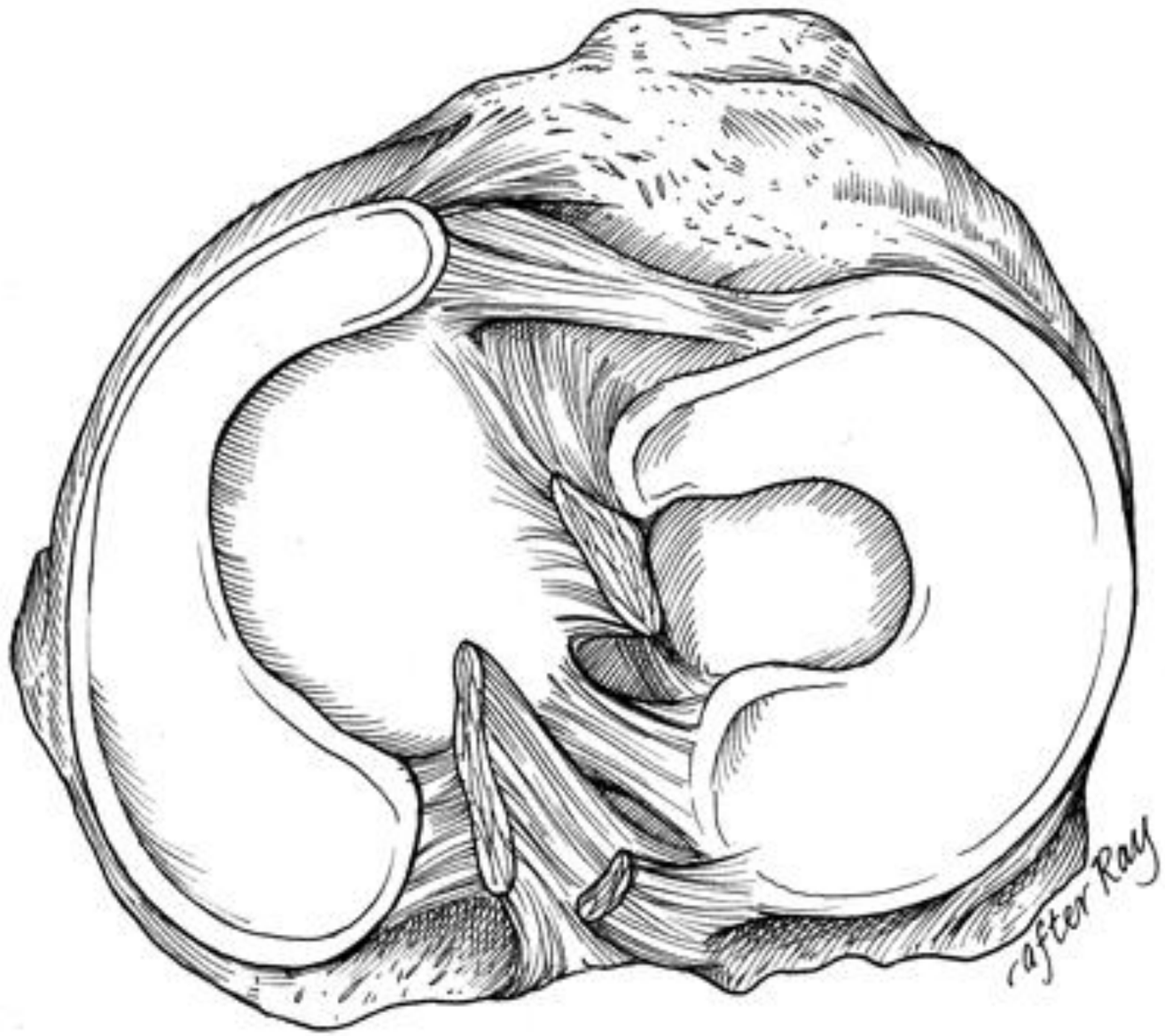
BONE SCHOOL POST GRADUATE TEACHING 04/03/2012

- Anatomy
- Function
- Epidemiology
- Diagnosis
- Outline of management

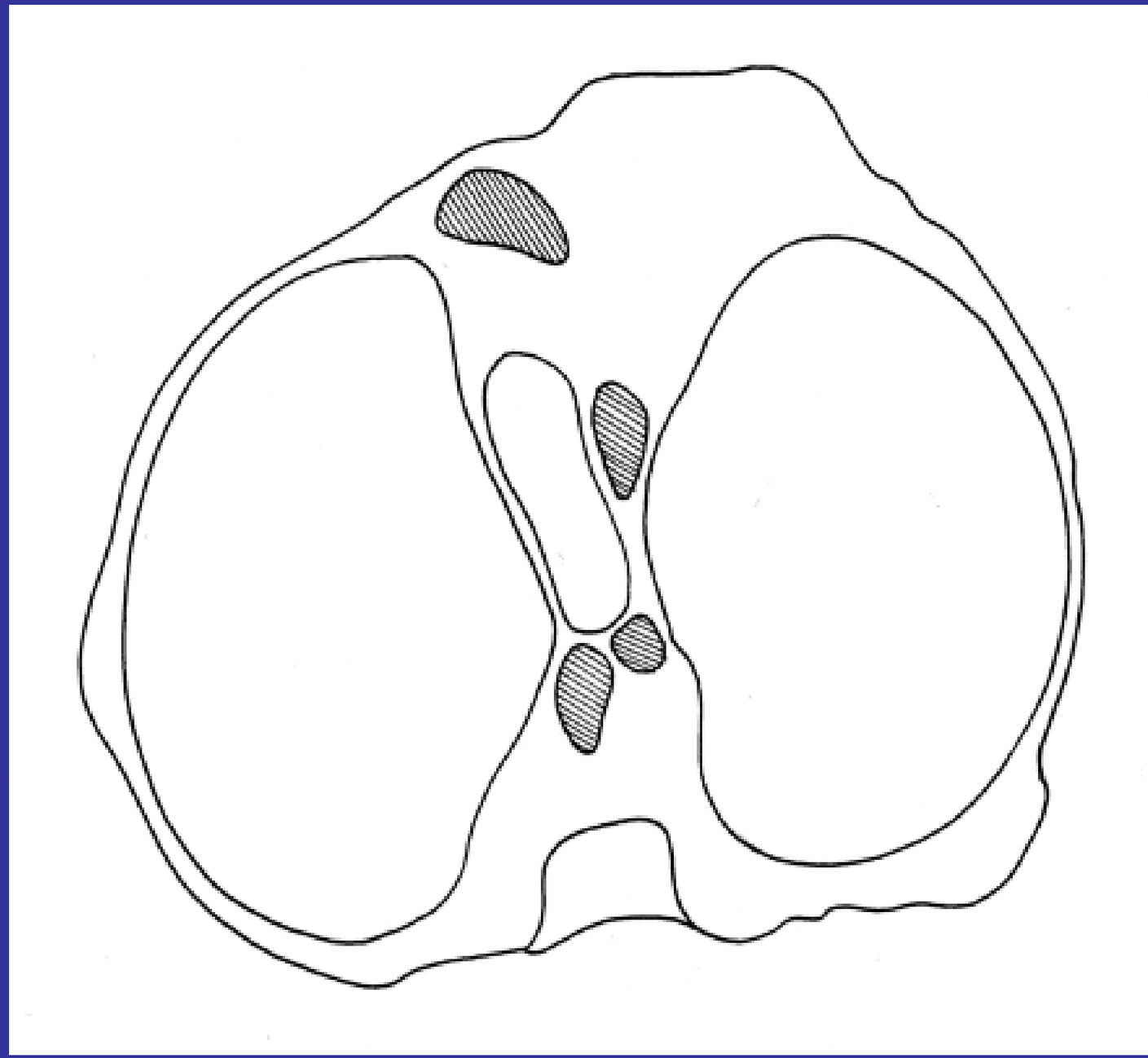
Gross anatomy

- Medial meniscus
  - C-shaped
  - Posterior horn larger than anterior
- Lateral meniscus
  - Semicircle



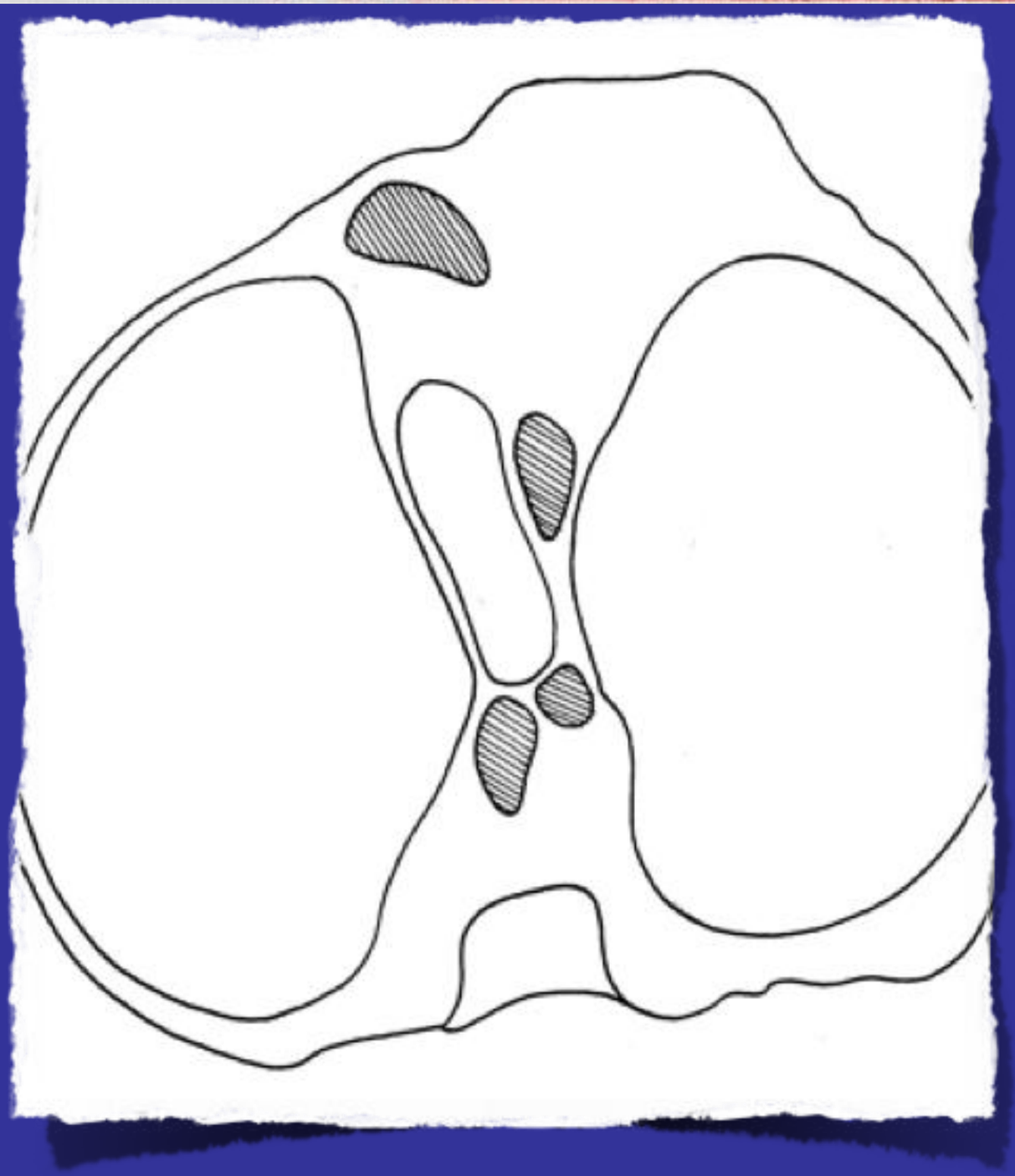
Medial meniscus

- Medial meniscus less mobile
- Less A-P translation on ROM of knee
- Points of attachment spaced farther apart
- Firmly attached peripherally to MCL collateral ligament



Lateral meniscus

- Semicircular
  - Covers larger surface area
- Anterior horn (ACL)
- Posterior horn (behind intercondylar eminence)

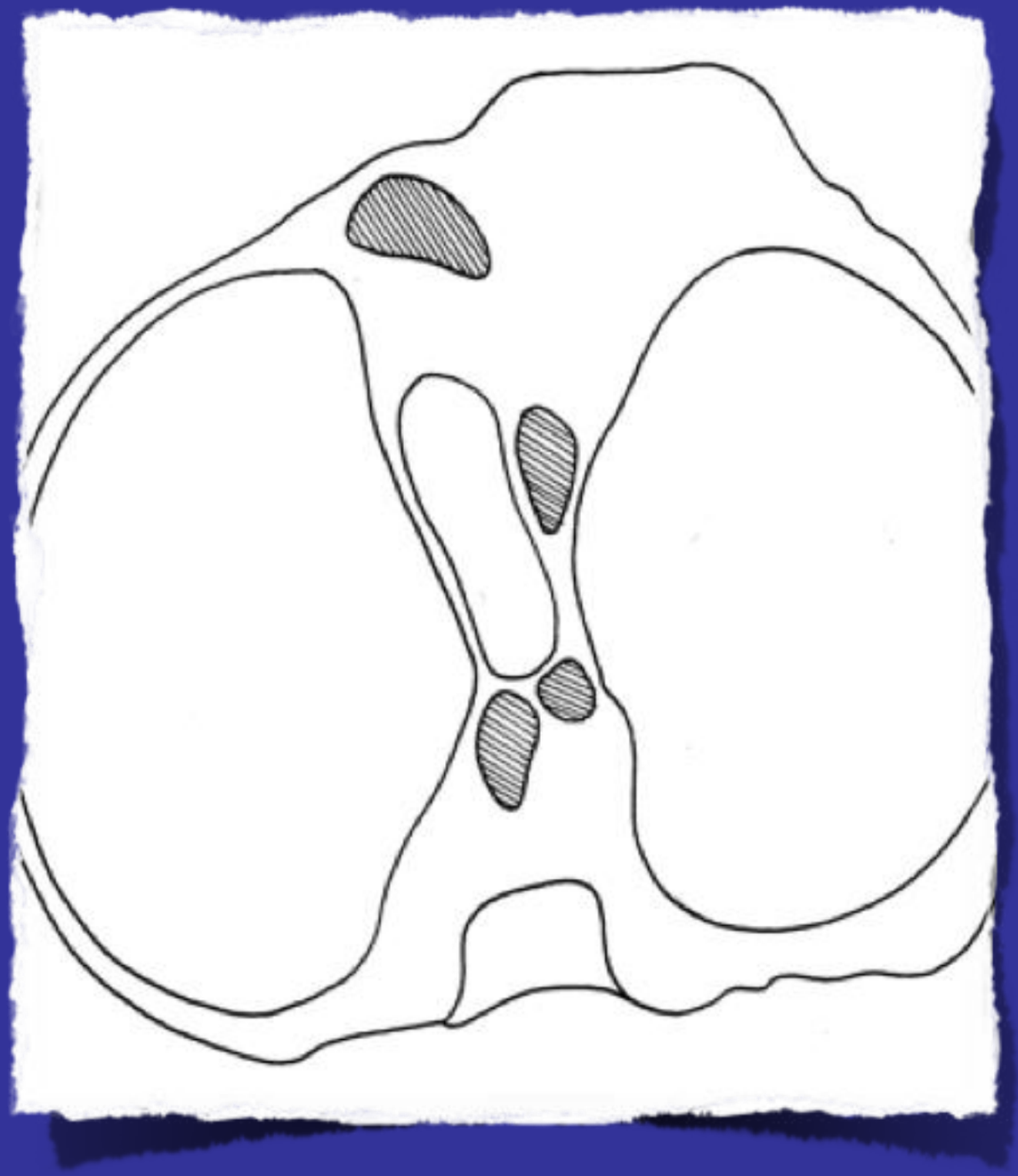


Lateral meniscus

- Posterior horn
  - Meniscofemoral ligaments
    - Posterior horn to lateral aspect of medial femoral condyle
- Ligament of Humphrey (anterior PCL)
- Ligament of Wrisberg (posterior PCL)

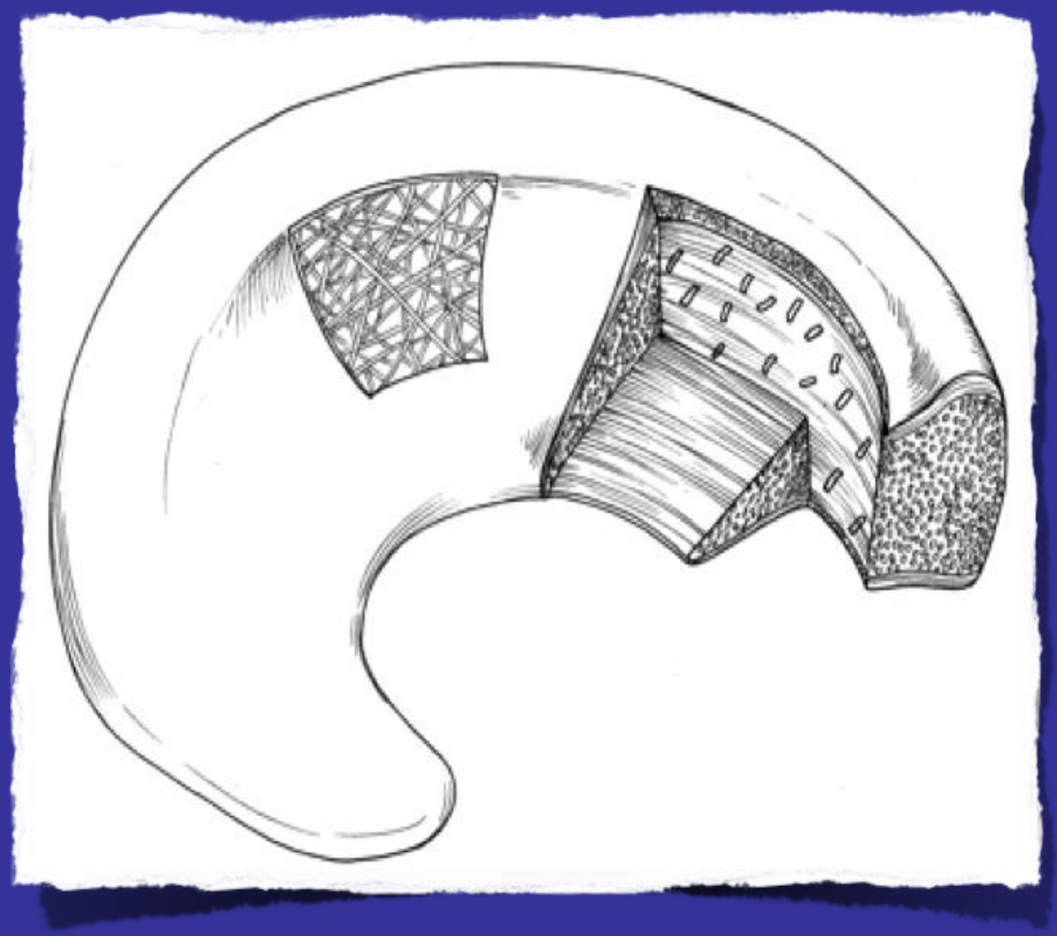
Lateral meniscus

- More mobile
- Points of attachment closer together
- No attachments to LCL



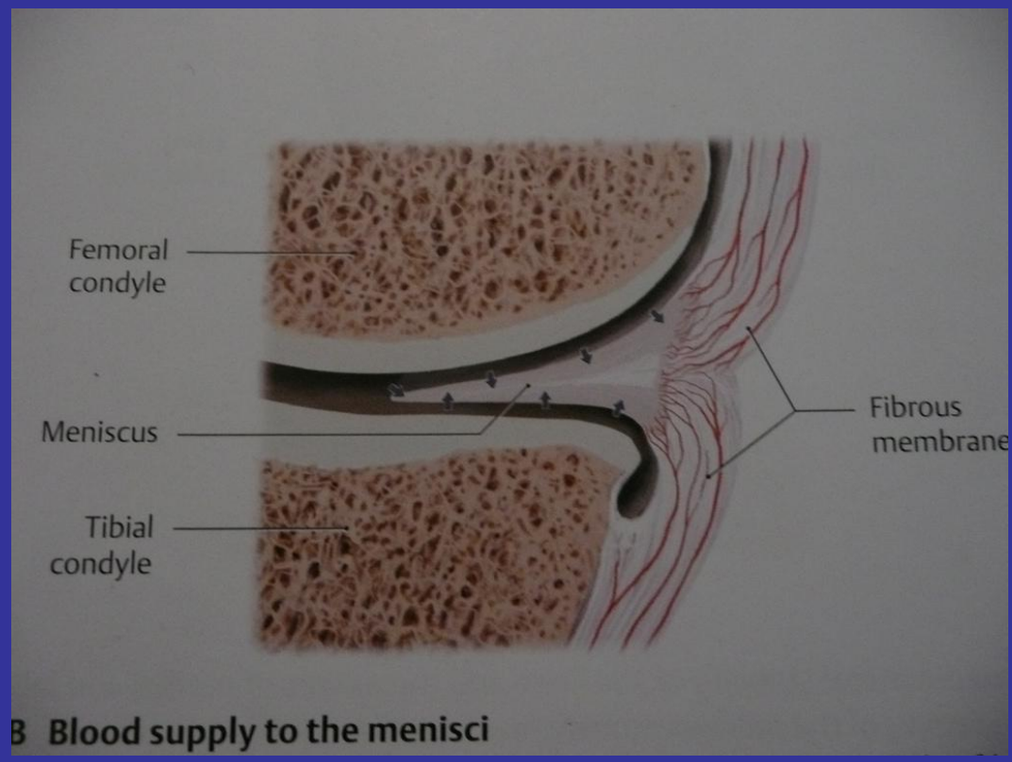
Micro anatomy

- Type I(90%) Collagen - Fibrocartilaginous structure
- Compressive loads (circular fibers)
- Tensile loads (radial fibers)
- Surface shear forces (mesh)



Neurovascular anatomy

- At birth entire meniscus is vascular
- At 9 months inner 1/3 avascular
- At 10 years <1/3 vascular
  - Resembles adult meniscus



Function of meniscus

- Load sharing & shock absorption
- Increased joint congruity
- Static stability
- Propioception
- Hoop stress

Biomechanics

- Total medial meniscectomy
  - 50-70% reduction in contact area & 100% increase in contact stress
- Total lateral meniscectomy
  - 40-50% reduction in contact area & 200-300% increase in contact stress

Epidemiology

- 60-70 per 100,000
- Male 3: female 1
- Male (21-30 yo) & female (11-20yo)
- Degenerative tears in 4-6th decades

Epidemiology

- 1/3 associated with ACL injury
- Acute ACL injury
  - Lateral meniscus
- Chronic ACL deficient knee
  - Medial meniscus
- Tibial plateau fracture

Physical exam

- Effusion
- Quads atrophy
- ROM
- Joint line tenderness (sensitive)
- Collateral & cruciate ligaments

Special tests

- McMurray & Apley tests
  - Adjunct to diagnosis
- Meniscal tear
  - Effusion, joint line tenderness, mechanical symptoms & +ve McMurray test

Mcmurray test

- Supine & hip flexed 90degrees & knee in maximal flexion
- Knee slowly extended with ER (medial) & IR (lateral) menisci
- Joint line pain + clunk

Apley grind test

- Prone & knee flexed 90 degrees
- Distraction + IR/ER
- Compression + IR/ER
- Joint line pain with appropriate rotation

MRI

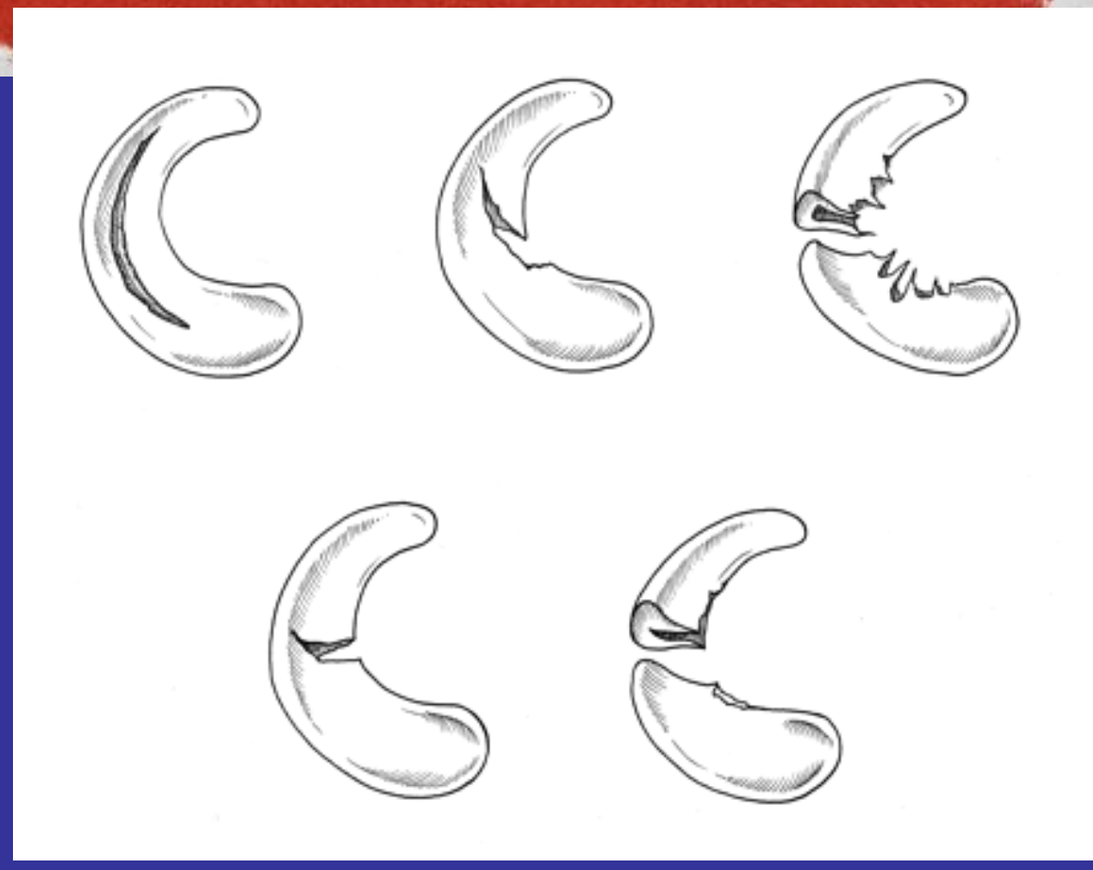
- Non-invasive
- Location of tears
- Presence of tear with accuracy >90%

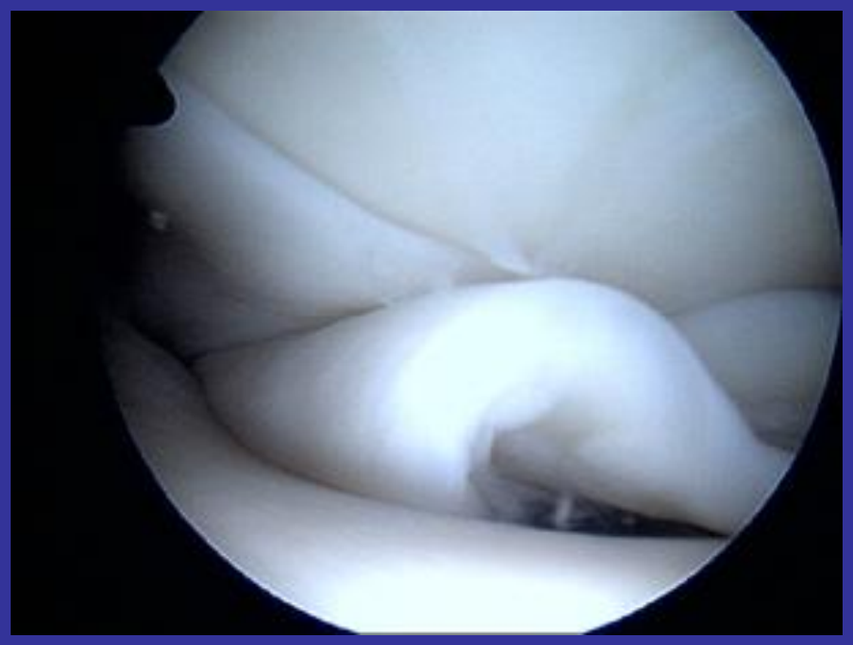
Classification

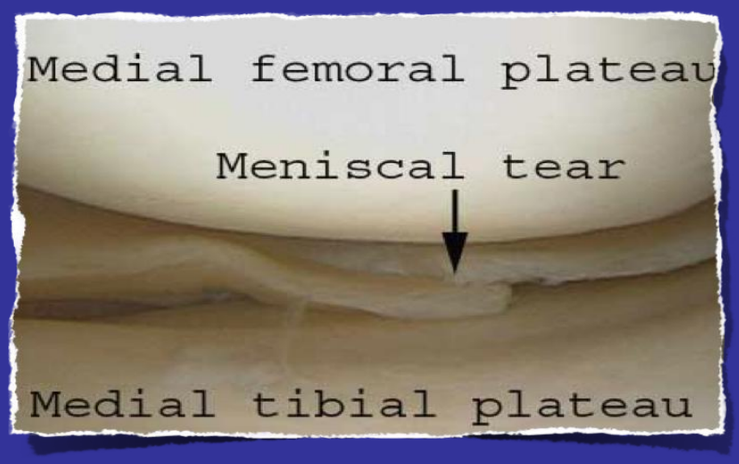
- Tear in Red zone/Red-White Zone/White Zone
- Unstable Tear/Stable Tear
- Vertical longitudinal, oblique, complex, transverse (radial), and horizontal
- 80% oblique or vertical longitudinal

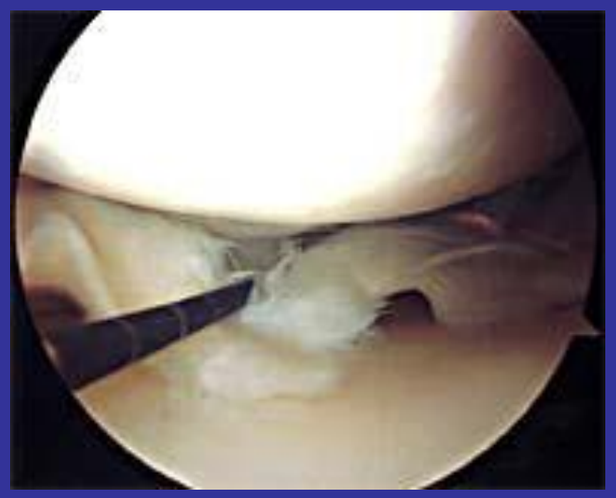
Vertical longitudinal

- Bucket handle tear(commonly associated with ACL)
- Commonly MM
- Oblique - Flap tear –Common at PM1/3rd
- Complex tear – Trauma or degenerative
- Radial and Horizontal tears are less common









Treatment

- Non-operative tx
- Operative tx
  - Total vs partial meniscectomy
  - Meniscal repair

Non-op tx

- Initial tx symptomatic
- Protected weight bearing
- Modified activity
- Ice
- NSAIDs

Meniscal repair indications

- Red Zone tears – Bucket handle tears
- Patient Age, characteristic
- Tear characteristics – Reducible tears

Timing of repair

- No firm data on acute vs chronic repair
  - Felt that acute repair fares better
    - Chronic tears may deform & degenerate
      - Difficult anatomic repair
- Location & appearance more impt factors

Age

- No specific age limit
- Most authors suggest partial meniscectomy age >45
  - Successful repairs

Ideal repair

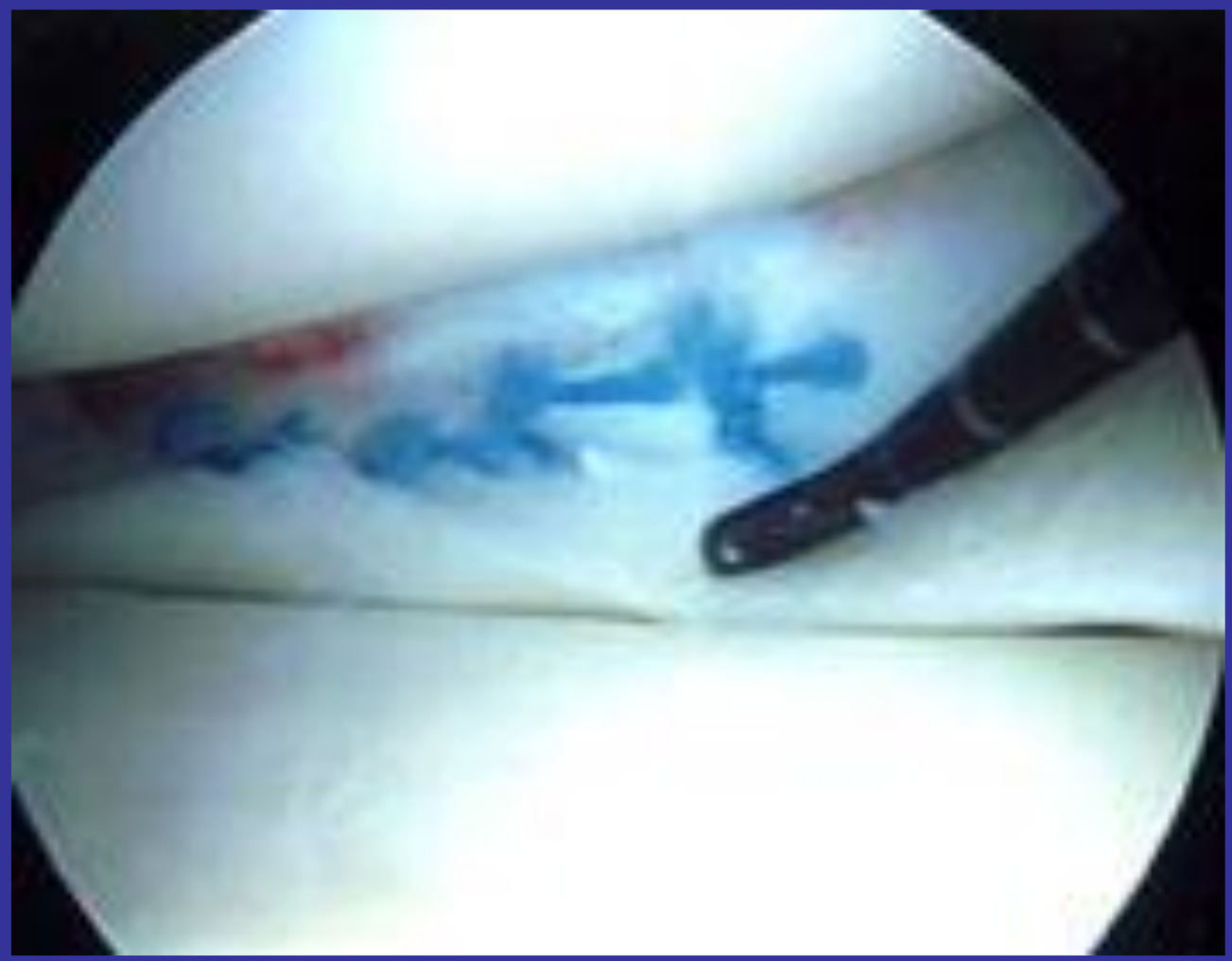
- Vertical longitudinal tear of lateral meniscus
- Peripheral zone (red-red)
- ACL injury
  - ACL reconstruction

Meniscectomy

- Total vs partial
- Remove unstable fragments
- Contour & trim edges
  - Stable to probe

Meniscal repair

- 4 methods
- Open meniscal repair
- Arthroscopic outside-in
- Arthroscopic inside-out
- Arthroscopic all inside



Open meniscal repair

- Limited indications
  - Knee dislocation and multi-ligament reconstruction
- Longitudinal incision over joint line
- Vertical sutures from capsule into meniscus

Inside-out repair

- Versatile & user friendly
- Excellent healing rates in literature
- Suture passer thru central to peripheral & tied over capsule

Outside-in repaire

- Minimize risk to peroneal nerve during LM repair
- Tight medial compartment
- Small incisions perpendicular to joint line
- Pass suture and tie knot inside joint

All inside repair

- Least # incisions
- Protect neurovascular structures
- Variety of techniques
  - Bioabsorbable anchors and suture tied inside joint

Complications

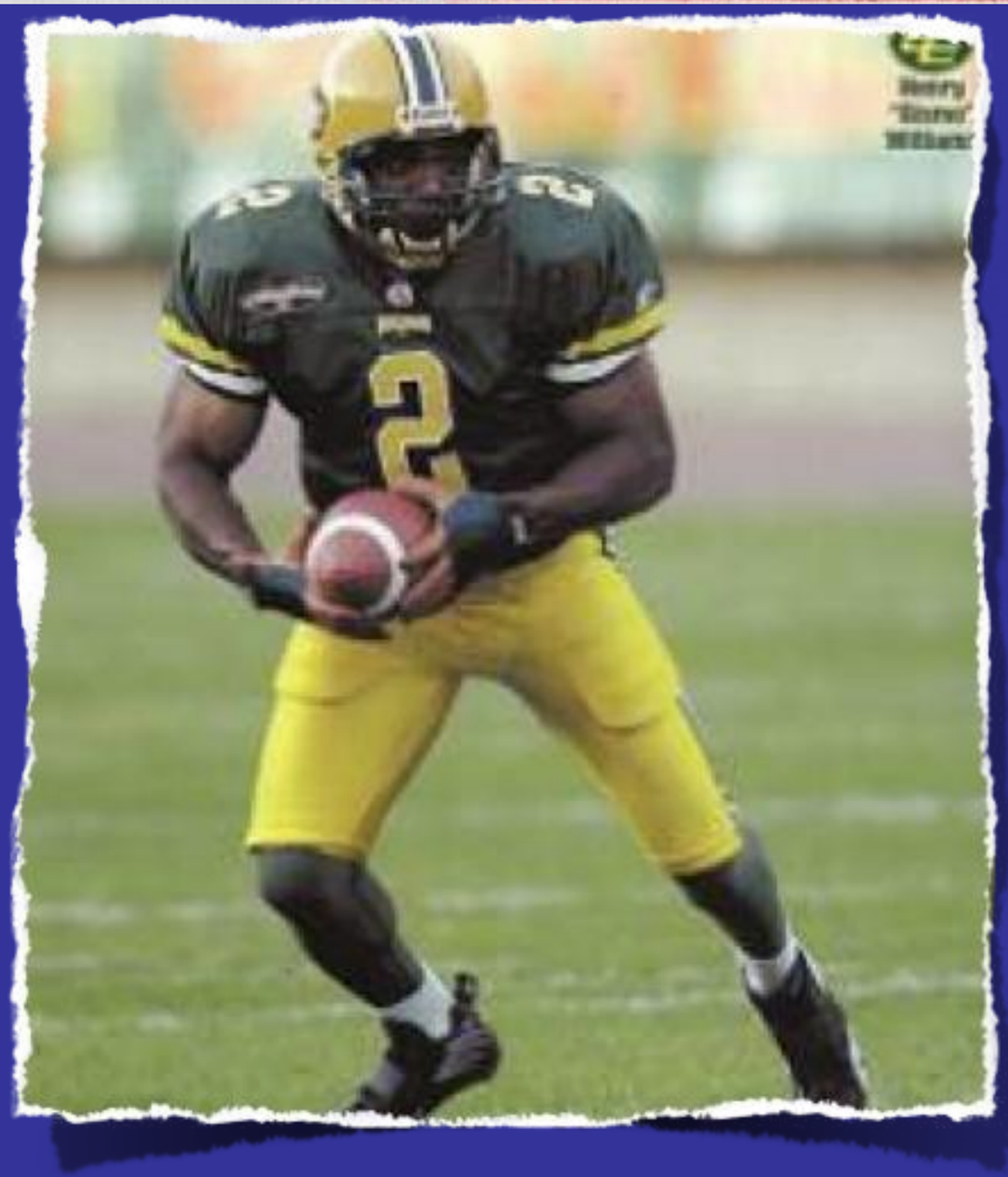
- Non healing of tear
- Neurovascular injury
- Saphenous neuropathy
- Common peroneal palsy
- Popliteal artery pseudoaneurysm

Rehab

- Protected mobilization with a splint
- Early ROM exercises to prevent arthrofibrosis
- Limit extremes of flexion/extension early
- Weight bearing – TOUCH weight bearing for 4-6 weeks

Rehab

- Return to sport
  - Pivot sports
- Historically 6 months
- Some evidence for early return if no effusion and good ROM



THANK YOU