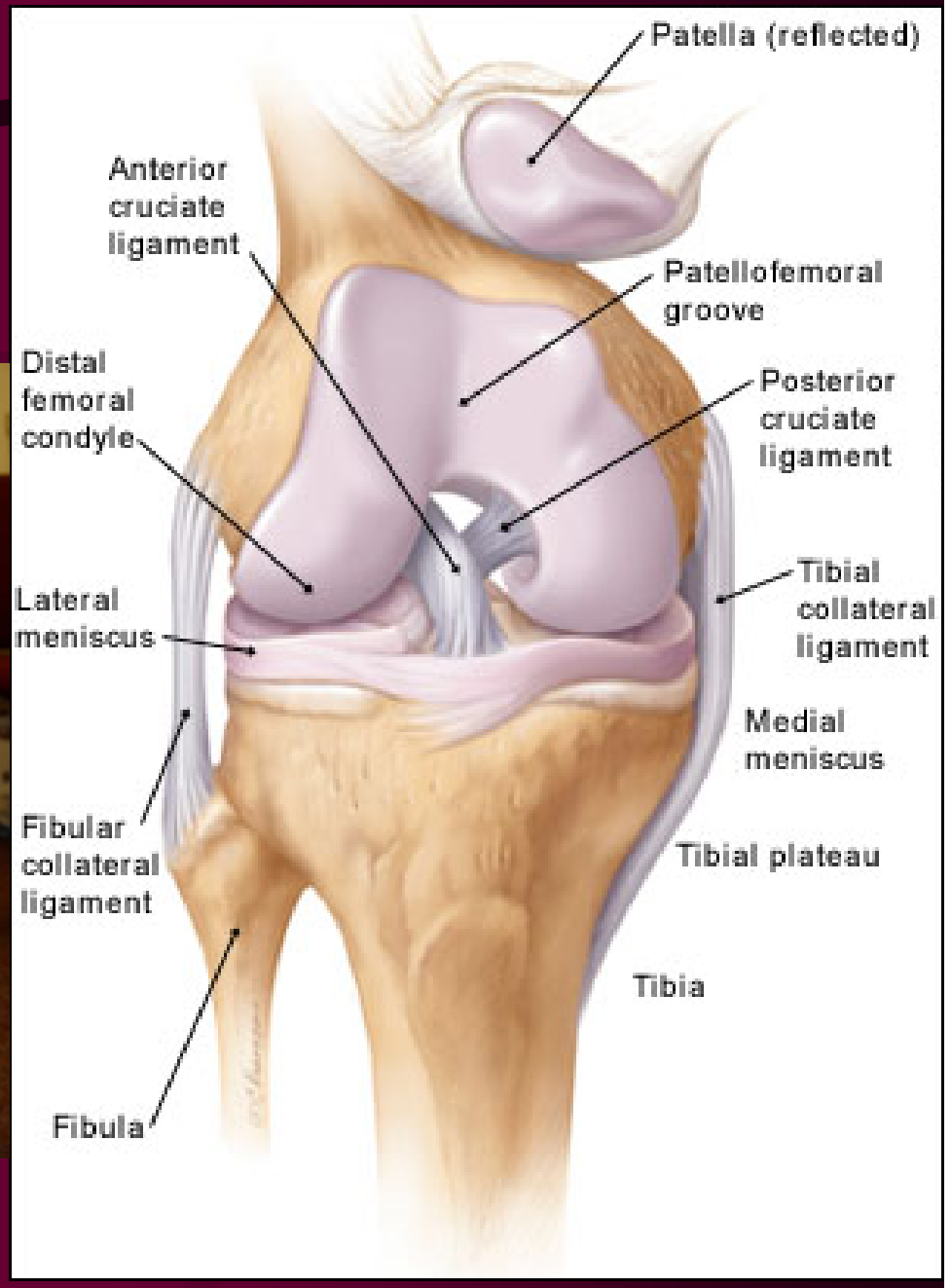
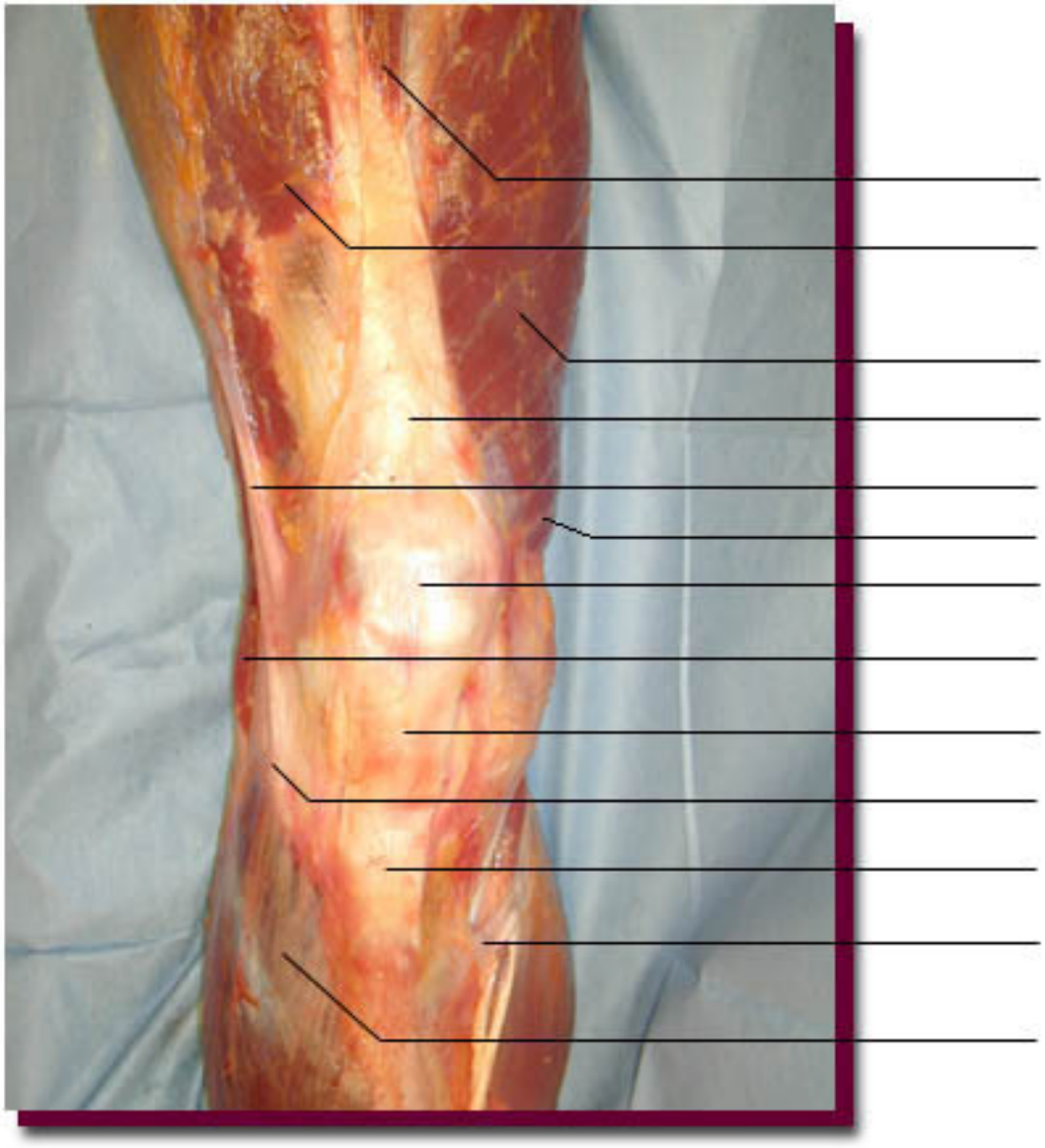
Skis for Knees

Anatomy


Patella (reflected)
Anterior cruciate ligament
Patellofemoral groove
Distal femoral condyle
Posterior cruciate ligament
Lateral meniscus
Tibial collateral ligament
Medial meniscus
Fibular collateral ligament
Tibial plateau
Tibia
Fibula

Knee Anatomy



THE KNEE HISTORY

- Pain (PQRST)
- Contact vs noncontact
- Effusions
- Mechanical symptoms
  - Locking
  - Instability (falls)
- Initial treatment

THE KNEE HISTORY

- Continue work/play?
- PM/SHx
  - Medications
- Occupation/Sport
  - Time tables

ACL: HISTORY

- Contact vs noncontact
- Immediate effusion (first 4-12 hr)
- Unable to continue
- Mechanism = pivot, hyperextension

Physical Exam of the Knee

- Inspection
- Palpation
- Range of Motion
- Special tests
- Neurovascular assessment

INSPECTION

- Effusion
- Erythema
- Ecchymosis
- Edema
- Q angle
- Angular deformities
- Muscular asymmetry

PALPATION

ANTERIOR

- Tibial tubercle
- Infrapatellar tendon
- Quad insertion
- Patellar facets
- Crepitus ?

MEDIAL

- MCL
- Meniscus
- Pes anserine insertion
- Tibial plateau
- Femoral condyle

PALPATION

LATERAL

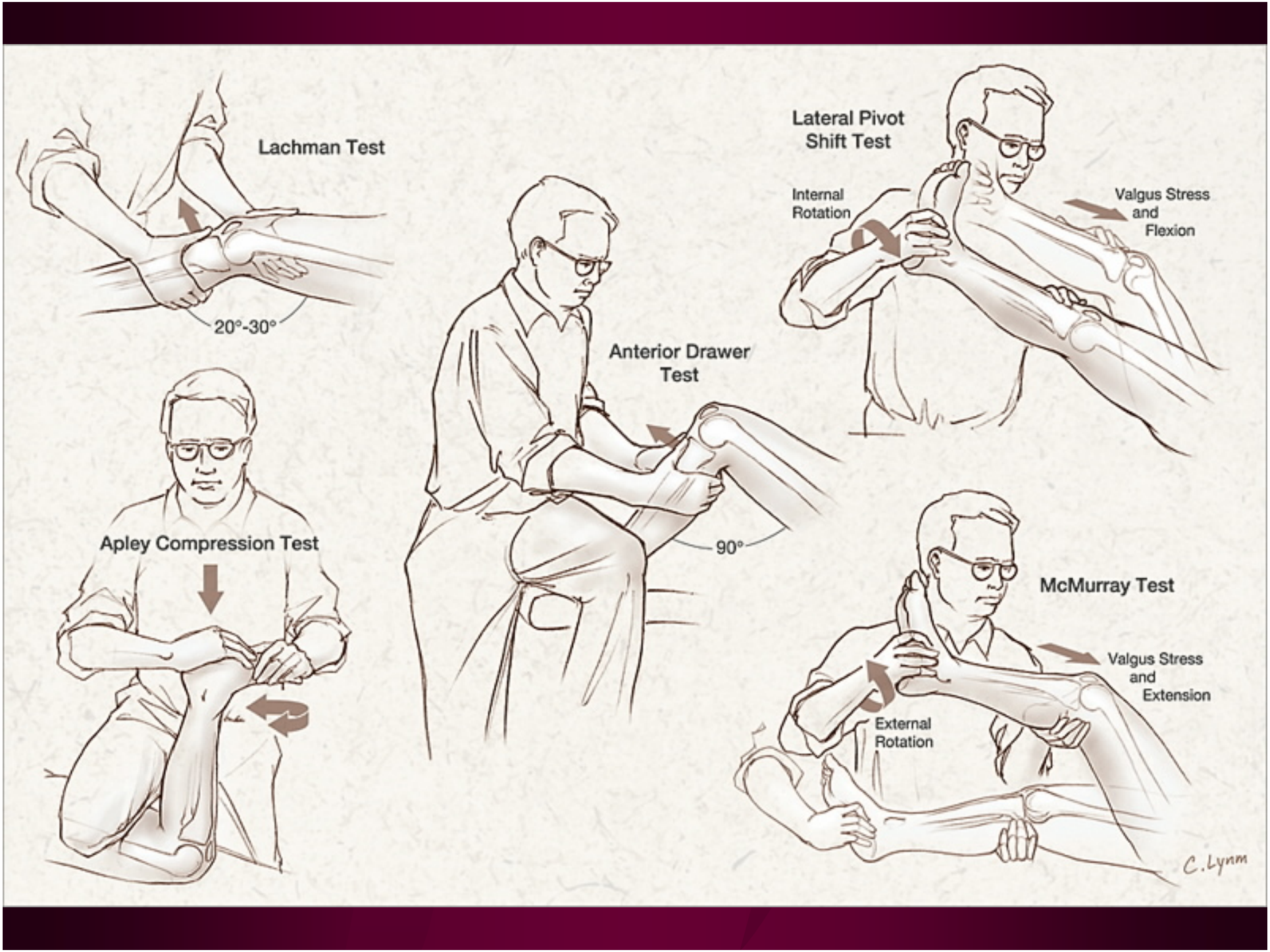
- Head of the fibula
- LCL
- Meniscus
- Tibial plateau
- Femoral condyle
- Gerdy's tubercle

POSTERIOR

- Menisci (posterior horns)
- Popliteal fossa
- Hamstring tendons

ACL Special Tests

- ~~Anterior drawer~~
- Lachman test
- Pivot shift test
- Valgus stress test at full extension!


Lachman Test
20°-30°
Lateral Pivot Shift Test
Internal Rotation
Valgus Stress and Flexion
Anterior Drawer Test
90°
Apley Compression Test
McMurray Test
Valgus Stress and Extension
External Rotation
C.Lynn

Grading Ligament Injuries

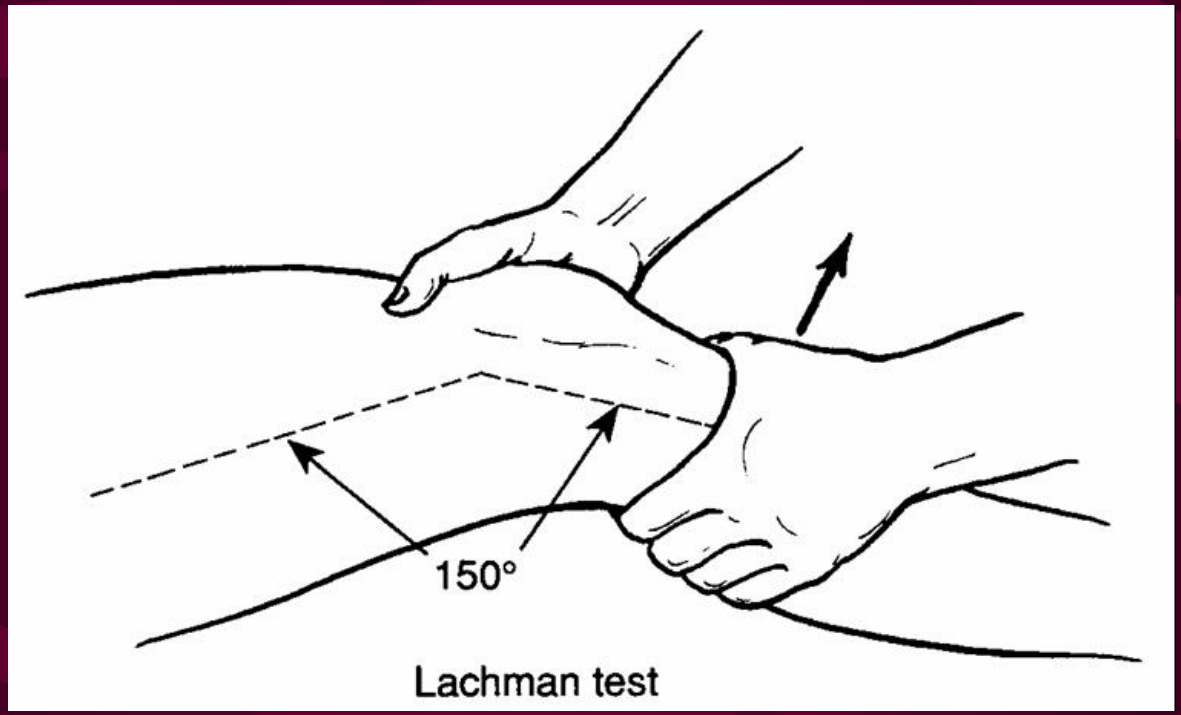
GRADE 1	**No instability**	**Good endpoint**
GRADE 2	**Some instability**	**Fair endpoint**
GRADE 3	**Opens wide**	**Poor endpoint**

ACL: PHYSICAL EXAM

- Decreased ROM
- Effusion-hemarthrosis, immediate
- + Instability tests
  - Lachman: most accurate
  - Pivot shift
  - Anterior drawer
- ± MCL and meniscus tests

LIGAMENT EXAM

Translation + ENDPOINTS!



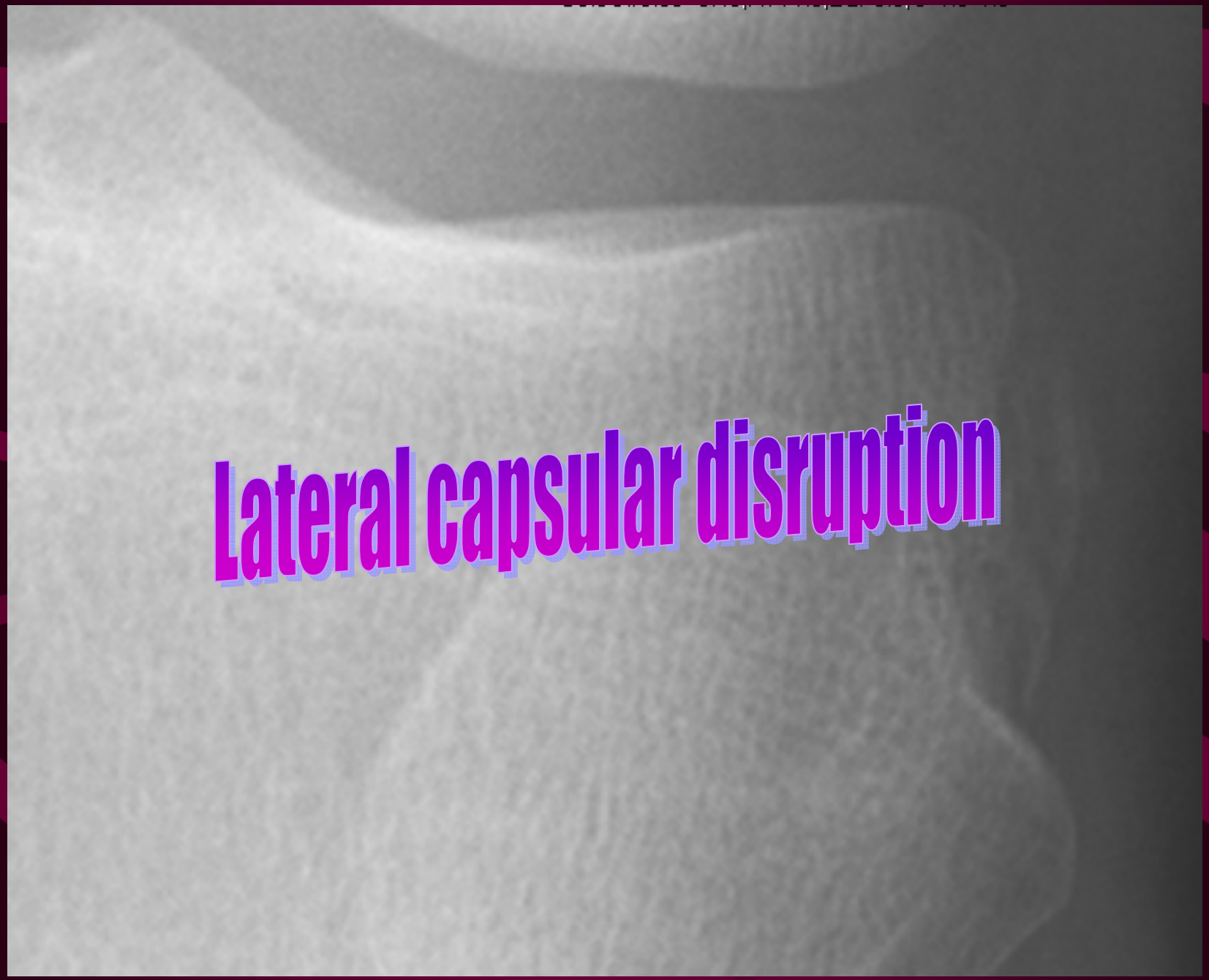
Lachman test

+ PIVOT SHIFT

Palpable clunk as the lateral tibial condyle reduces on the femur

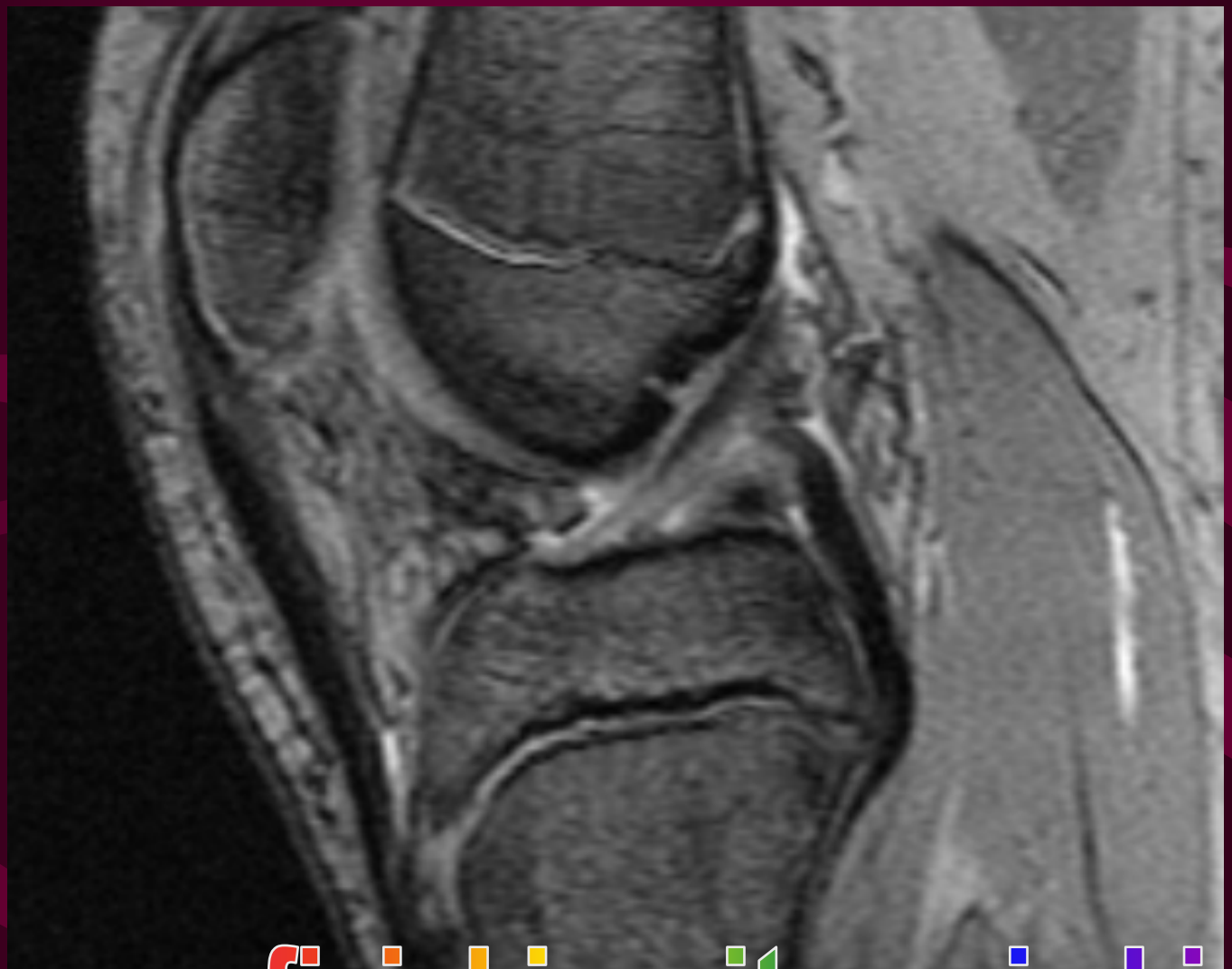
LIGAMENT INJURIES: DIAGNOSIS

- Serial Exams
- Plain radiography
- Arthrocentesis ?
- MRI??
- KT-2000???


Lateral capsular disruption


2.4 mm
43.0 mm

MRI: If you must…



The Use of MRI in Evaluation of Knee Injuries

• Sensitivity	M. Meniscus	73-100%
	L. Meniscus	55-90
	ACL	91-100
• Specificity	MM	55-97
	LM	94-98
	ACL	99-100

The Use of MRI in Evaluation of Knee Injuries

• + PV	M. Meniscus	81-98%
	L. Meniscus	90-95
	ACL	93-100
• - PV	MM	86-100
	LM	70-97
	ACL	99-100

The REAL Question-

Is MRI that much better than clinical exam?

- Rose, et al. Arthroscopy, 1996
  - Compared accuracy of clinical exam vs MRI
  - In 154 pts, clinical exam was as good as MRI
- Many articles comparing MRI to arthroscopy

"Partial" ACL tear

- > 40% ACL substance
- + Lachman, - pivot shift
- Clinically
  - Most behave functionally as full tears
  - Continued shifting ↑'s risk of meniscus damage
  - Rx as full tear

The Utility of Arthrocentesis

- Indications
  - Diagnosis in question
    - ? Infectious/Metabolic process
  - Tense effusion
- Indications for surgery
- Timing of surgery

ACL TREATMENT

- Grade 3- Nonsurgical
  - ? modify activity
  - PRICES
  - Hamstrings, gastroc!
  - Functional bracing ?
  - 100% @ 9-12 months

ACL TREATMENT

- Grade 3 Injuries- Surgery
- Indications
  - Most active people will require surgery to restore adequate function and decrease instability
  - Recurrent instability
  - Inability to modify activity
  - Associated injuries: meniscus
  - Age?
- Wait three weeks due to arthrofibrosis risk
- 100% @ 6-12 months

MCL INJURIES

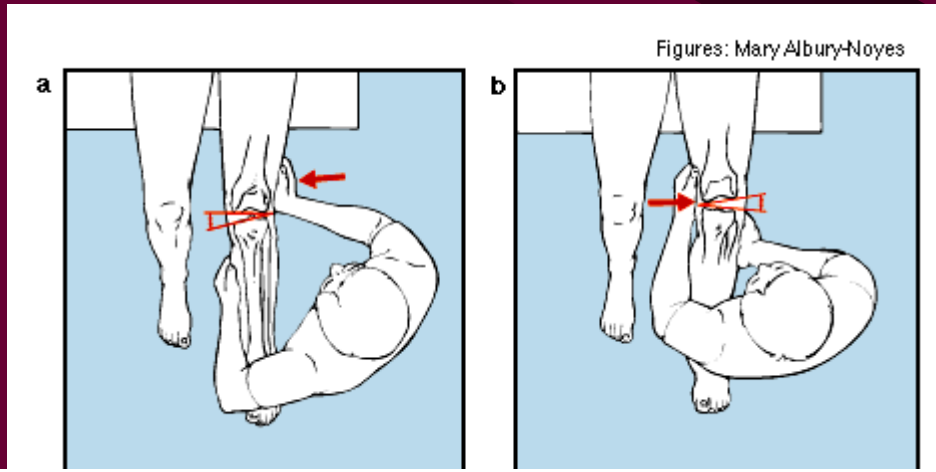
HISTORY

- Mechanism = valgus stress
- Medial joint line pain
- Lack of large effusion
- Difficulty weight-bearing

MCL INJURIES

PHYSICAL EXAM

- Tender to palpation along MCL
- Pain ± instability with valgus stress
  - 30° flexion = MCL
  - 90° flexion = associated ACL
- Pain with Apley's distraction test
- COMPARE SIDES



MCL INJURIES

Treatment Of Grade 1 &2

- Early mobilization
- Weight-bearing as tolerated
- Hinged knee brace
- PRICES
- Recovery 4-6 weeks

MCL INJURIES

Treatment of Grade 3 (full tears)

- Isolated = nonsurgical management
- Combined = surgery consistent with associated injuries
- Natural Hx = *lack* of long-term degenerative changes seen with ACL, meniscus

PCL INJURIES

PCL INJURIES

PHYSICAL EXAM

- + Effusion
- + Posterior drawer test
- + Posterior sag sign
- False positive Lachman test
- Common to have *isolated* injuries

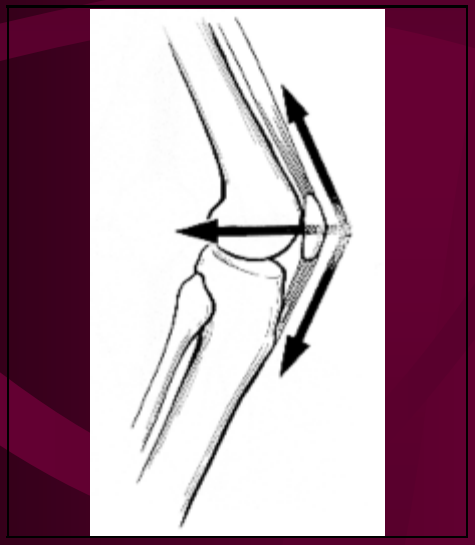
PCL INJURIES

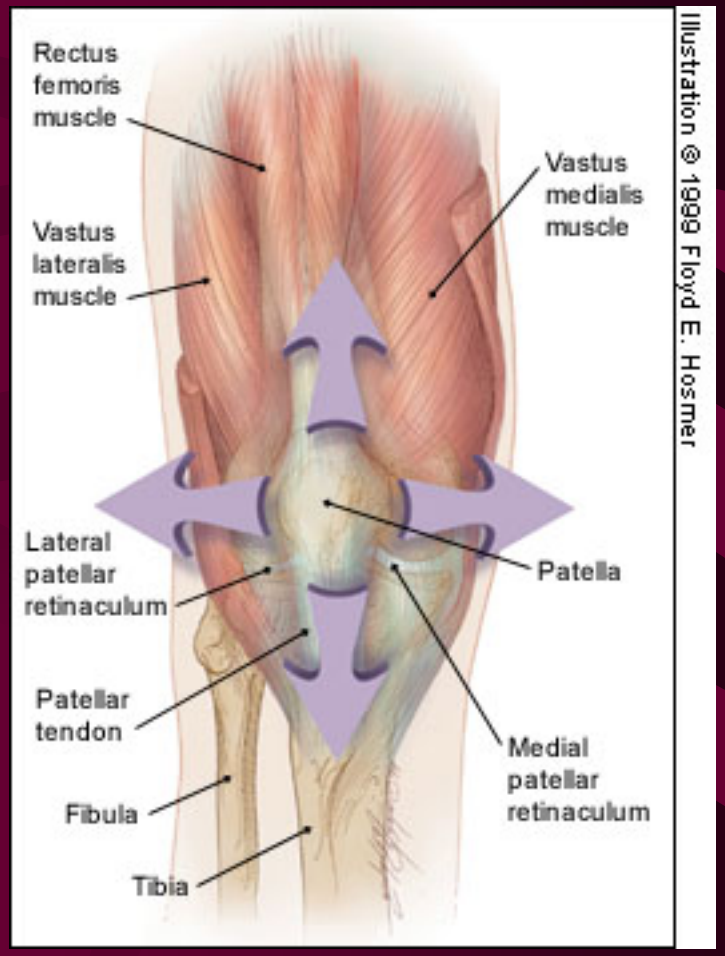
TREATMENT

- PRICES
- Functional bracing (early)
- Rehab
- Surgery if continued instability, effusions
- Note- 2% of NFL preseason exam with incidental isolated PCL tear

Quad Musculature

- VMO- terminal extension
- VLO
- Rectus femoris





Patellofemoral Arthralgia

Often referred to as chondromalacia patella. This term should be reserved for observed articular cartilage damage

PFA-HISTORY

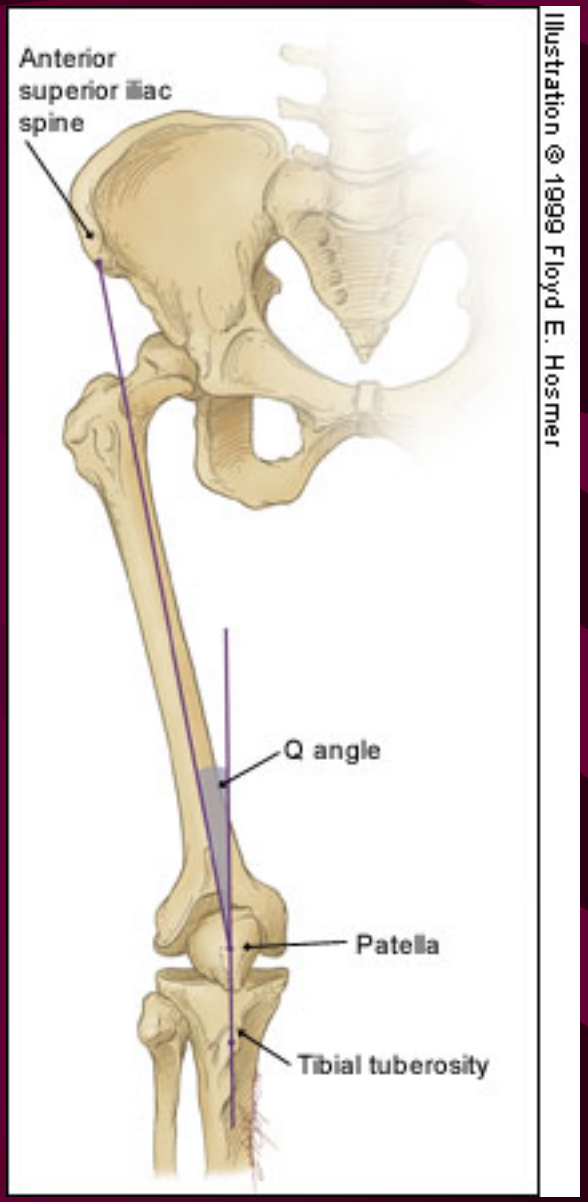
- PQRST of pain
- Pain with:
  - Stairs
  - Prolonged sitting
  - Deep squat activities
- Lack of effusions, locking, instability

PFA-HISTORY

- Theatre sign- pain with prolonged sitting (as in theatre or planes)

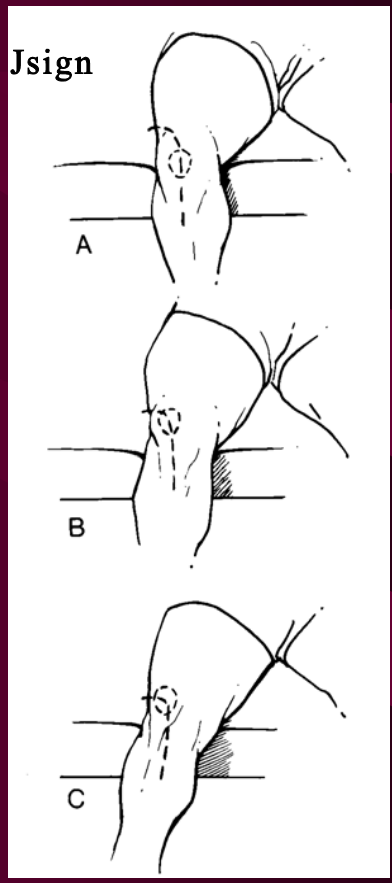
- Pain with stairs


(c) P. Kubal



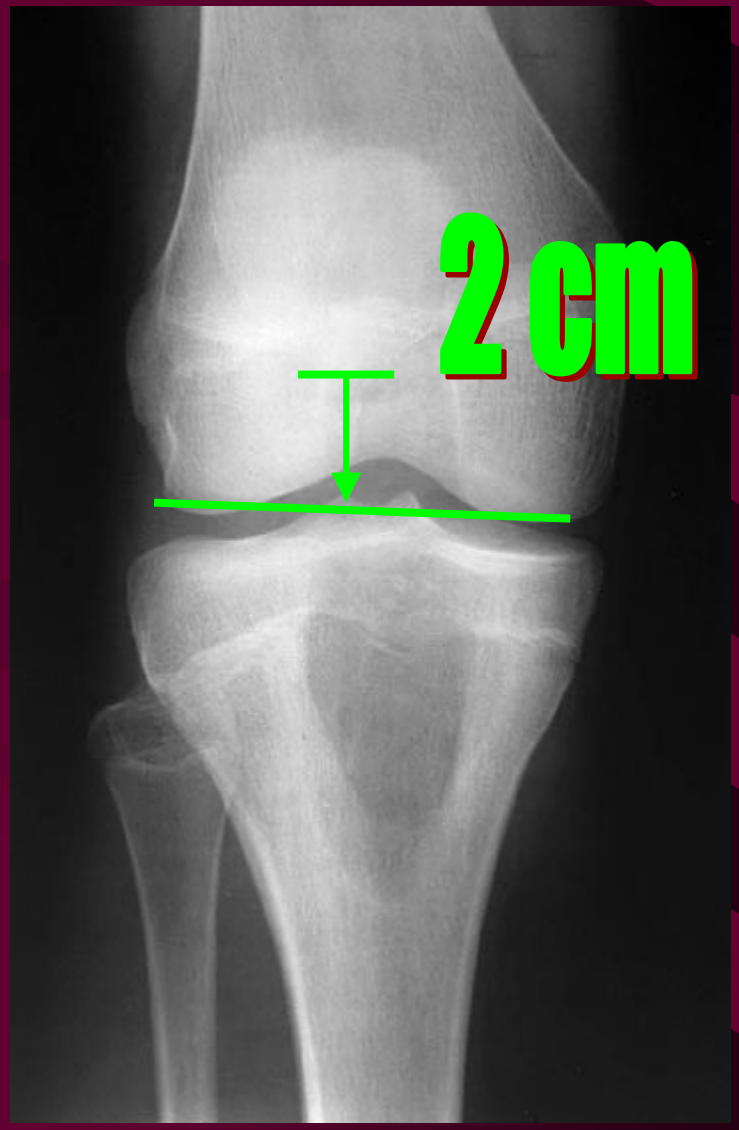
PHYSICAL EXAM

- Patellar compression/grind tests
- No patellar apprehension
- Poor hamstring flexibility
- ± "J" sign
- Normal ligaments, meniscus
- Lack of effusion



XRAYS

- AP
- Lateral
- Tangential

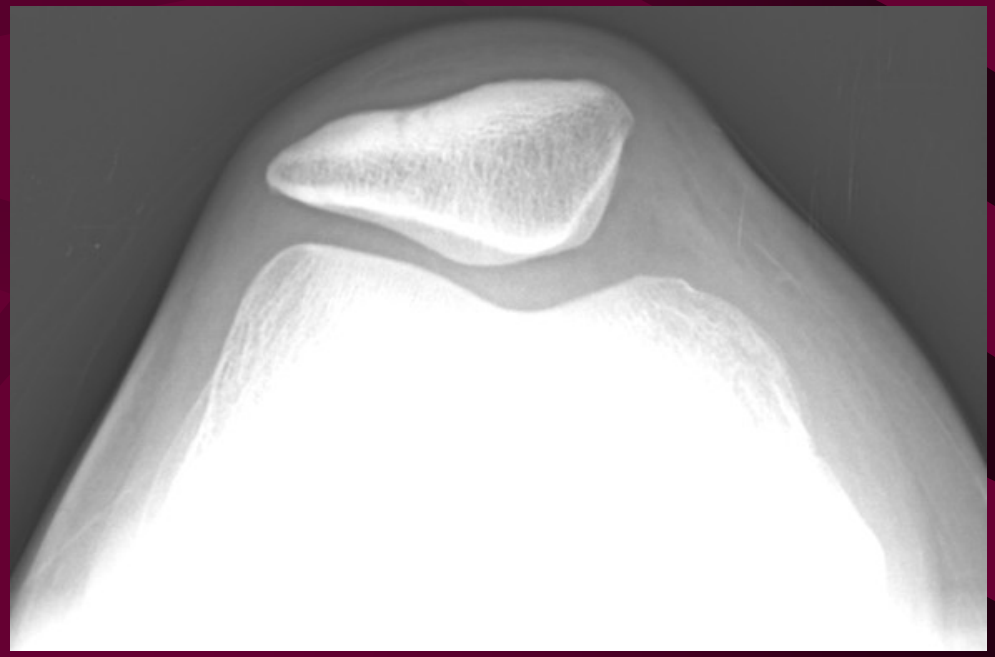


KNEE- LATERAL XRAYS

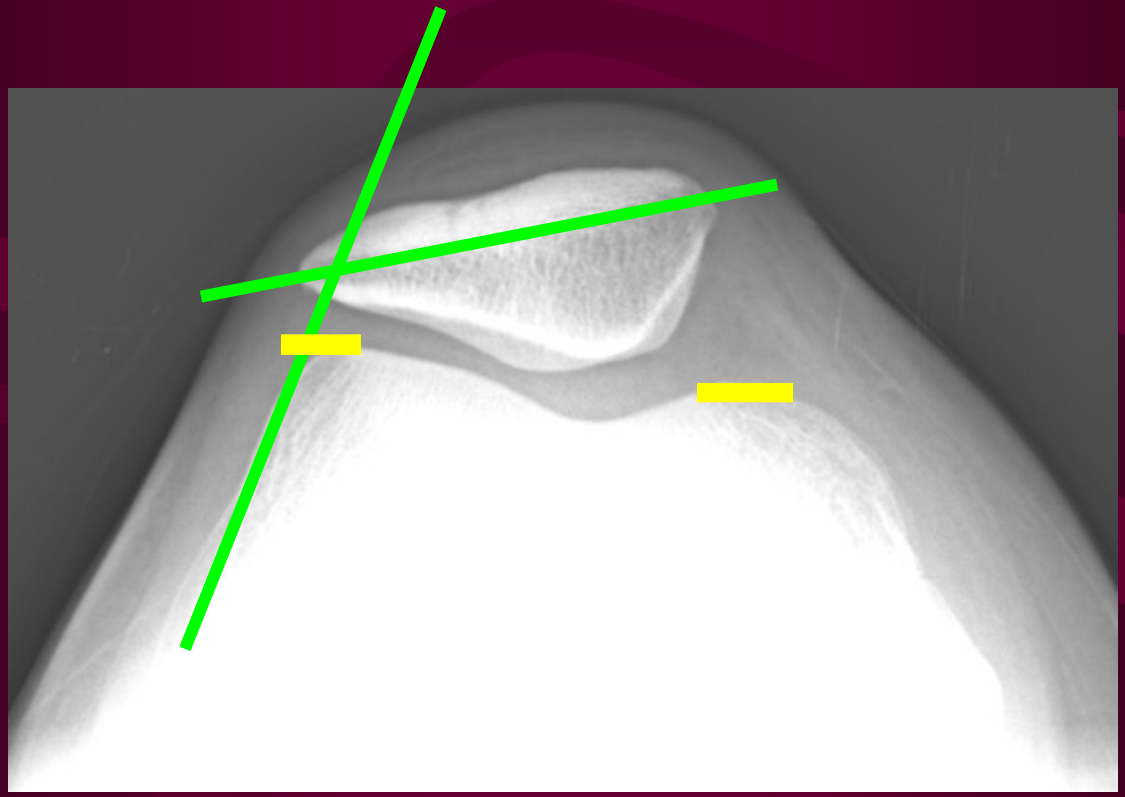
- Patella alta/baja
  - Insall and Salvati ratio > 1.20
  - Blumensaat
- Patellar poles
- Fat pads/ bursae
- Evaluate avulsion fx

KNEE- TANGENTIAL XRAYS

- Assess patellofemoral joint
- Patellar tilt
- Lateralization
- Depth of trochlear groove



Lateralization and Tilt



PATELLAR INSTABILITY

- Acute patellar dislocation
- Acute patellar subluxation
- Patellar tracking dysfunction

PATELLAR DISLOCATION

History

- Mechanism = pivot
- Immediate effusion
- May visualize patella dislocated laterally
- ± Instability (chronically)

N.B. Patella spontaneously relocates

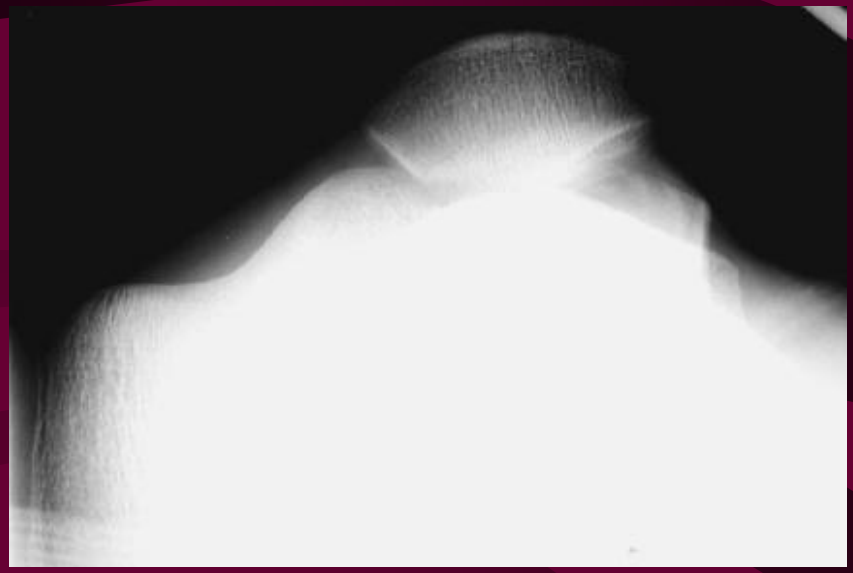
PATELLAR DISLOCATION

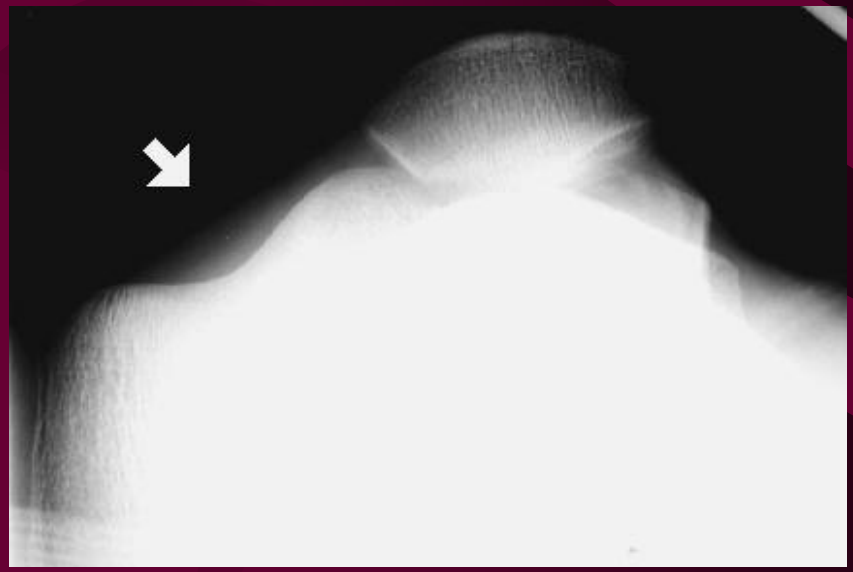
Physical Exam

- Tender peripatellar structures
  - Medial retinaculum
  - Lateral femoral condyle
- Effusion
- ? Patella dislocated laterally

Xrays- osteochondral fracture, effusion

XRAYS





PATELLAR DISLOCATION

Treatment

- Knee extension immobilizer x 4 wks
- Early quad setting exercises
- PRE's at 4 wks to pain tolerance
- Return to sport
  - Full, painless ROM
  - Normal strength
  - Adequate aerobic fitness

Biology of the Meniscus

- Medial Meniscus
- Semilunar
- Narrow anteriorly
- Adherent to MCL
- Lateral Meniscus
- Circular
- Covers more of tibia
- Uniform size
- Less adherent

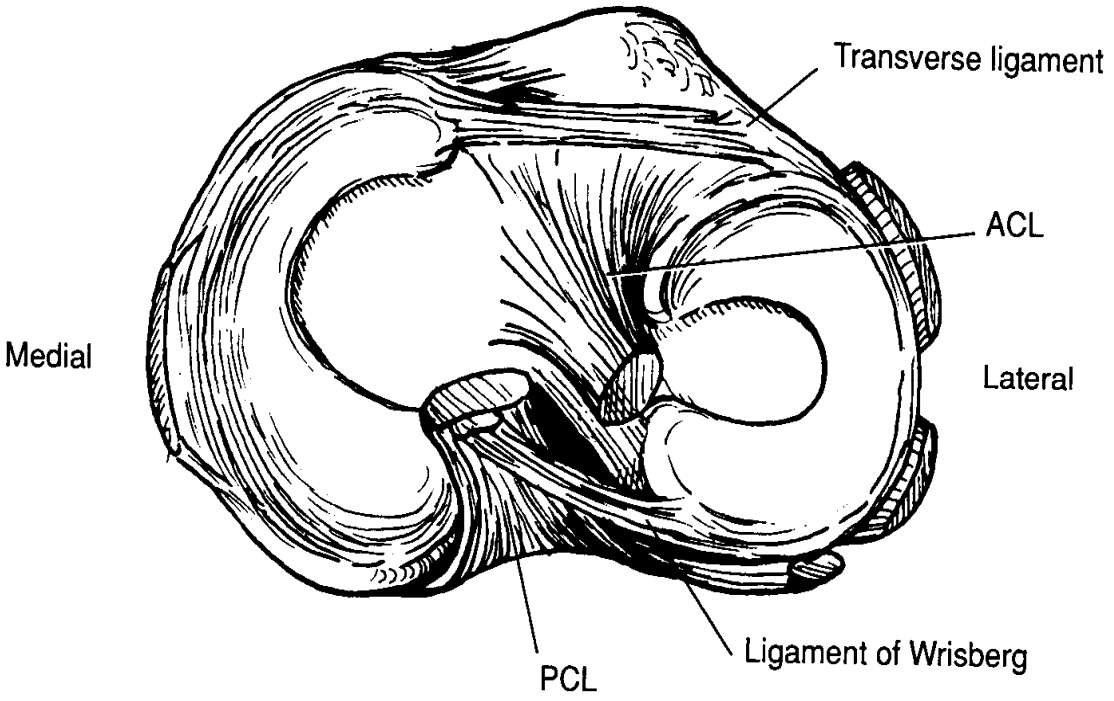
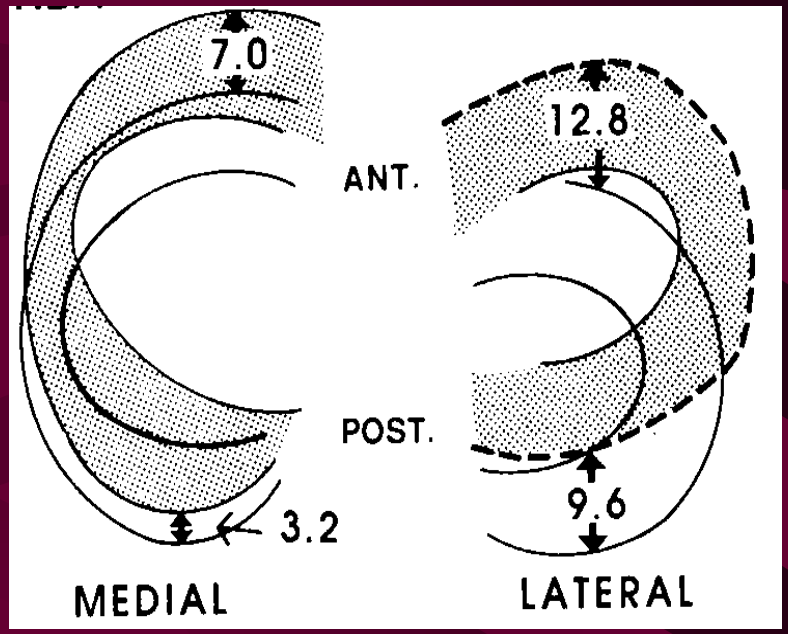


Figure 54.4. Tibial articular surface.

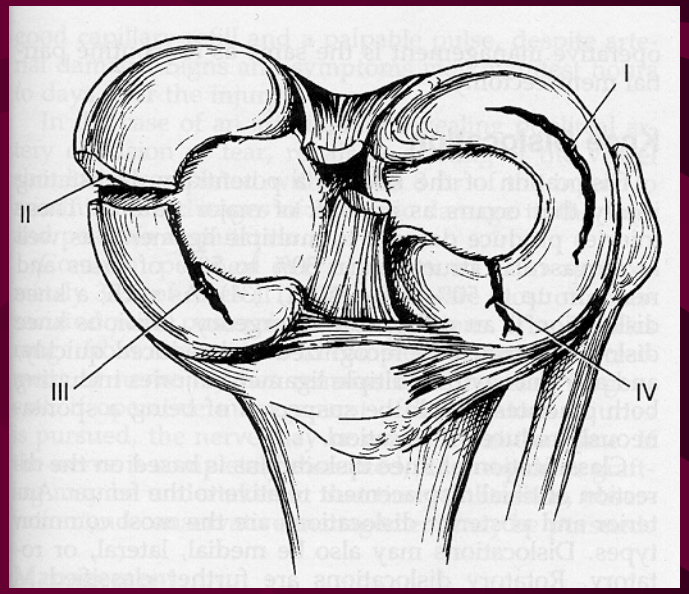
Biology of the Meniscus

- Fibrocartilage
- Fibrochondrocytes
- Extracellular matrix
  - Collagens (90% type I)
  - Elastins
  - Proteoglycans
- Lateral has more translation on the tibial plateau
  - *Bend but doesn't break*



Types of Meniscus Tears

- Longitudinal
- Horizontal
- Oblique
- Radial



MENISCAL INJURIES

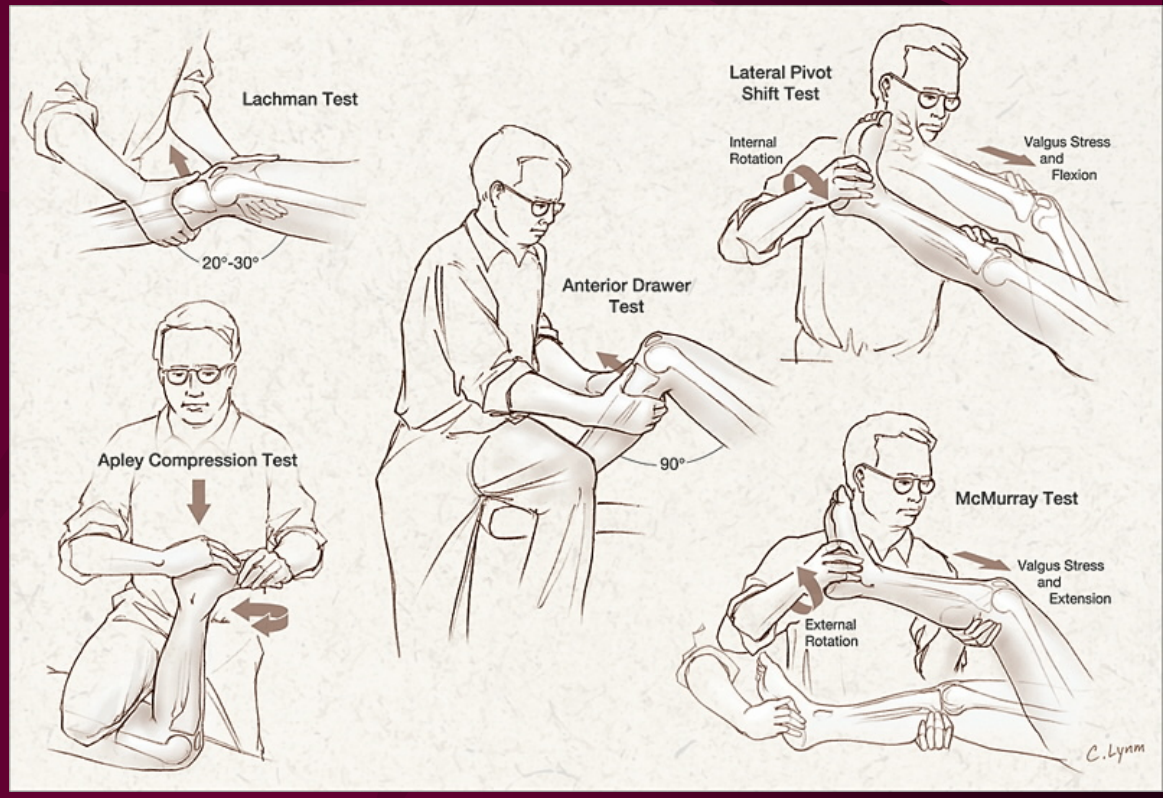
History

- Mechanism = pivot, twist
- ± heard a "pop"
- Effusion- 12-36º after injury
- Mechanical Sxs- locking, instability

MENISCAL INJURIES

Physical Exam

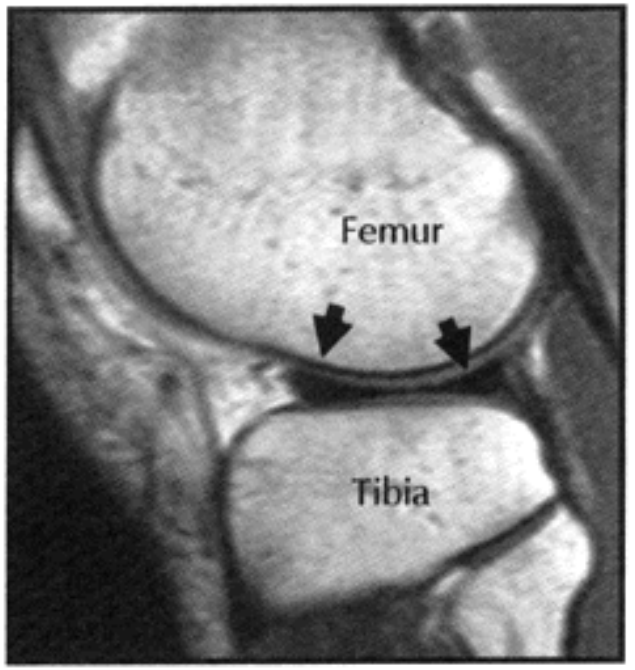
- Joint line tenderness
  - IR/ER
- Decreased ROM
- McMurray's test
- Apley's compression test



MENISCAL INJURIES

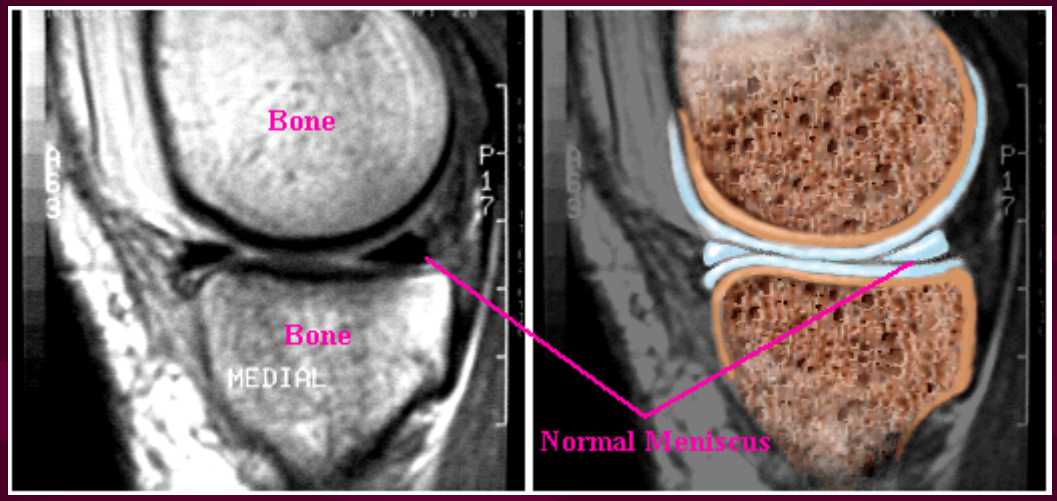
Ancillary Studies

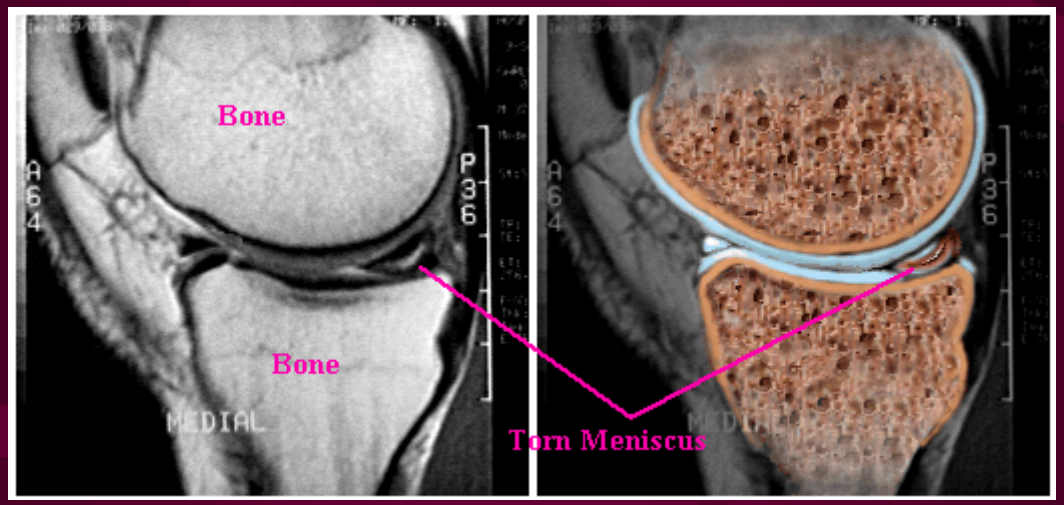
- Plain radiographs
  - Other causes mechanical Sxs
- MRI
  - Higher vascularity in peds patients
- CT-arthrography outdated

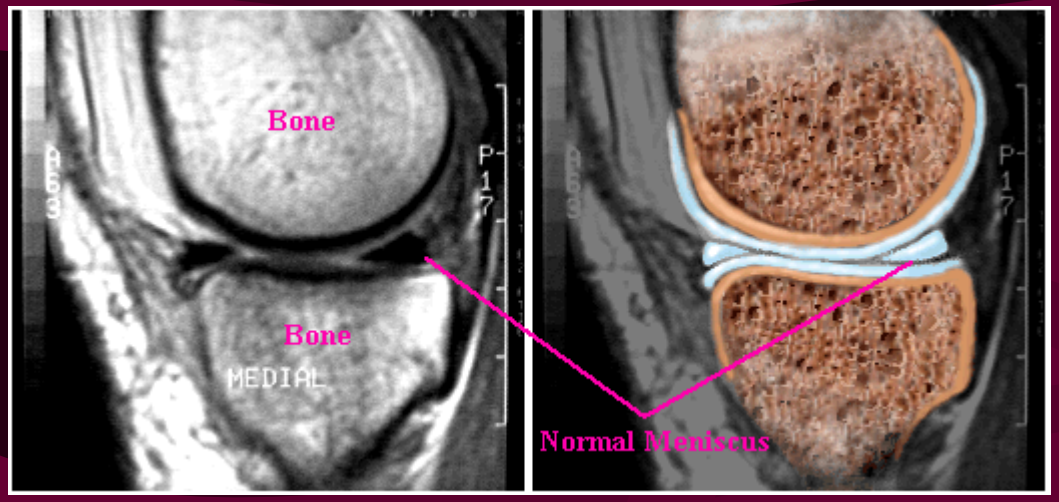


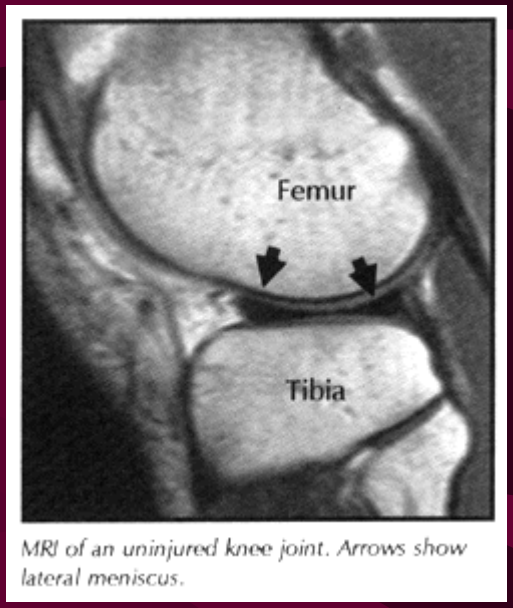
MRI of an uninjured knee joint. Arrows show lateral meniscus.

Meniscus MRI

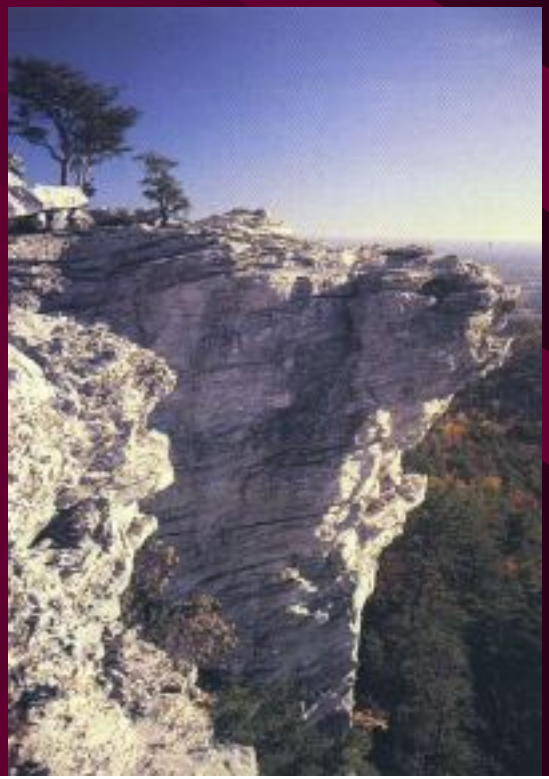






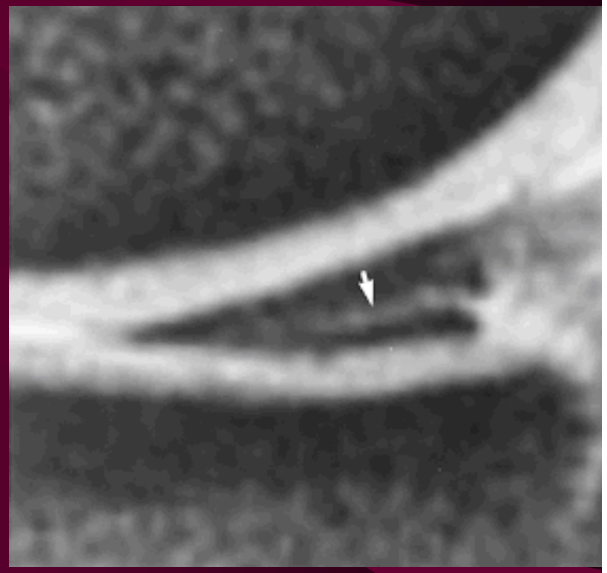


MRI of an uninjured knee joint. Arrows show lateral meniscus.



Grading of Meniscal Tears: MRI

- I: globular changes
- II: linear changes not to margin
- III: linear to sup/inf margin
- IV: complex linear changes
- **Only grade III and IV visible on arthroscopy**



MENISCAL INJURIES

Treatment

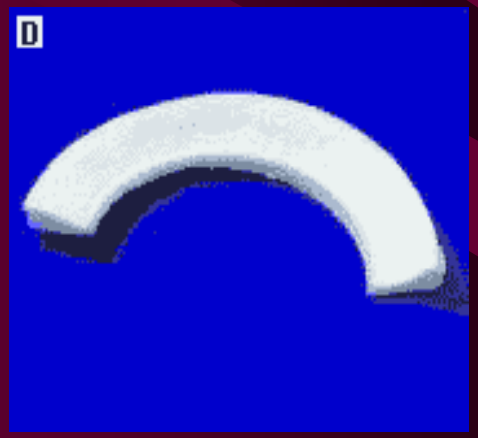
- Nonoperative (Aggressive Nonsurgical)
- Acute Rehab
  - ROM, Quad setting
- Subacute Rehab
  - ROM, PRE's
- Bracing (hinged knee brace)

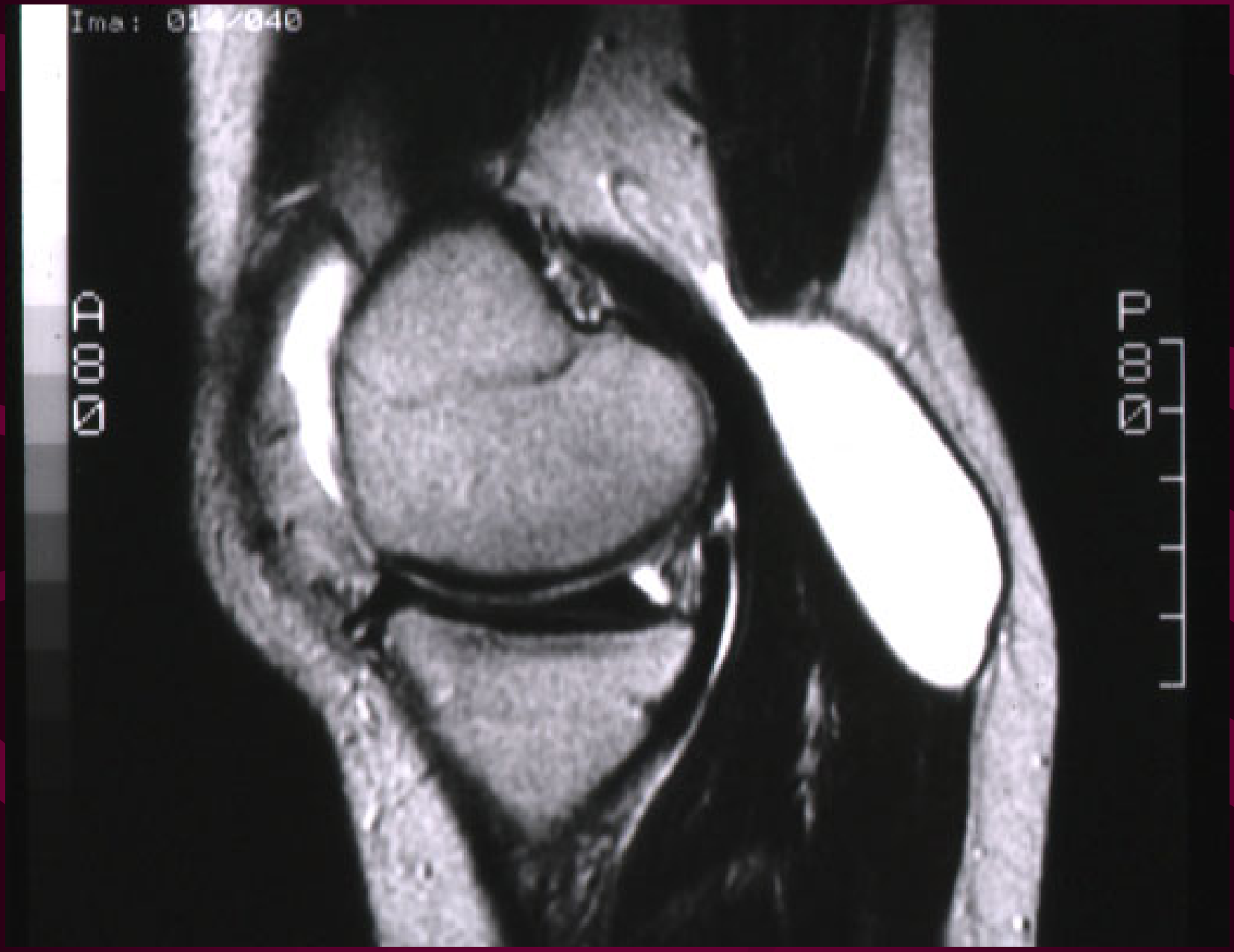
- Continue sport specific drills when tolerable

MENISCAL INJURIES

Treatment

- Operative
  - Partial Menisectomy
  - Meniscal Repair (peripheral)
  - Meniscus Implants
  - Total Menisectomy- outdated

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A
P

Assorted Knee Problems

- Osgood-Schlatter Syndrome
- Patellar, Quad Tendinitis
- Plica
- Iliotibial Band Syndrome
- Discoid Meniscus
- Osteoarthritis
- Osteochondritis dessicans (OCD)

TENDINITIS
Quadriceps and Patellar

History

- Pain with:
  - Jumping
  - Stairs
  - Prolonged sitting
- Mechanism = overuse

TENDINITIS
Quadriceps and Patellar

Physical Exam

- Tender superior/inferior pole of patella
- Tender tibial tubercle
- Tight hams, Achilles, quads
- Pain with resisted action of muscle

TENDINITIS
Quadriceps and Patellar

Treatment

- **P**: protection, pain meds
- **R**: rest
- **I**: ice
- **C**: compression
- **E**: elevation
- **S**: support, strength/stretch exercises

Traction *Apo*physitis

- Osgood-Schlatter “disease”
- Sinding- Larsen-Johannson disease

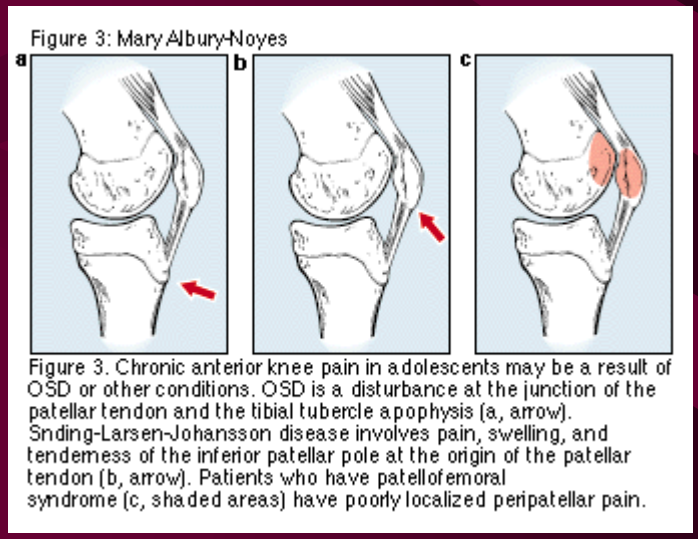


Figure 3. Chronic anterior knee pain in adolescents may be a result of OSD or other conditions. OSD is a disturbance at the junction of the patellar tendon and the tibial tubercle apophysis (a, arrow). Snding-Larsen-Johansson disease involves pain, swelling, and tenderness of the inferior patellar pole at the origin of the patellar tendon (b, arrow). Patients who have patellofemoral syndrome (c, shaded areas) have poorly localized peripatellar pain.

BURSITIS

- Prepatellar bursa
- Infrapatellar bursae
- Pes anserine bursa

- Mechanism = direct blow, overuse
- Physical exam- point tender, nonintraarticular effusion

Figure 2: Mary Albury-Noyes

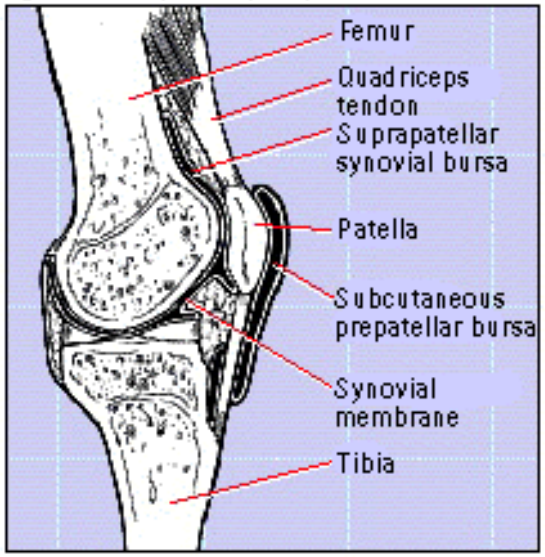


FIGURE 2. The patellar bursae allow the anterior knee ligaments to pass smoothly over the long bones of the leg. Bursae are typically only a few cell layers thick, but when irritated the cell number increases, collagen production is elevated, and fluid and proteinaceous exudates flow into the bursa. The prepatellar bursa shown here is continuous.

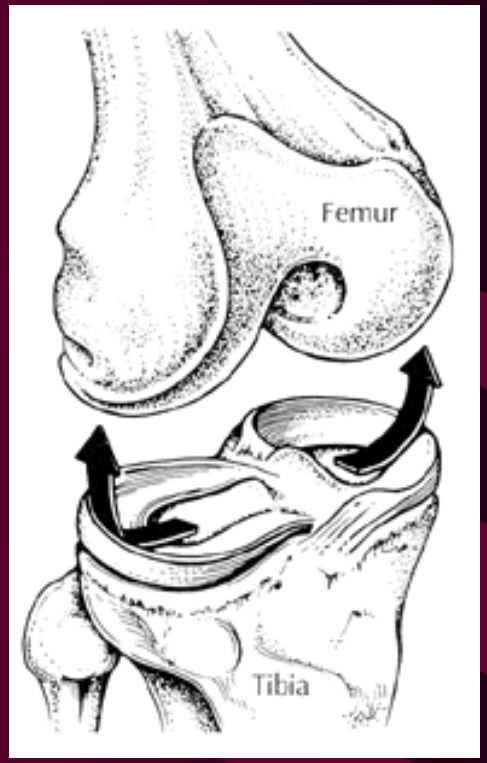
BURSITIS

Treatment

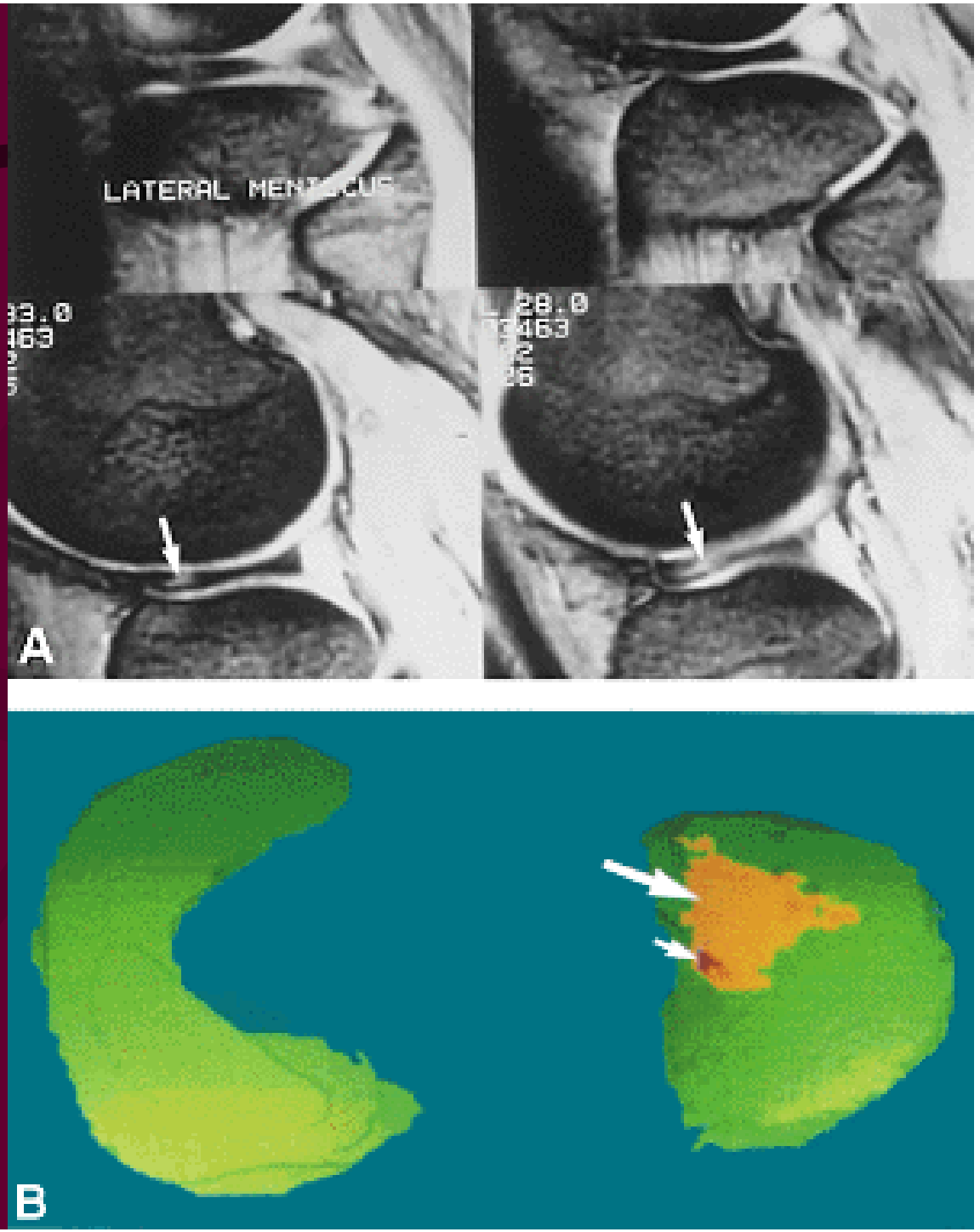
- NSAID's
- Ice
- Flexibility exercises
- Steroid injections
- Surgery for chronic cases (prepatellar)

Discoid Meniscus

- Programmed cell death
- More likely to tear
- Often Lateral
- Male > female
- Ages 6-10 yrs
- Xray- wide lateral joint space
- Rx- may require resection if Sx



Discoid Meniscus



Discoid Meniscus