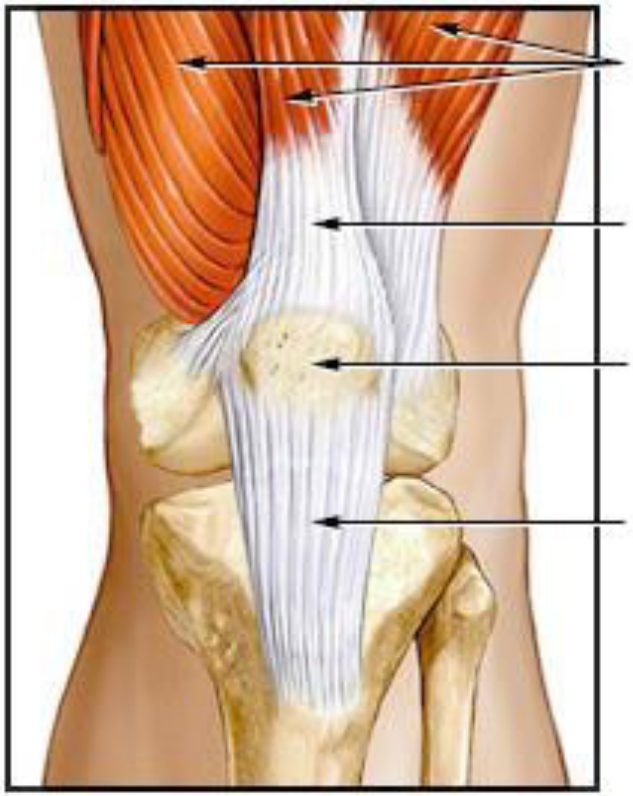
Knee Disorders

Dr. Mohammad Hamdan



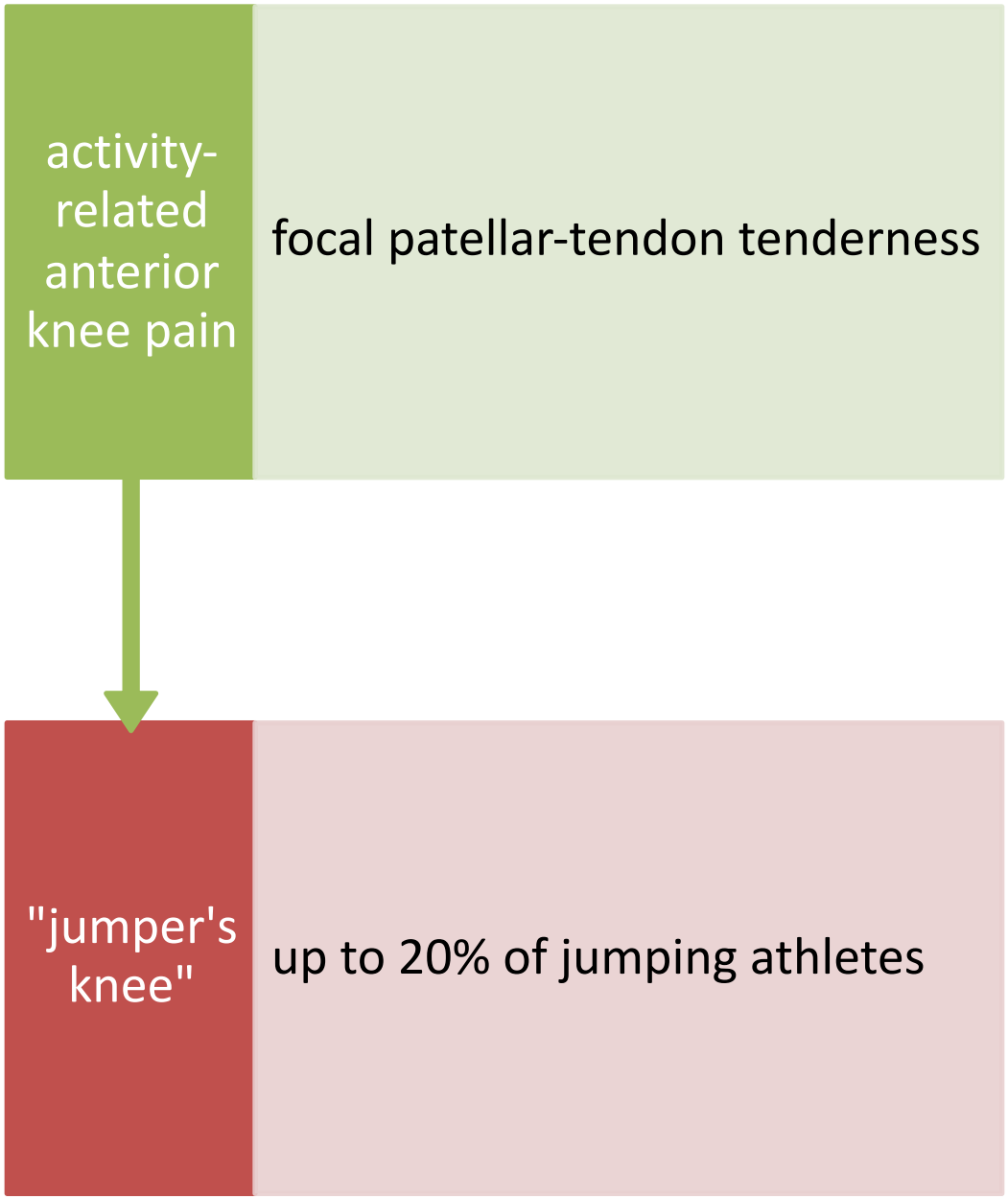
Quadriceps muscles

Quadriceps tendon

Patella (kneecap)

Patellar tendon

Patellar Tendinitis



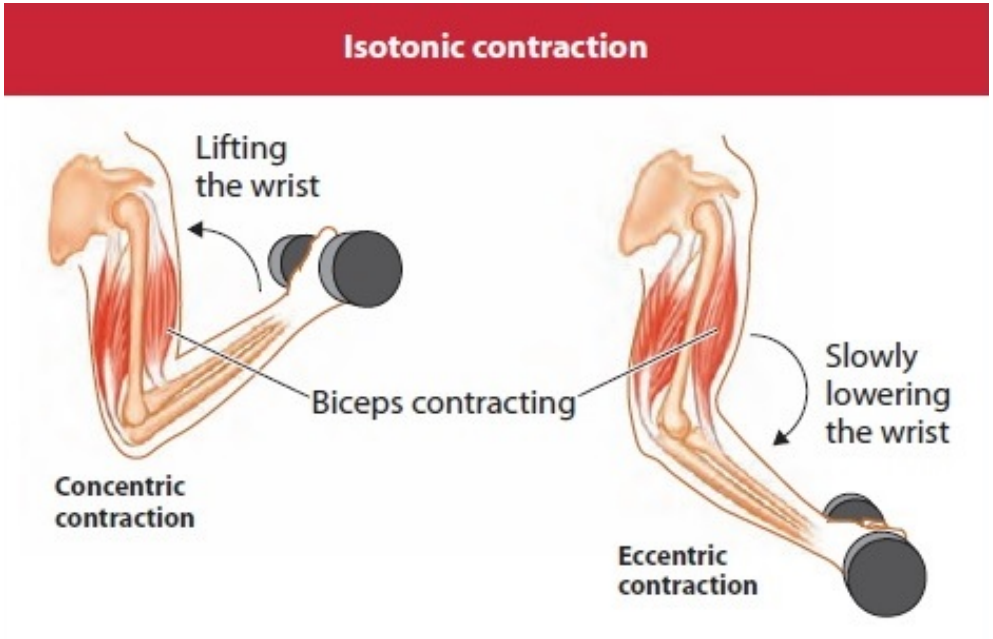
Pathophysiology

degenerative, rather than inflammatory

micro-tears of the tendinous tissue

mechanism

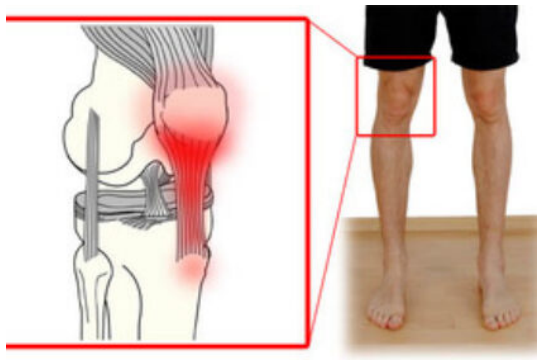
- repetitive, forceful, eccentric contraction of the extensor mechanism



Risk factors

- males > females
- volleyball most common
- adolescents/young adults
- poor quadriceps and hamstring flexibility

Symptoms



- anterior knee pain at inferior border of patella
  - initial phase
    - pain following activity
  - late phase
    - pain during activity
    - pain with prolonged flexion ("movie theater sign")

Physical exam

tenderness at inferior border of patella

Basset's sign

tenderness to palpation at distal pole of patella in full extension	no tenderness to palpation at distal pole of patella in full flexion

Imaging

Radiographs

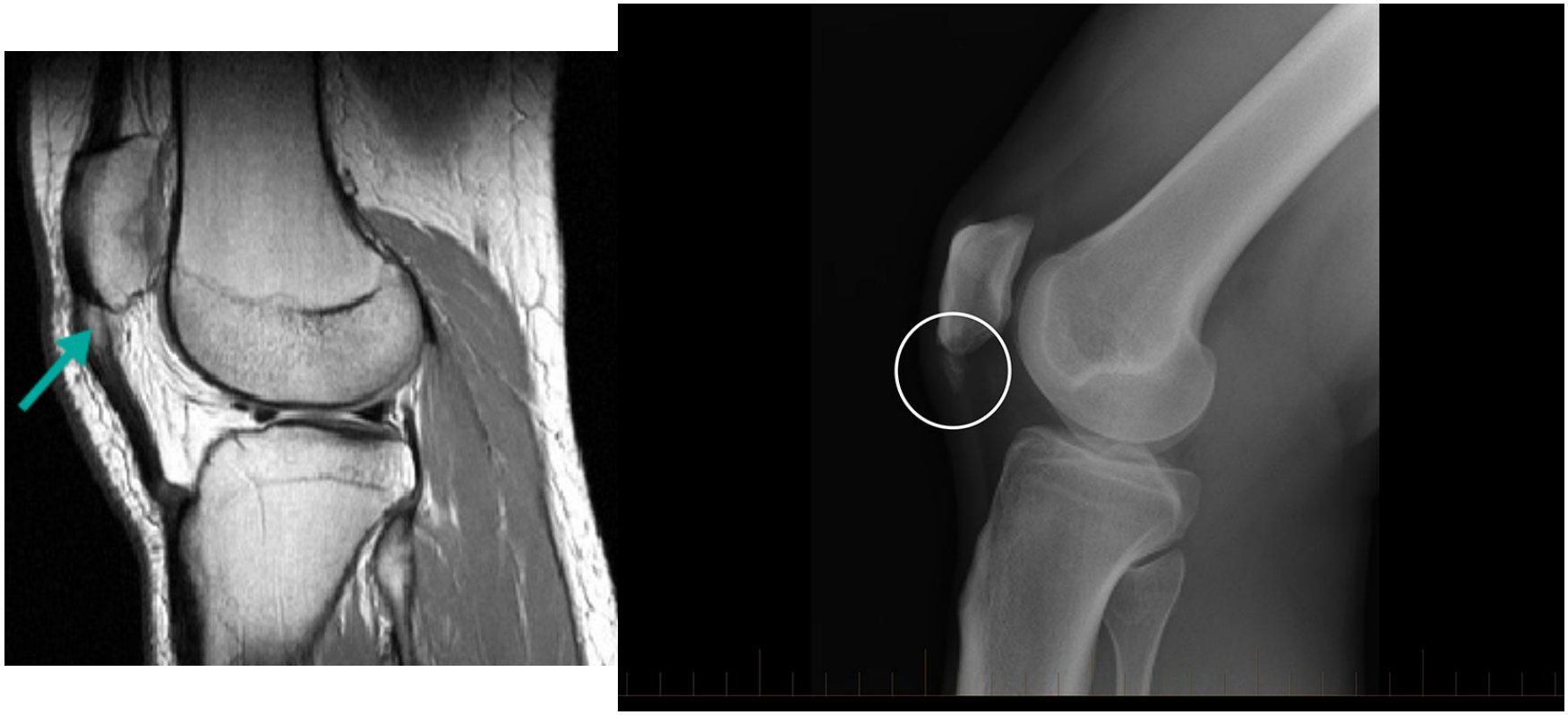
- usually normal
- may show inferior traction spur

Ultrasound

- thickening of tendon
- hypoechoic areas

MRI

- tendon thickening
- signal



Treatment

Nonoperative

ice, rest, activity modification, followed by physical therapy

Operative

surgical excision and suture repair as needed

Quadriceps Tendonitis

Inflammation of the suprapatellar tendon of the quadriceps muscle

8:1 male-to-female ratio

risk factors

- jumping sports
  - basketball
  - volleyball
  - Adult athletes (e.g., long jump, high jump)

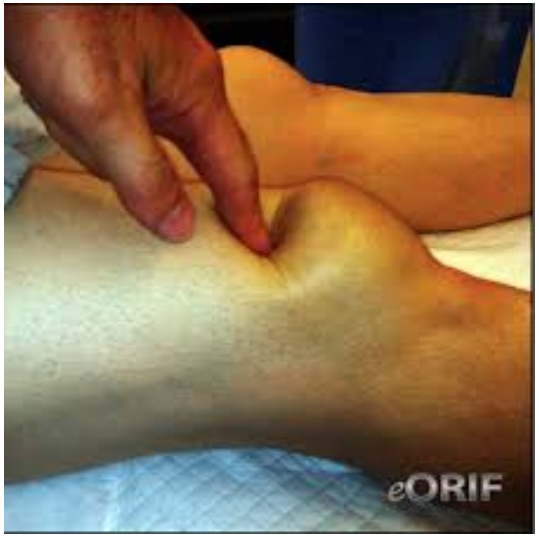
Symptoms

pain localized to the superior border of patella

worse with activity

swelling

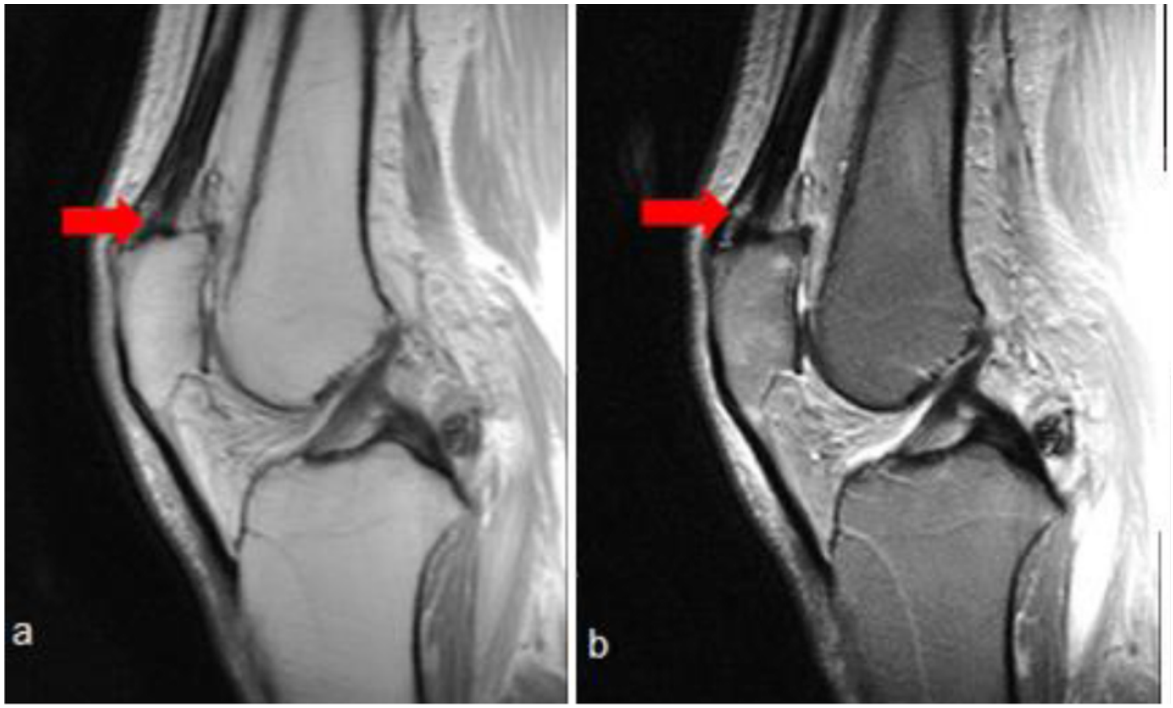
Physical examination



- tenderness at quadriceps tendon insertion at the patella
- palpable gap would suggest a quads tendon tear
- Swelling
- pain with active extension against gravity

Imaging

Radiographs	• usually normal
Ultrasound	• disruption in tendon • operator and user-dependent
MRI	• most sensitive • intrasubstance signal and thickening of tendon


a
b

Treatment

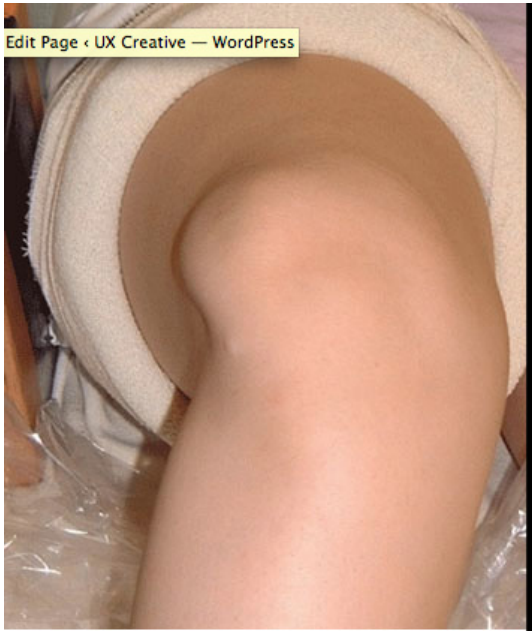
Nonoperative

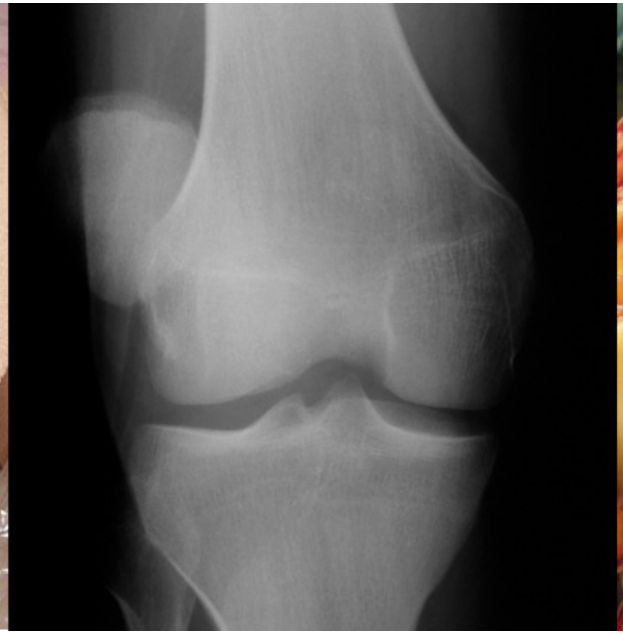
- **activity modification, NSAIDS, and physical therapy**
  - mainstay of treatment

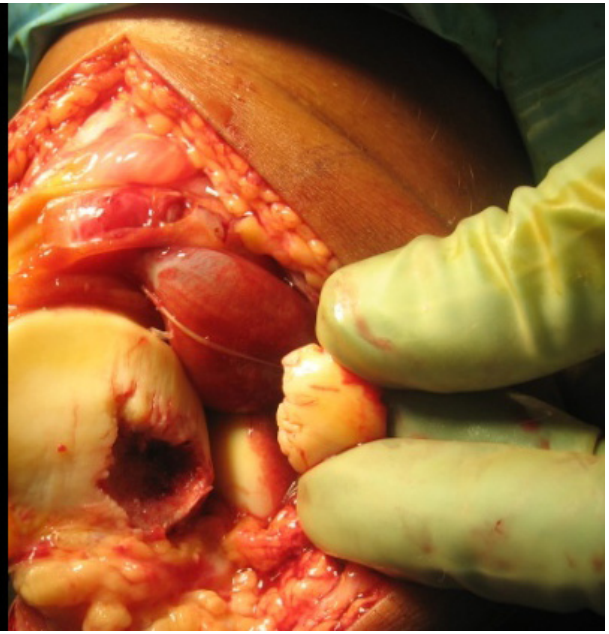
Operative

- **quadriceps tendon debridement**
  - very rarely required

Patellar Instability







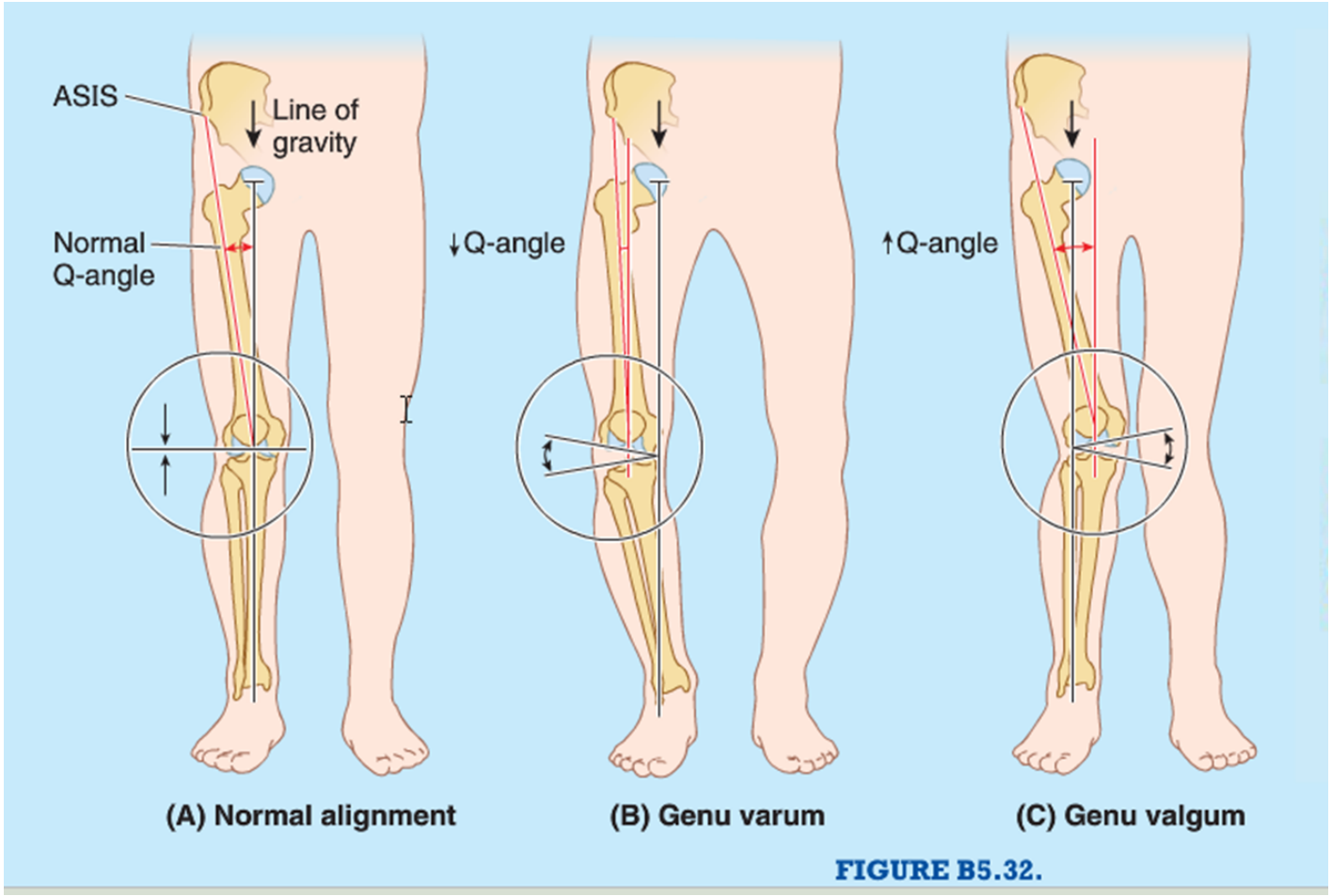
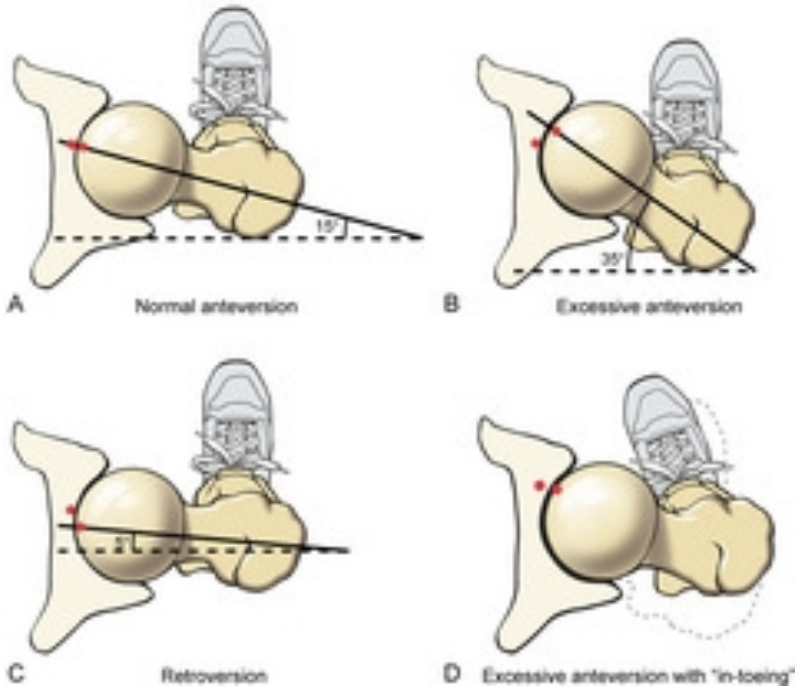
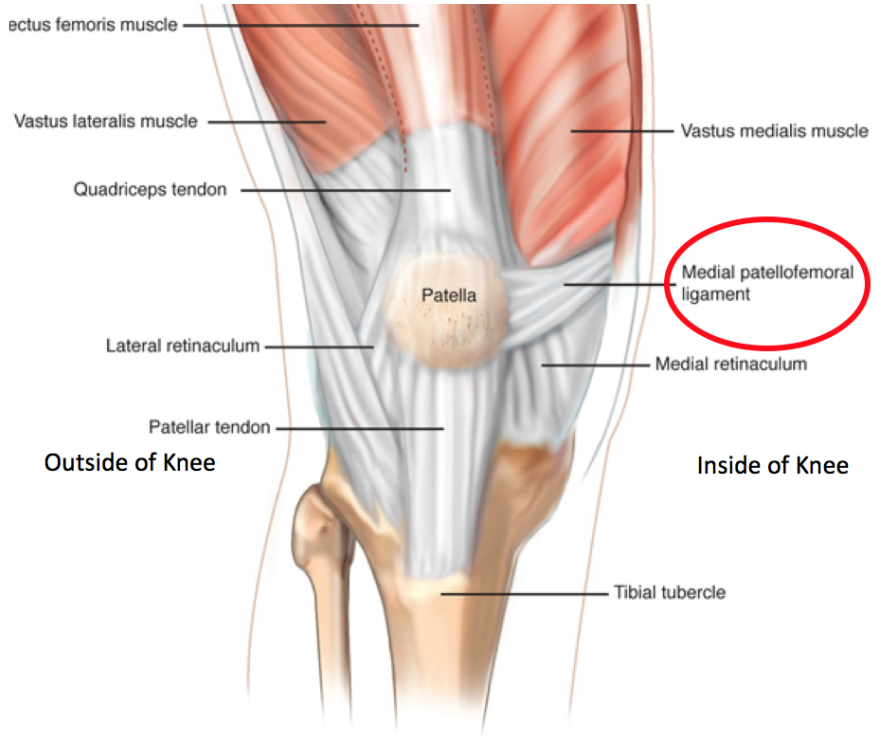

ASIS
Line of gravity
Normal Q-angle
↓Q-angle
↑Q-angle
(A) Normal alignment
(B) Genu varum
(C) Genu valgum

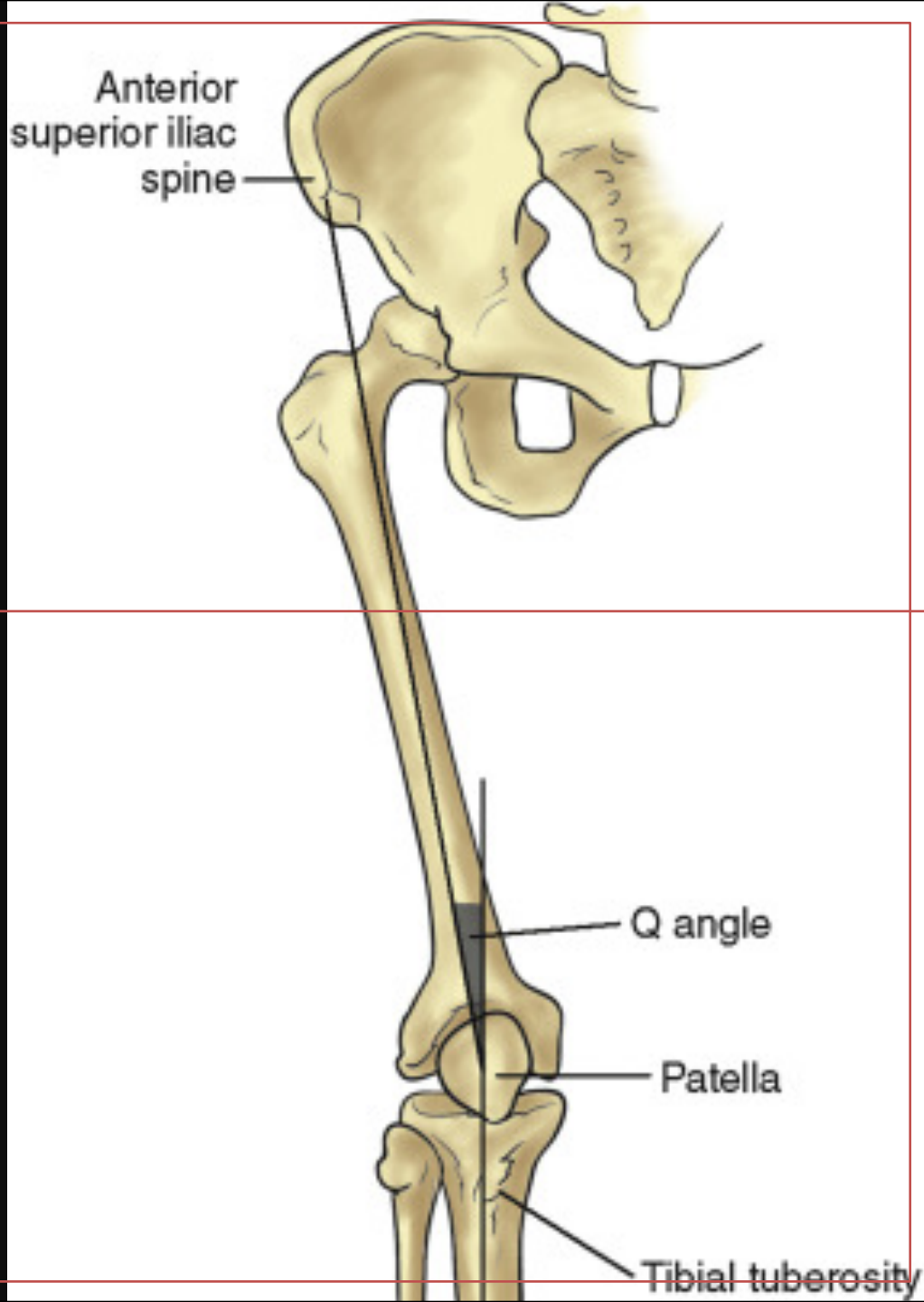
FIGURE B5.32.

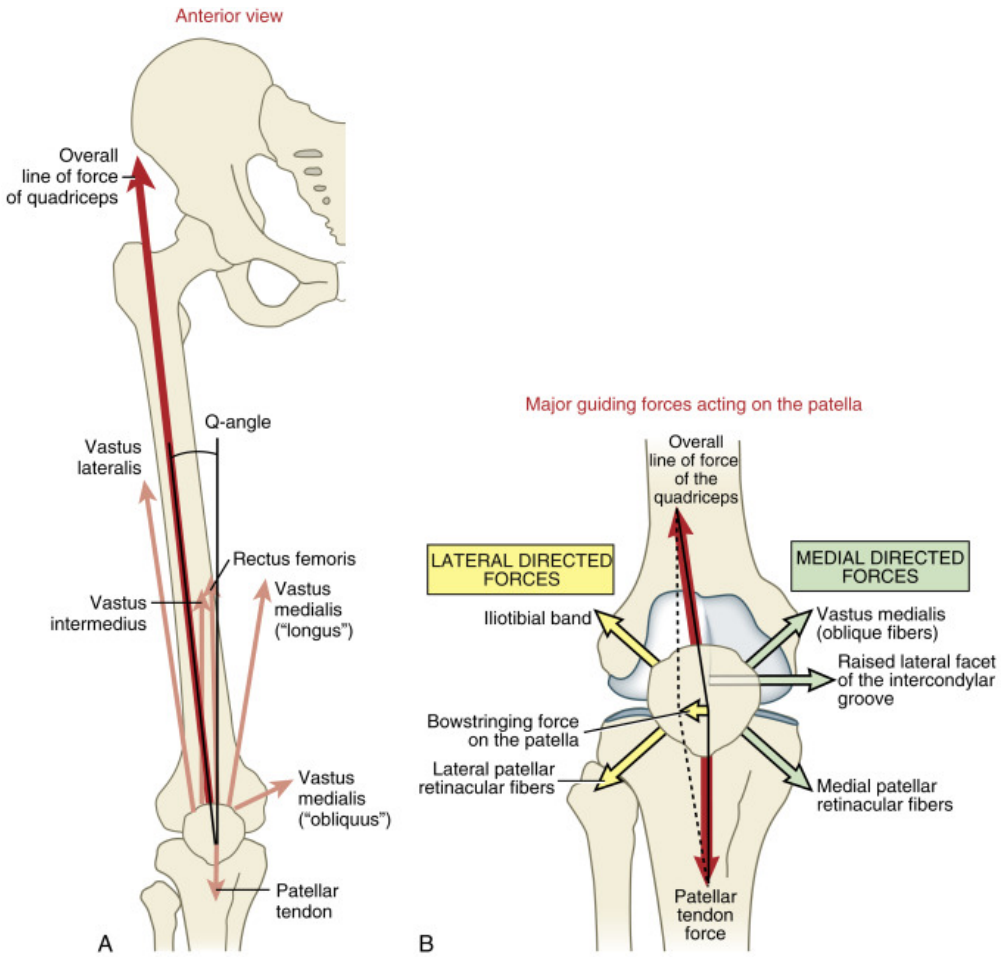

15°
A
Normal anteversion
35°
B
Excessive anteversion
C
Retroversion
D
Excessive anteversion with "in-toeing"

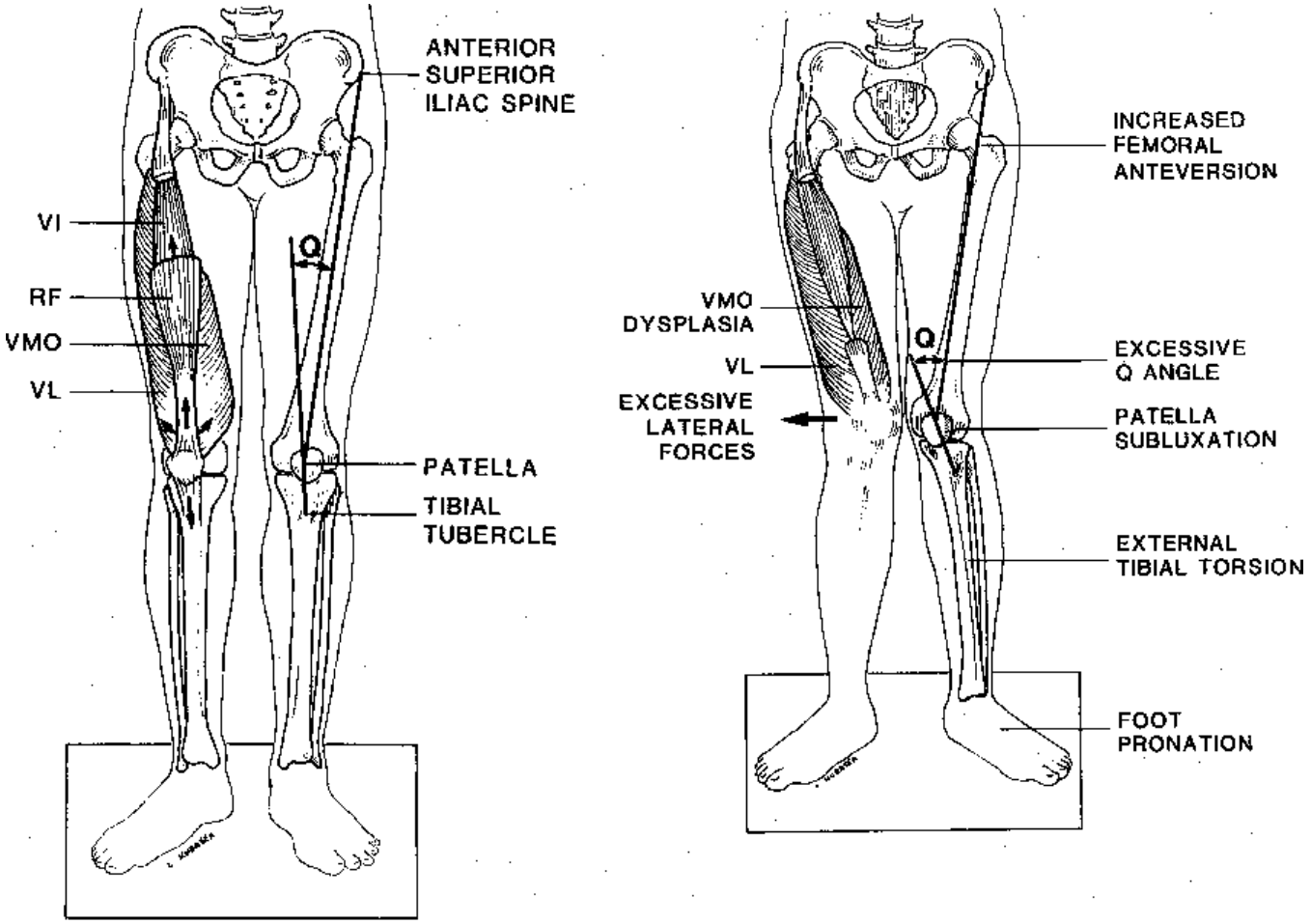

ectus femoris muscle
Vastus lateralis muscle
Quadriceps tendon
Vastus medialis muscle
Medial patellofemoral ligament
Patella
Lateral retinaculum
Medial retinaculum
Patellar tendon
Outside of Knee
Inside of Knee
Tibial tubercle

Anatomy

Q angle


Anterior
superior iliac
spine
Q angle
Patella
Tibial tuberosity


Anterior view
Overall line of force of quadriceps
Q-angle
Vastus lateralis
Rectus femoris
Vastus intermedius
Vastus medialis ("longus")
Vastus medialis ("obliquus")
Patellar tendon
A
Major guiding forces acting on the patella
Overall line of force of the quadriceps
LATERAL DIRECTED FORCES
MEDIAL DIRECTED FORCES
Iliotibial band
Vastus medialis (oblique fibers)
Raised lateral facet of the intercondylar groove
Bowstringing force on the patella
Lateral patellar retinacular fibers
Medial patellar retinacular fibers
Patellar tendon force
B


ANTERIOR
SUPERIOR
ILIAC SPINE
VI
RF
VMO
VL
Q
PATELLA
TIBIAL
TUBERCLE
INCREASED
FEMORAL
ANTEVERSION
VMO
DYSPLASIA
VL
EXCESSIVE
LATERAL
FORCES
Q
EXCESSIVE
Q ANGLE
PATELLA
SUBLUXATION
EXTERNAL
TIBIAL TORSION
FOOT
PRONATION

Classification

acute traumatic

- occurs equally by gender
- may occur from a direct blow (ex. helmet to knee collision in football)

chronic

- recurrent subluxation episodes
- more in women
- associated with malalignment

habitual

- usually painless
- occurs during each flexion movement

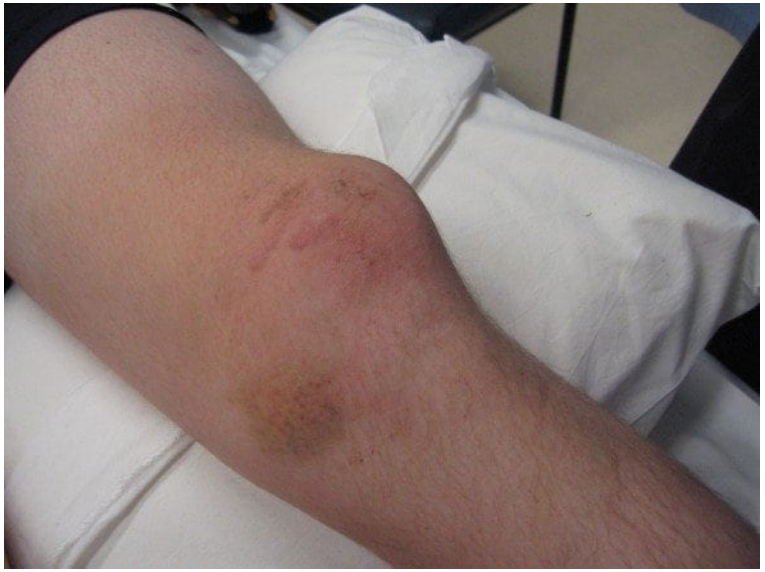

52
28

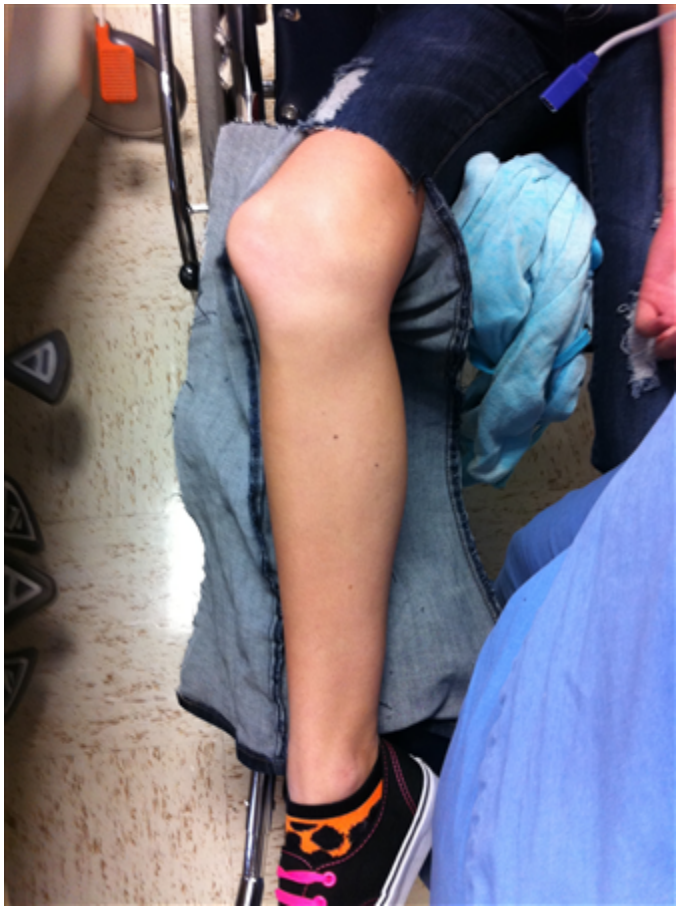
Symptoms

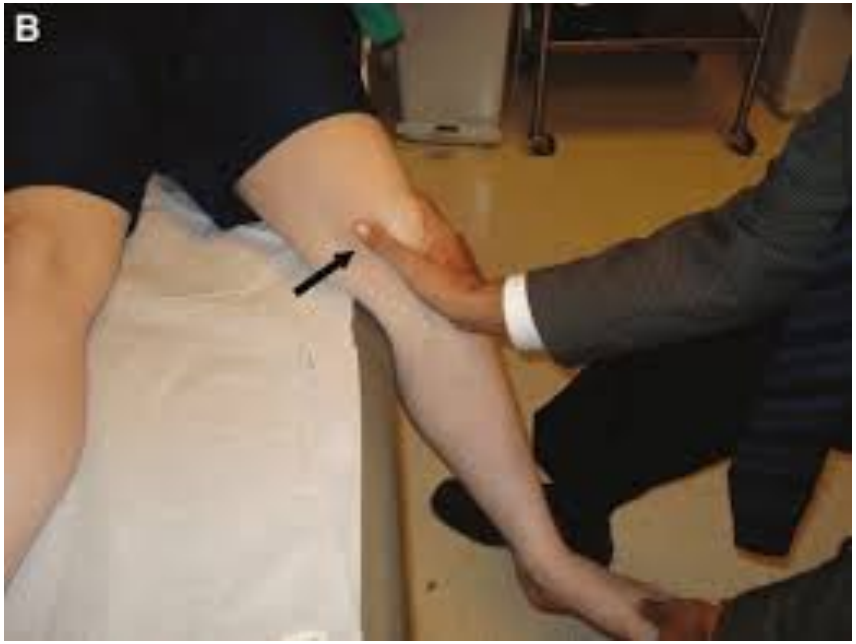
- Instability
- Anterior knee pain
- Swelling

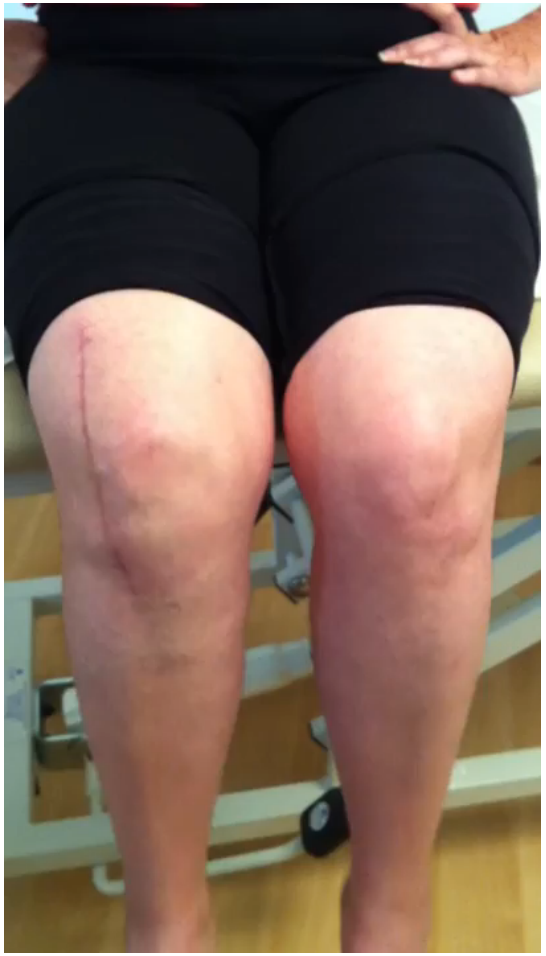
Physical exam

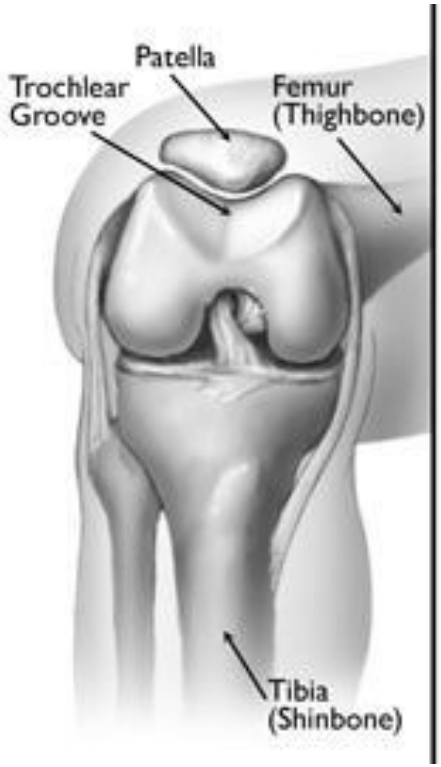
- large hemarthrosis
- No swelling … ligamentous laxity and habitual dislocation
- medial sided tenderness increase in passive patellar translation
- Uncovered medial femoral condyle
- patellar apprehension
- J sign

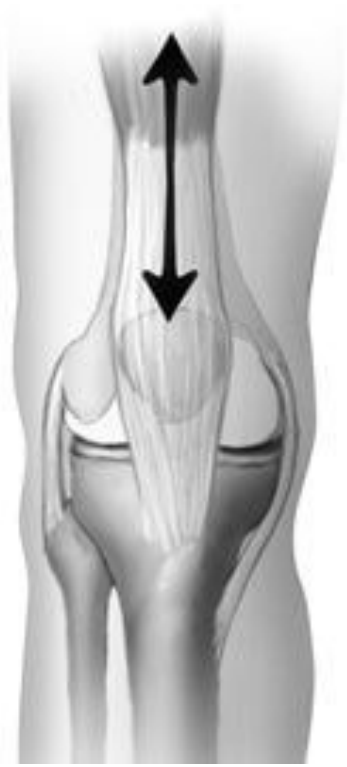


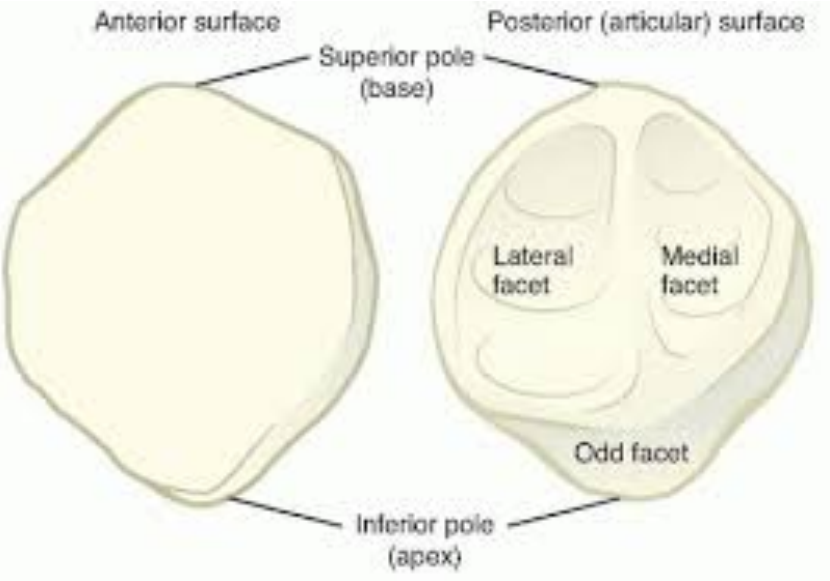



B




Patella
Trochlear Groove
Femur (Thighbone)
Tibia (Shinbone)




Anterior surface
Posterior (articular) surface
Superior pole (base)
Lateral facet
Medial facet
Odd facet
Inferior pole (apex)

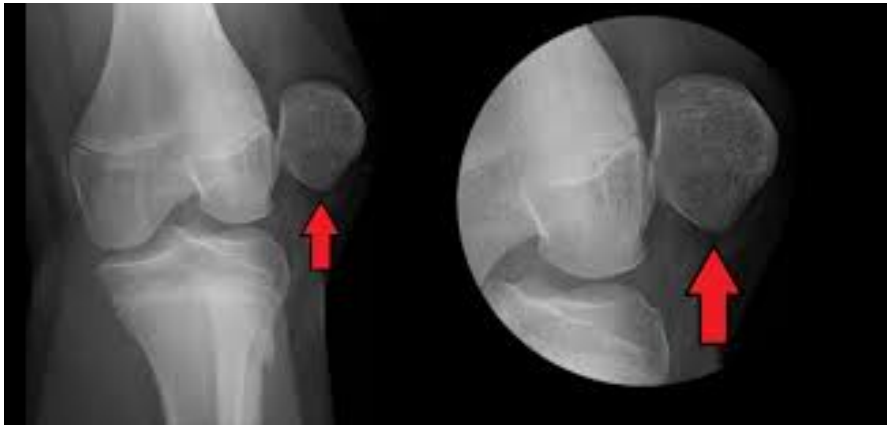
Imaging

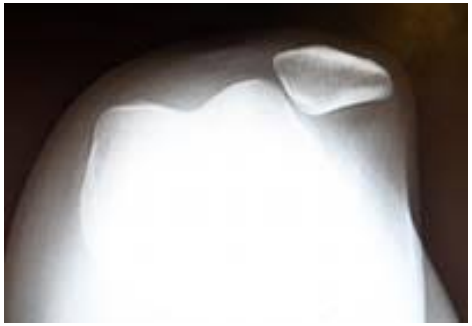
Radiographs:

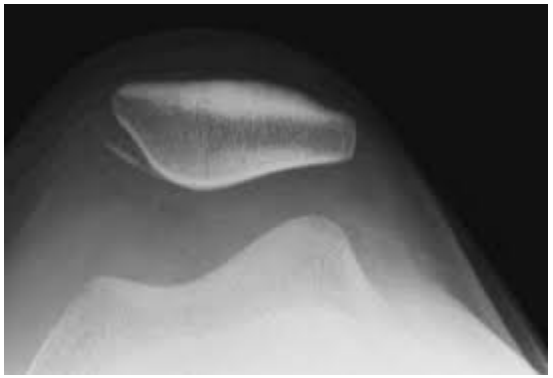
- rule out fracture or loose body
  - medial patellar facet (most common)
  - lateral femoral condyle

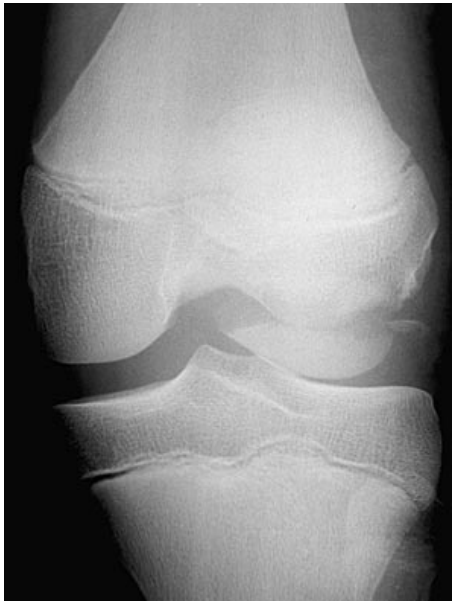
MRI help further rule out suspected loose bodies

- osteochondral lesion and/or bone bruising
- tear of MPFL









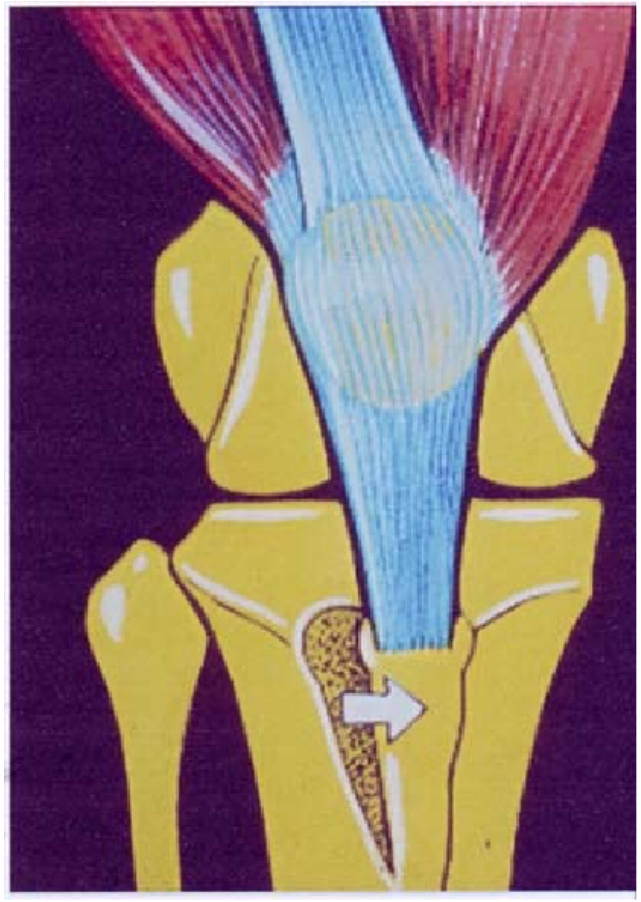
Treatment

Nonoperative

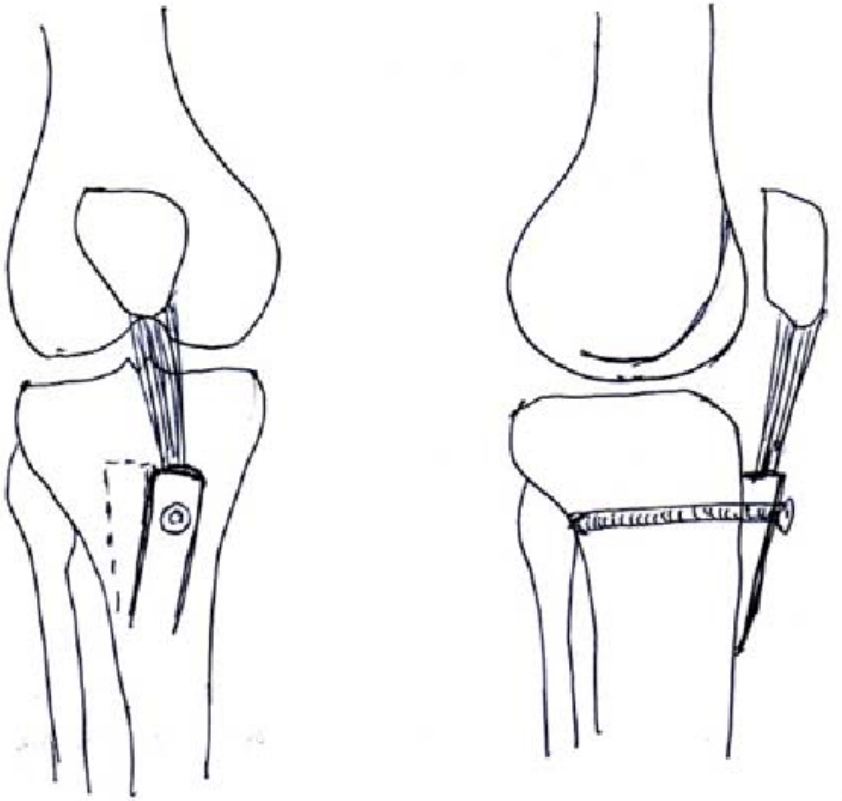
- NSAIDS, activity modification, and physical therapy
- 1st dislocation and habitual

Operative

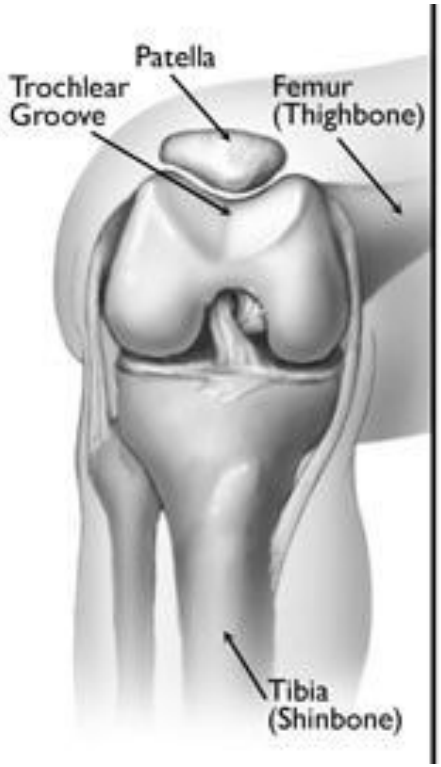
- Arthroscopic debridement (removal of loose body) vs Repair
- MPFL repair
- MPFL reconstruction
- lateral release
- anterior and medial tibial tubercle transfer

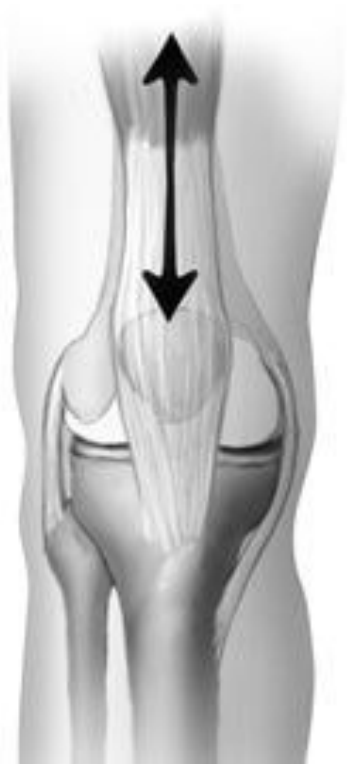


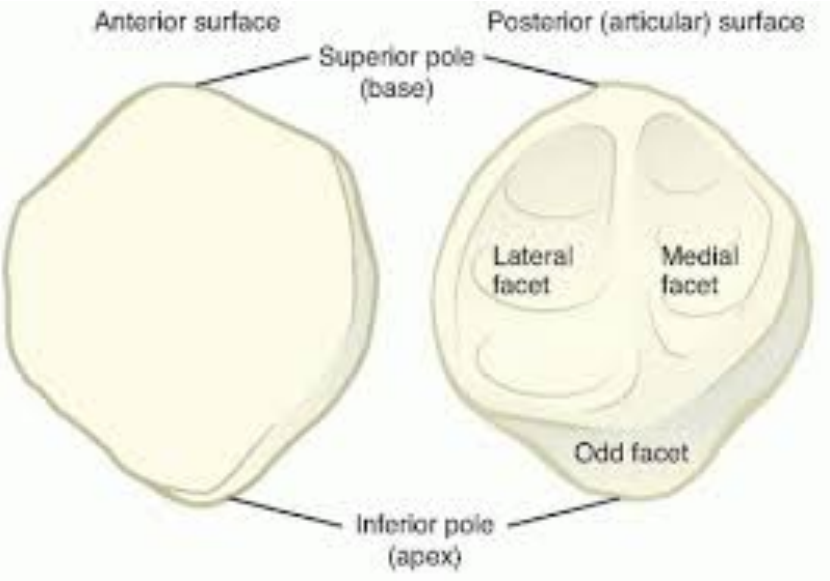
a) Medial transfer Before screw



b) after fixation by screw


Patella
Trochlear Groove
Femur (Thighbone)
Tibia (Shinbone)




Anterior surface
Posterior (articular) surface
Superior pole (base)
Lateral facet
Medial facet
Odd facet
Inferior pole (apex)

Lateral Patellar Compression Syndrome

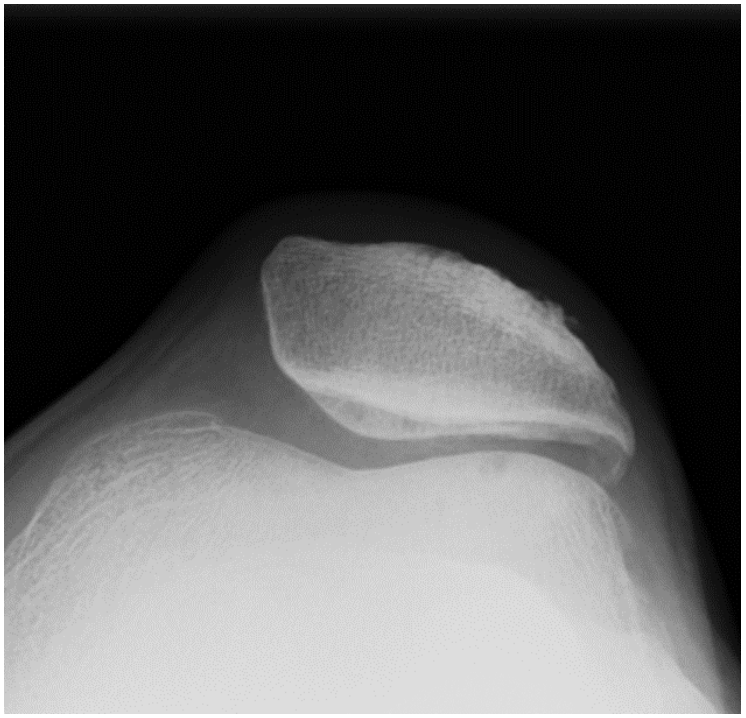
Improper tracking of patella in trochlear groove

Caused by tight lateral retinaculum

- leads to excessive lateral tilt

Miserable malaligment syndrome


R

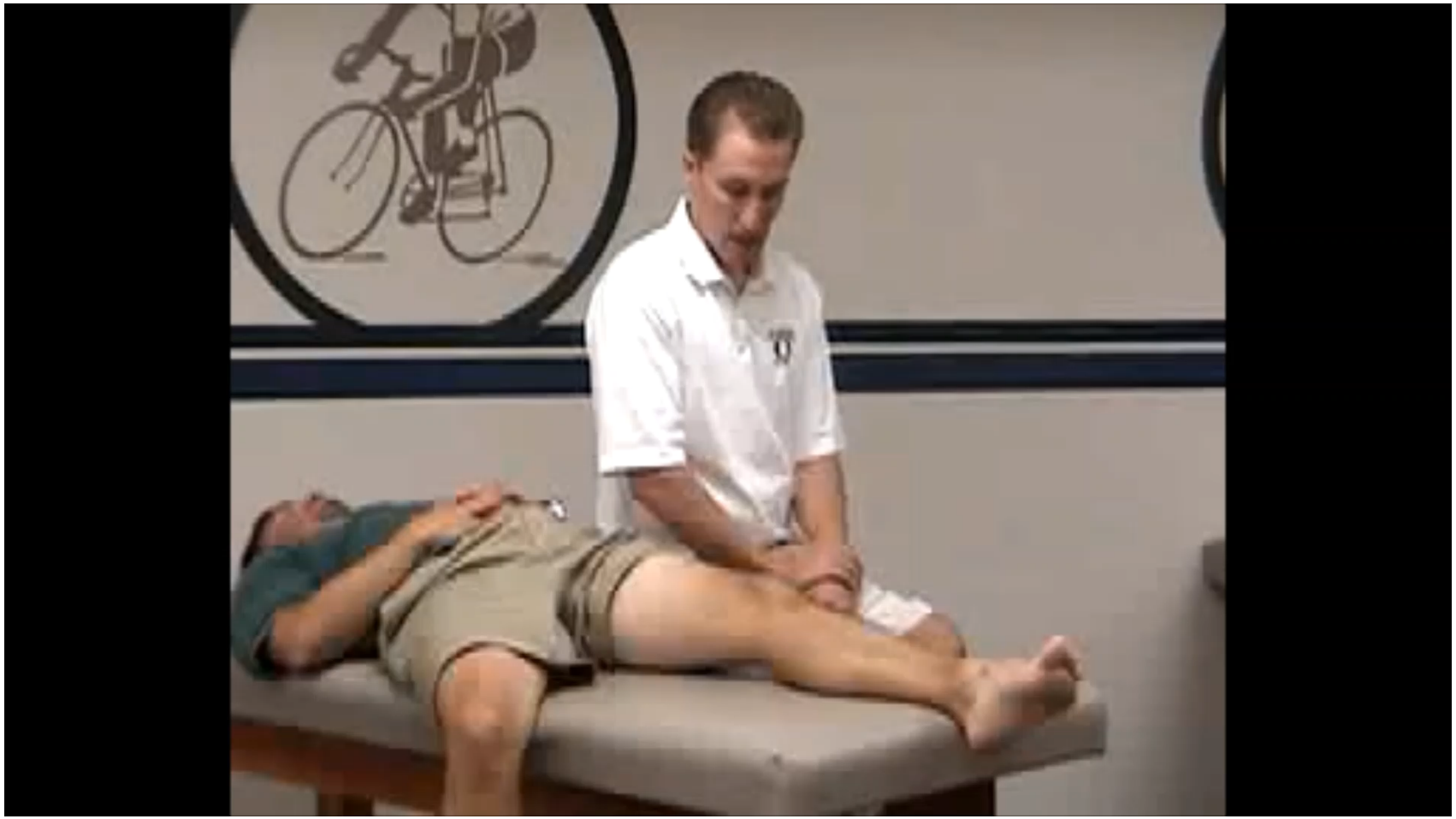


Symptoms

- pain with stair climbing
- theatre sign

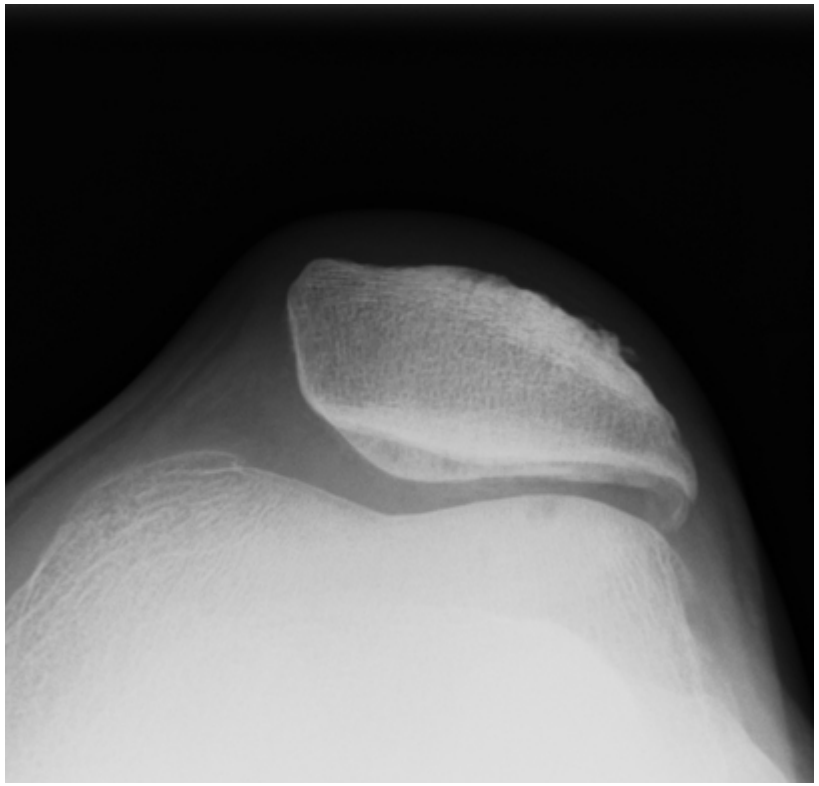
Physical exam

- pain with compression of patella
- lateral facet tenderness
- inability to evert the lateral edge of the patella



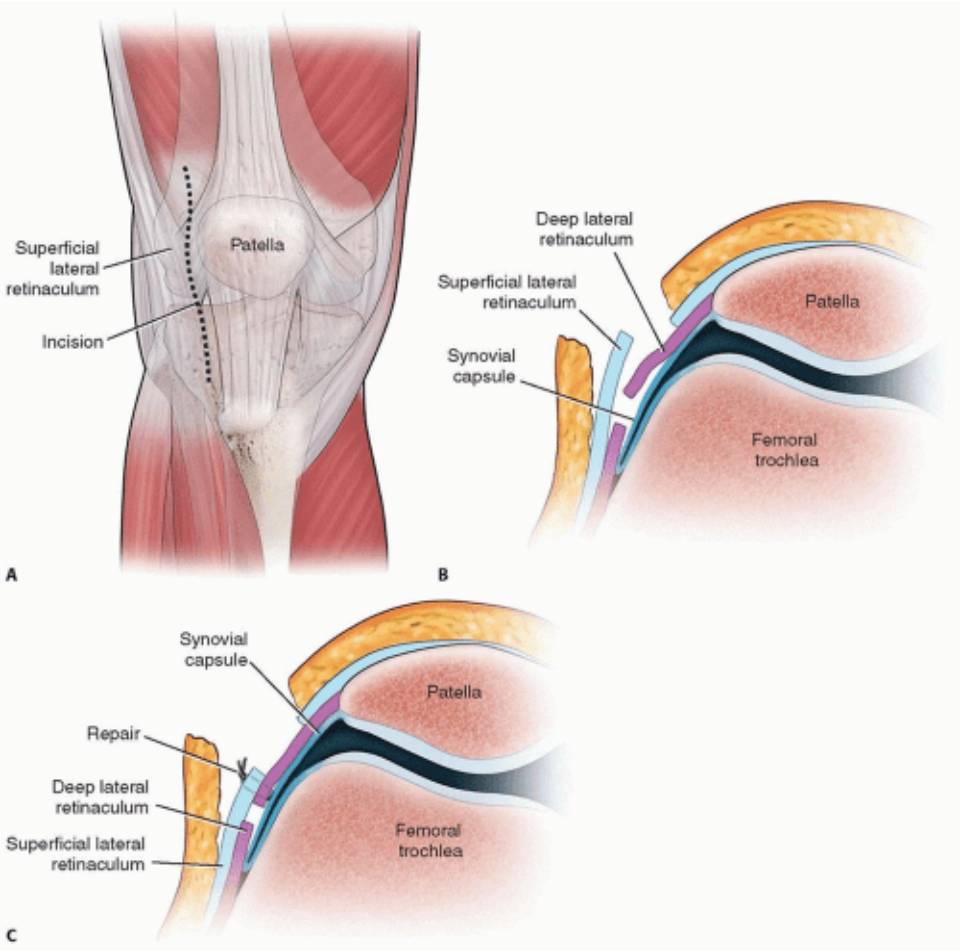
Imaging

- Radiographs
  - patellar tilt in lateral direction



Treatment

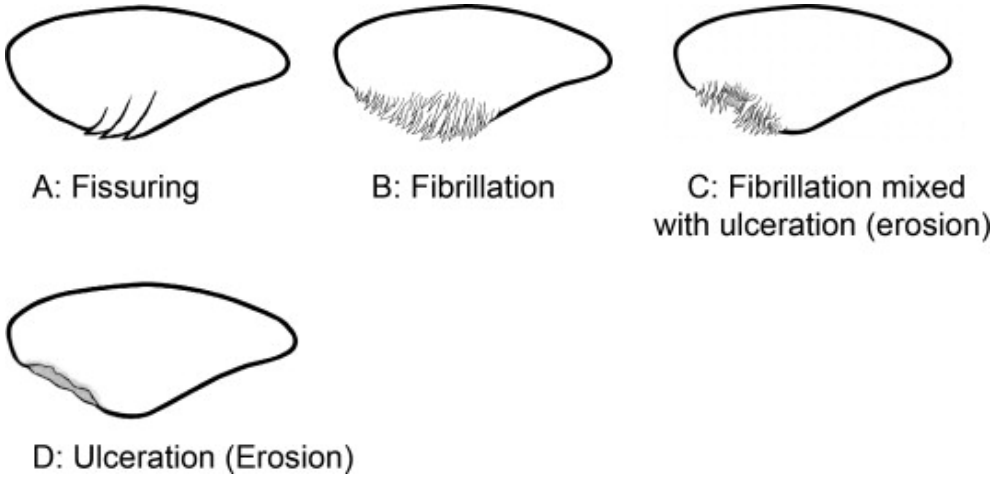
Nonoperative	Operative
NSAIDS, activity modification, and therapy • **mainstay of treatment** and should be done for extensive period of time	lateral release patellar realignment surgery

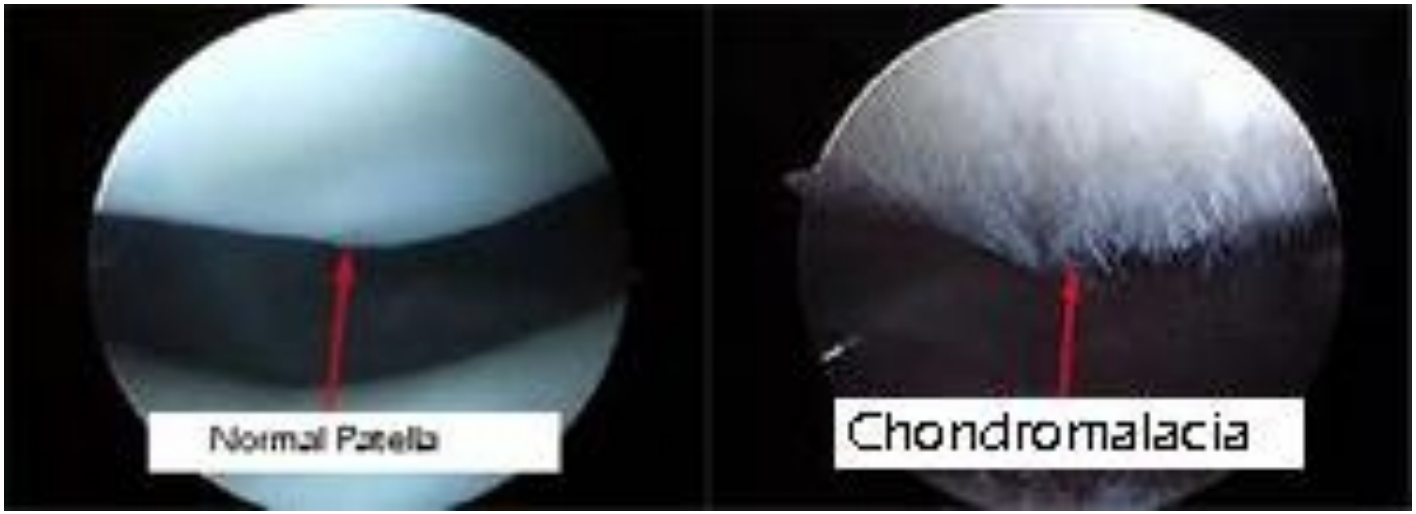

Superficial lateral retinaculum
Patella
Incision
A
Deep lateral retinaculum
Superficial lateral retinaculum
Patella
Synovial capsule
Femoral trochlea
B
Synovial capsule
Patella
Repair
Deep lateral retinaculum
Superficial lateral retinaculum
Femoral trochlea
C

Idiopathic Chondromalacia Patellae

characterized by idiopathic articular changes of the patella

term is now falling out of favor




Normal Patella
Chondromalacia

Symptoms

diffuse pain in the peripatellar or retropatellar area of the knee (major symptom)

insidious onset

vague in nature

aggravated by

- climbing or descending stairs
- prolonged sitting with knee bent (known as theatre pain)
- squatting or kneeling

Physical exam

quadricep muscle atrophy

palpable crepitus

pain with compression of patella with knee range of motion or resisted knee extension

Imaging

Radiographs

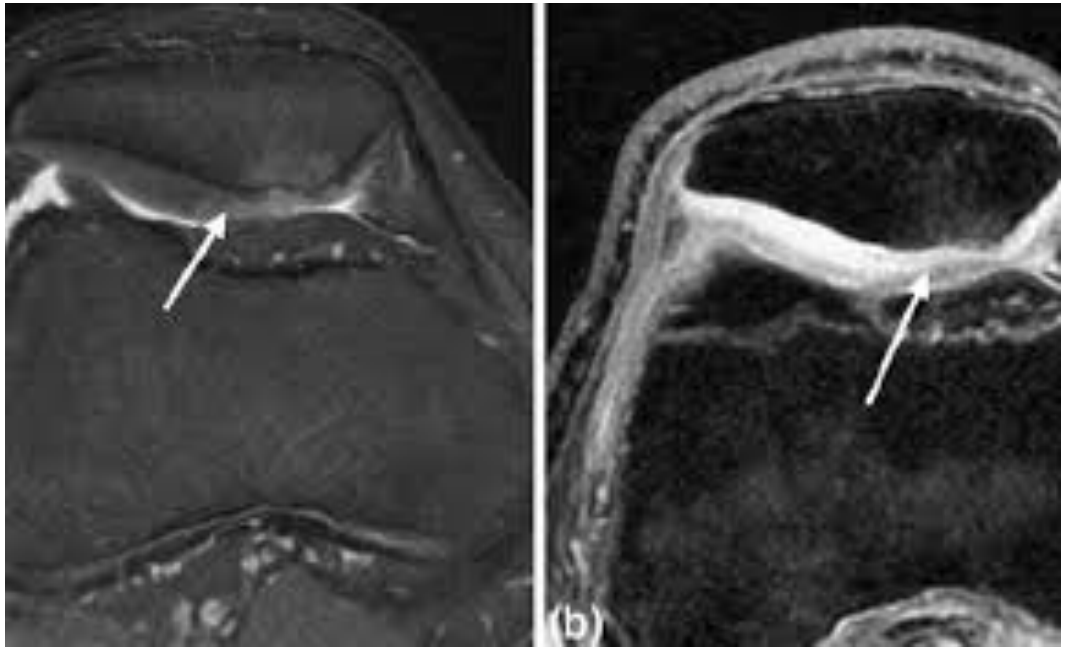
- shallow sulcus, patella alta/baja, or lateral patella tilt

CT scan

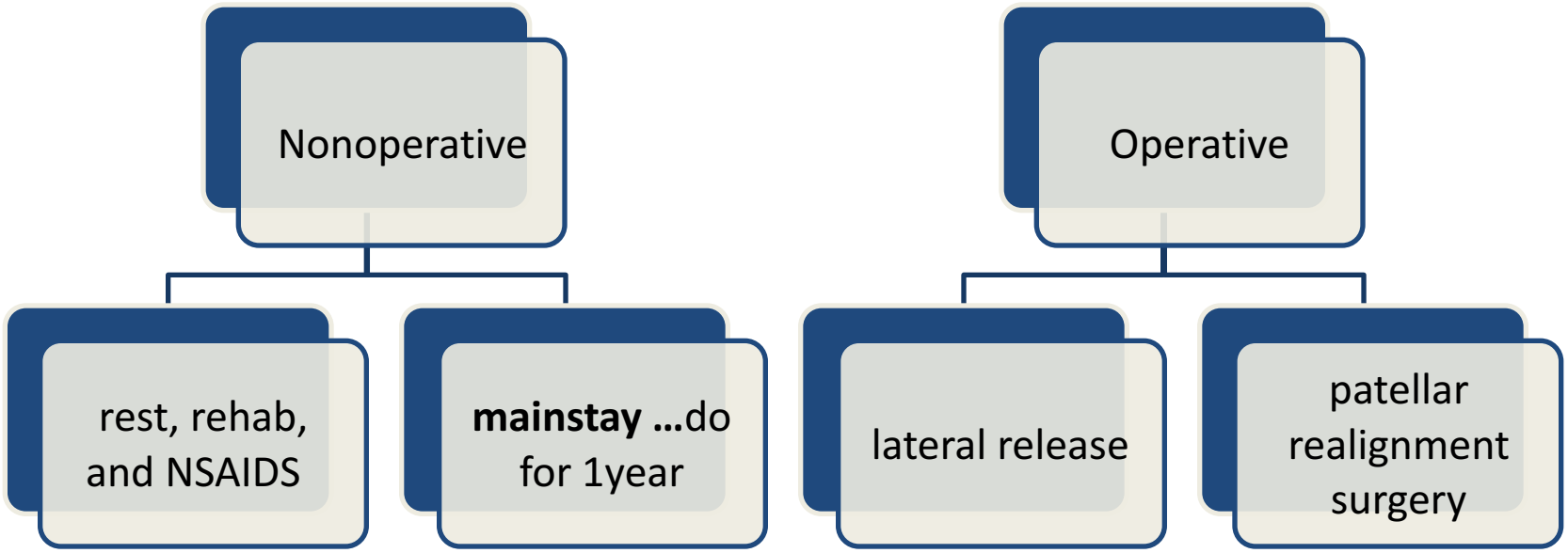
- trochlear geometry
- TT-TG distance
- torsion of the limb

MRI

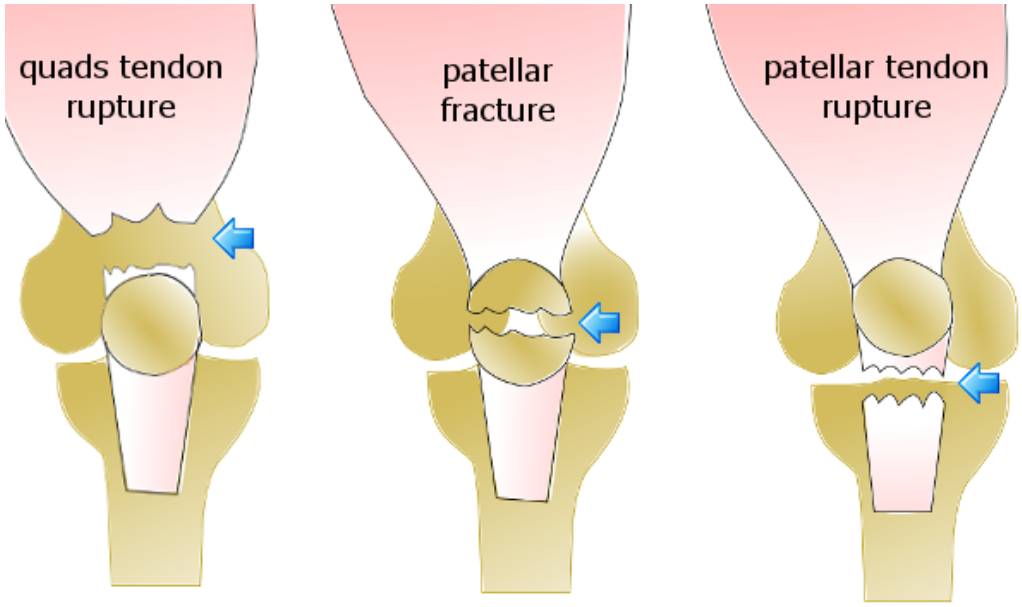
- indications
  - best modality to assess articular cartilage

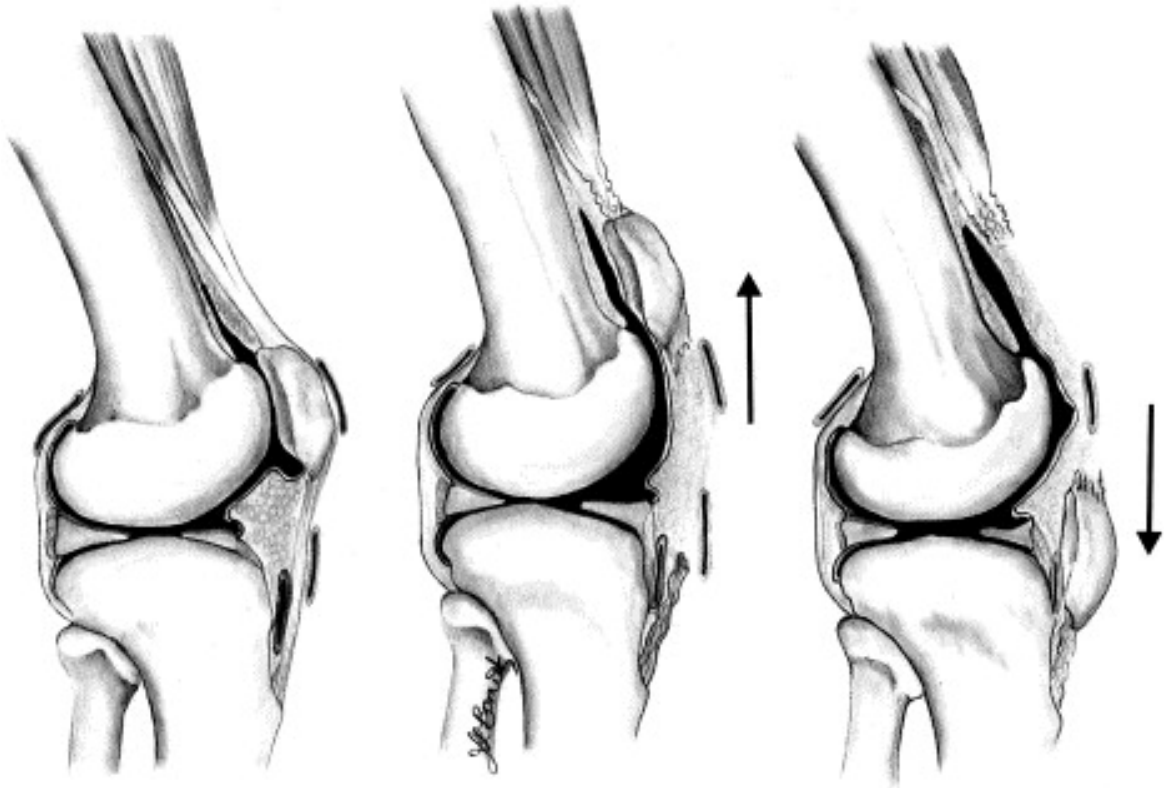

(b)

Treatment


Nonoperative
rest, rehab, and NSAIDS
mainstay …do for 1year
Operative
lateral release
patellar realignment surgery


40


quads tendon rupture
patellar fracture
patellar tendon rupture


Normal
Patella Alta
Patella Baja

Quadriceps Tendon Rupture

quadriceps tendon rupture is more common than patellar tendon rupture

> 40 years of age

males > females

nondominant limb> dominant

usually at insertion of tendon to the patella

risk factors

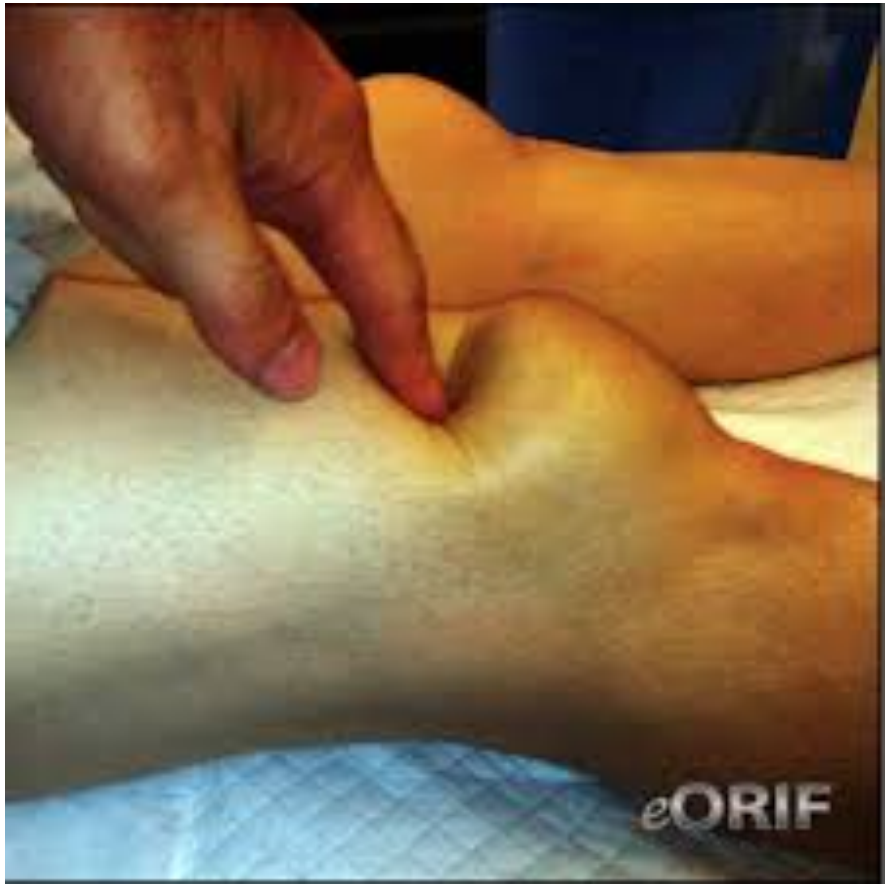
- renal failure
- diabetes
- RA
- hyperparathyroidism
- CTD
- steroid use
- intraarticular injections

Symptoms

- Pain
- Difficulty to move
- Swelling

Physical exam

- tenderness at site of rupture
- palpable defect
- unable to extend the knee against resistance or to do SLR


eORIF

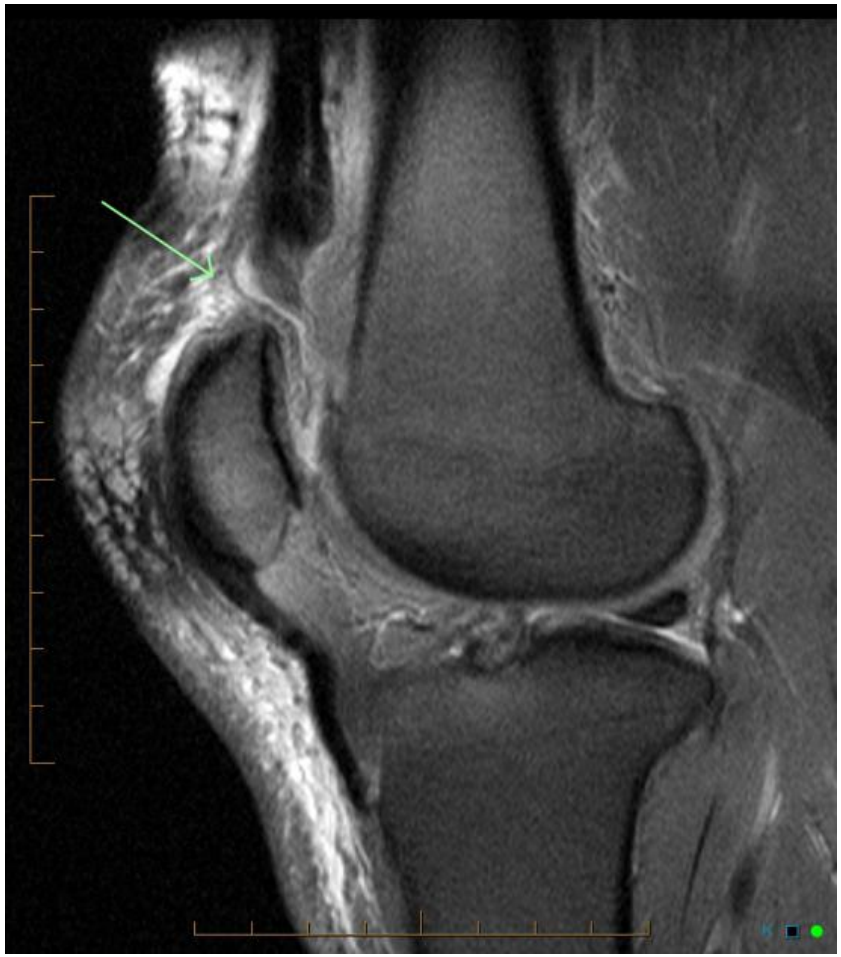
Imaging

Radiographs

- will show patella baja

MRI

- helps differentiate between a partial and complete tear



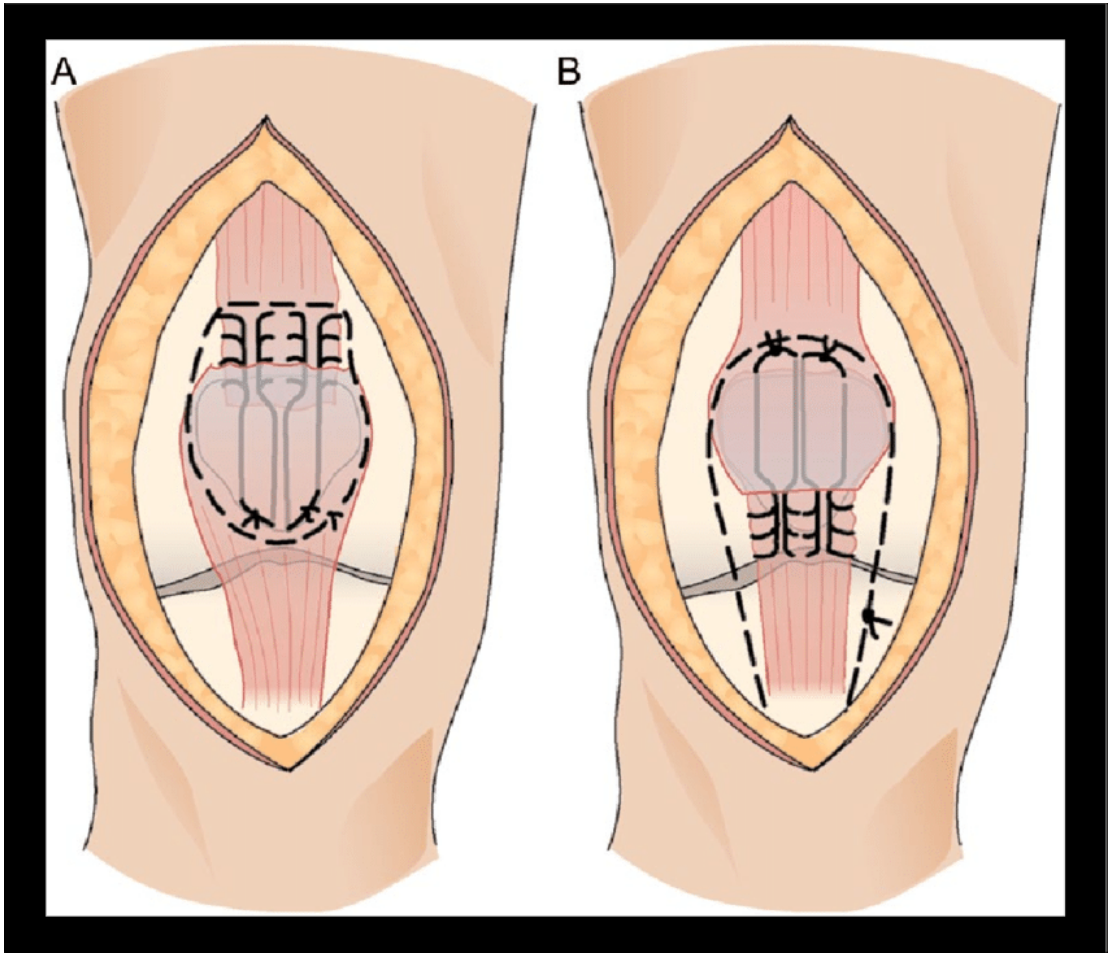
Treatment

Nonoperative

- **knee immobilization in brace**

Operative

- **primary repair with reattachment to patella**
- **Reconstruction**


A
B

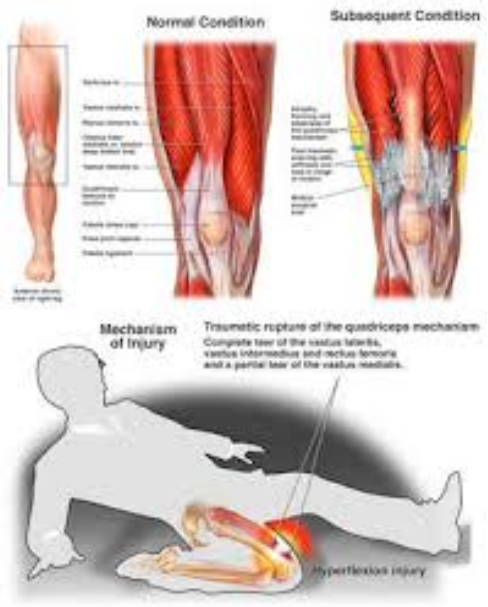
Patella Tendon Rupture

- most commonly in 3rd and 4th decade
- male > female

risk factors

- weakening of collagen structure
  - systemic
    - SLE
    - RA
    - CKD
    - DM
  - local
    - previous injury
    - patellar tendinopathy
  - other
    - corticosteroid injection

History



- sudden quadriceps contraction with knee in a flexed position (e.g., jumping sports, missing step on stairs)

Symptoms

- infrapatellar pain
- popping sensation
- difficulty weight-bearing

Physical exam

- elevation of patella height
- a large hemarthrosis and ecchymosis
- localized tenderness
- palpable gap below the inferior pole of the patella
- unable to perform active straight leg raise
- reduced ROM of knee …extensor lag

Imaging

Radiographs

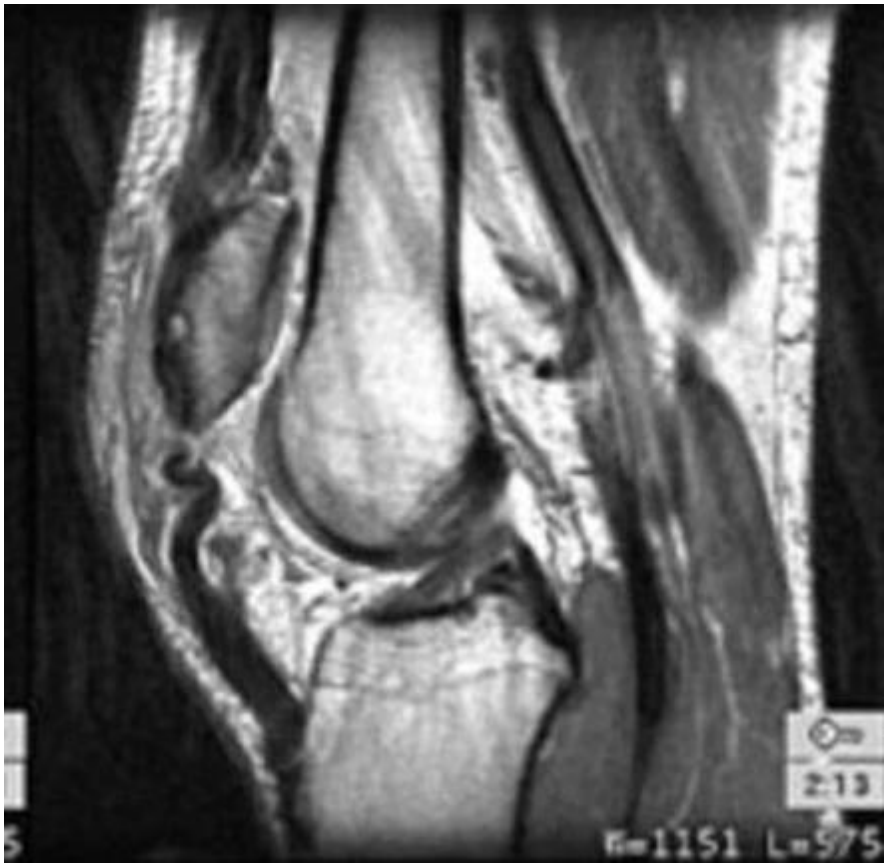
- AP and lateral of the knee
- patella alta seen in complete rupture

Ultrasound

- effective at detecting and localizing disruption
- operator and user-dependent

MRI

- differentiate partial from complete tendon rupture
- most sensitive imaging modality


2:13
W=1151 L=575

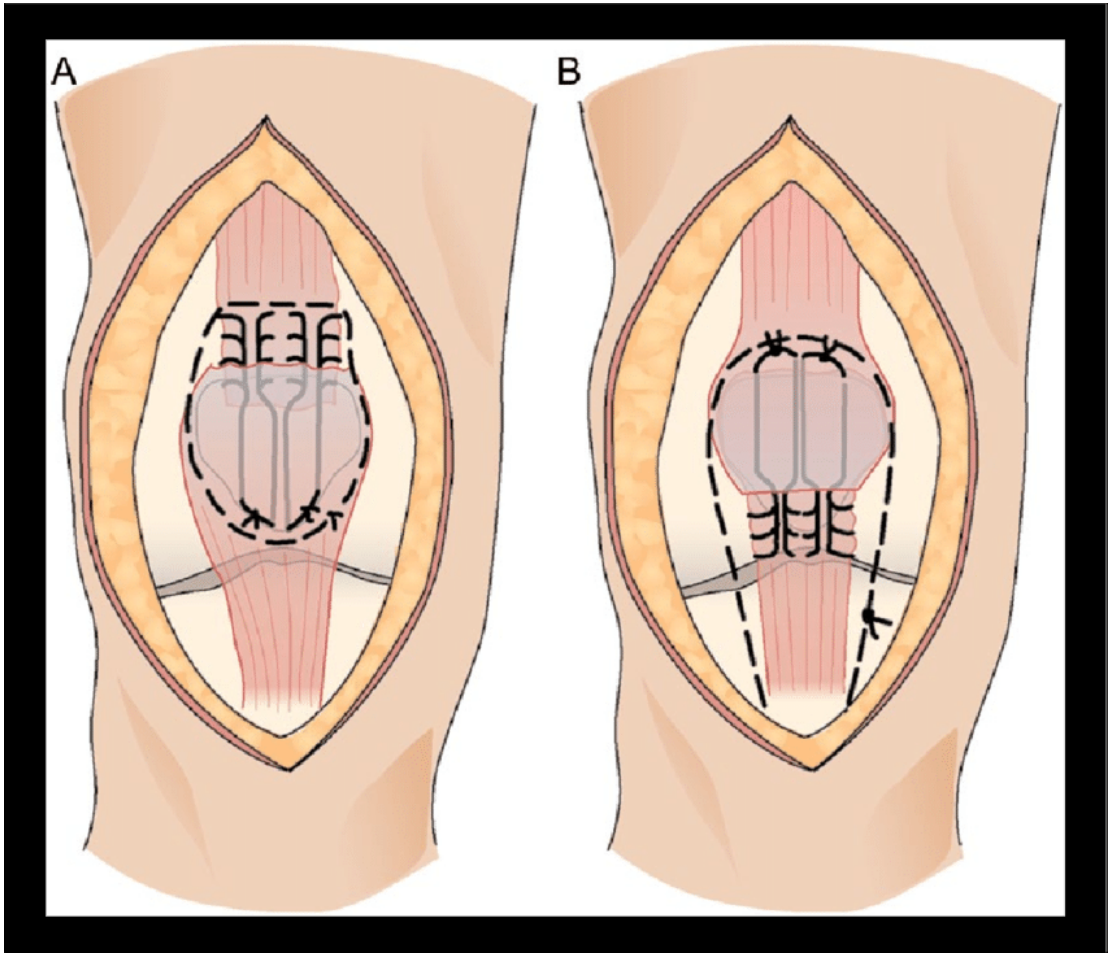
Treatment

Nonoperative

- **immobilization in full extension with a progressive weight-bearing exercise program**
  - partial tears with intact extensor mechanism

Operative

- **primary repair**
- **tendon reconstruction**


A
B

Articular Cartilage Defects of Knee

- Spectrum of disease entities from single, focal defects to advanced degenerative disease of articular cartilage

History

commonly present with history of precipitating trauma

some defects found incidentally on MRI or arthroscopy

Symptoms

- Asymptomatic
- localized knee pain
- effusion
- mechanical symptoms (e.g., catching, instability)

Physical exam

inspection

Look for

- Malalignment
- joint laxity
- compartment overload

assess range of motion, ligamentous stability, gait

Imaging

Radiographs

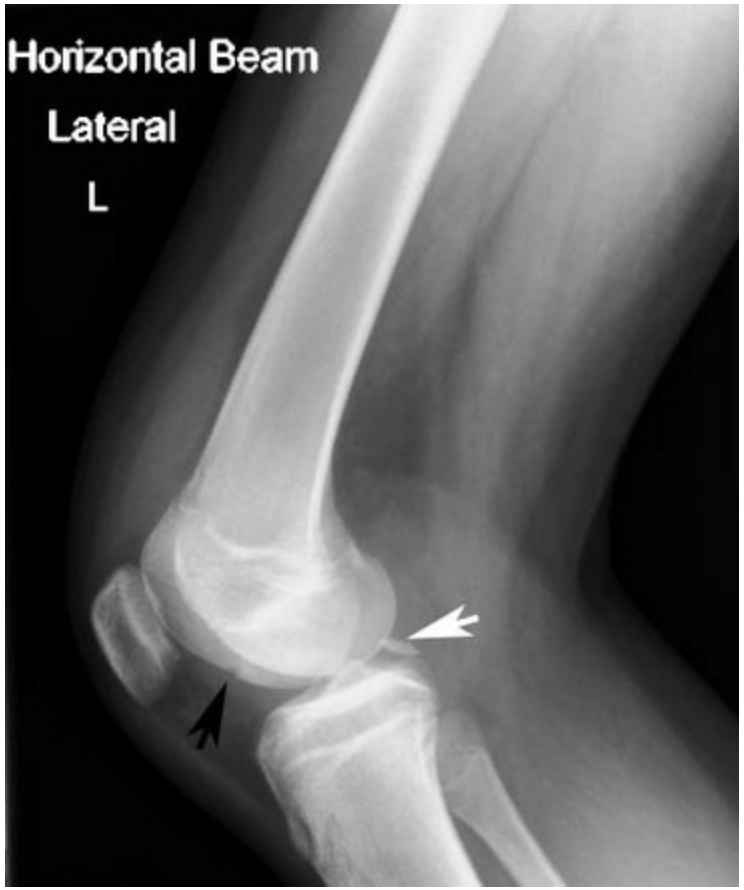
- used to rule out arthritis, bony defects, and check alignment

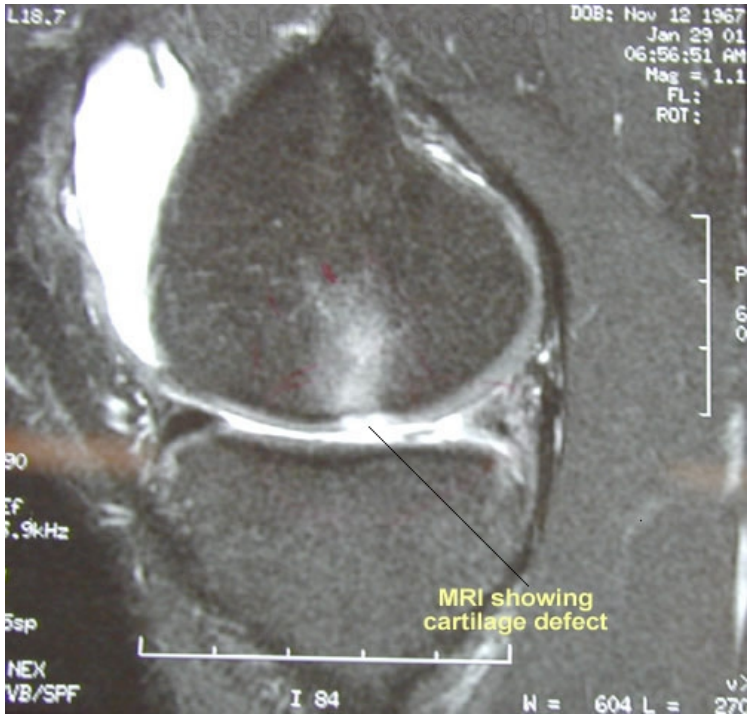
CT scan

- better evaluation of bone loss

MRI

- most sensitive for evaluating focal defects


Horizontal Beam
Lateral
L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FL:
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MRI showing
cartilage defect
I 84
W = 604 L =

Treatment

Nonoperative

Rest, NSAIDs, physiotherapy, weight loss

- first line of treatment when symptoms are mild

Operative

Debridement

Reconstruction techniques