

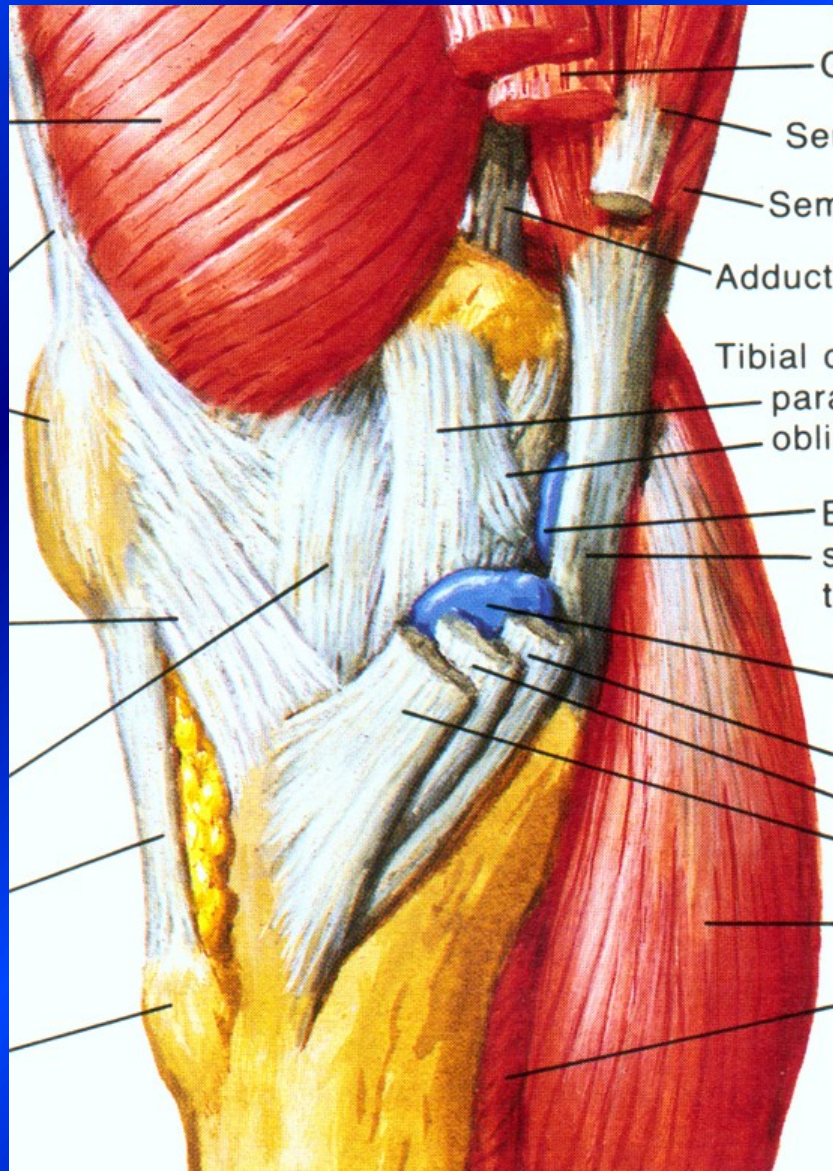
Knee joint

Anatomy, clinical examination,
imaging, pathology

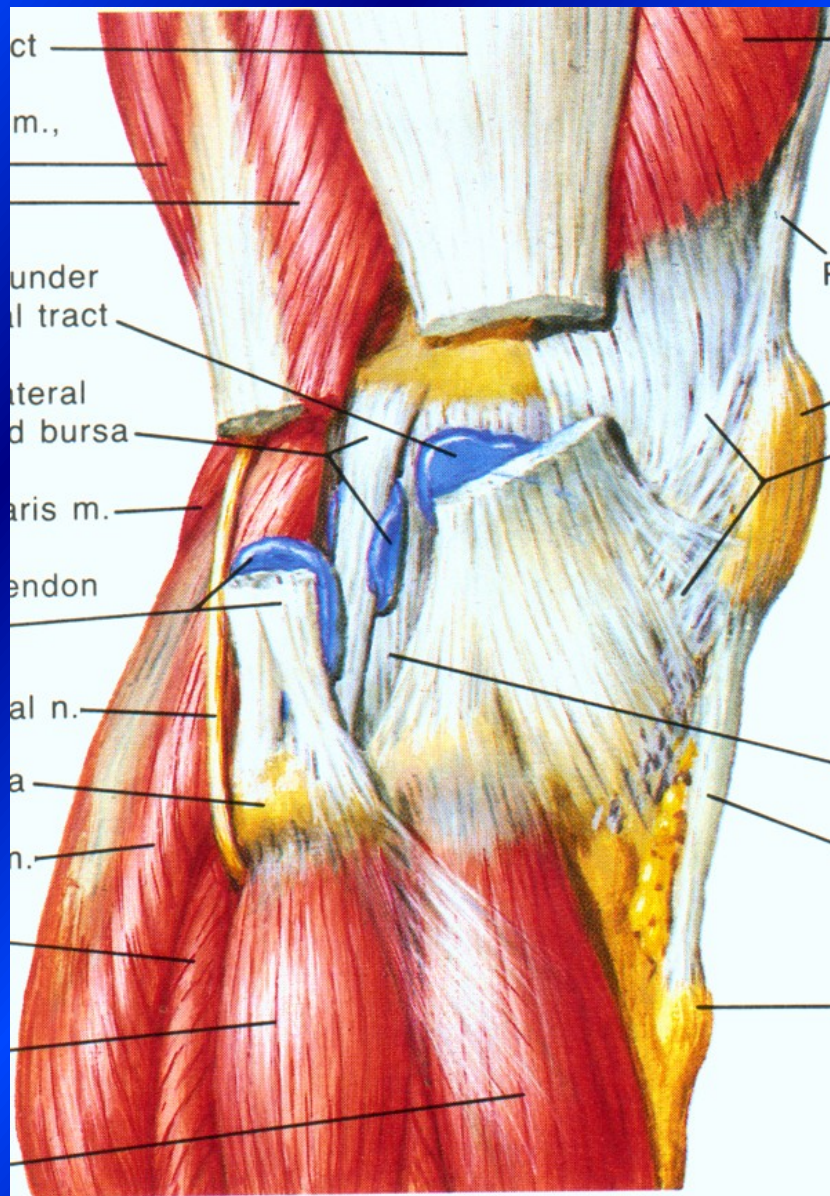
Anatomy- skeleton



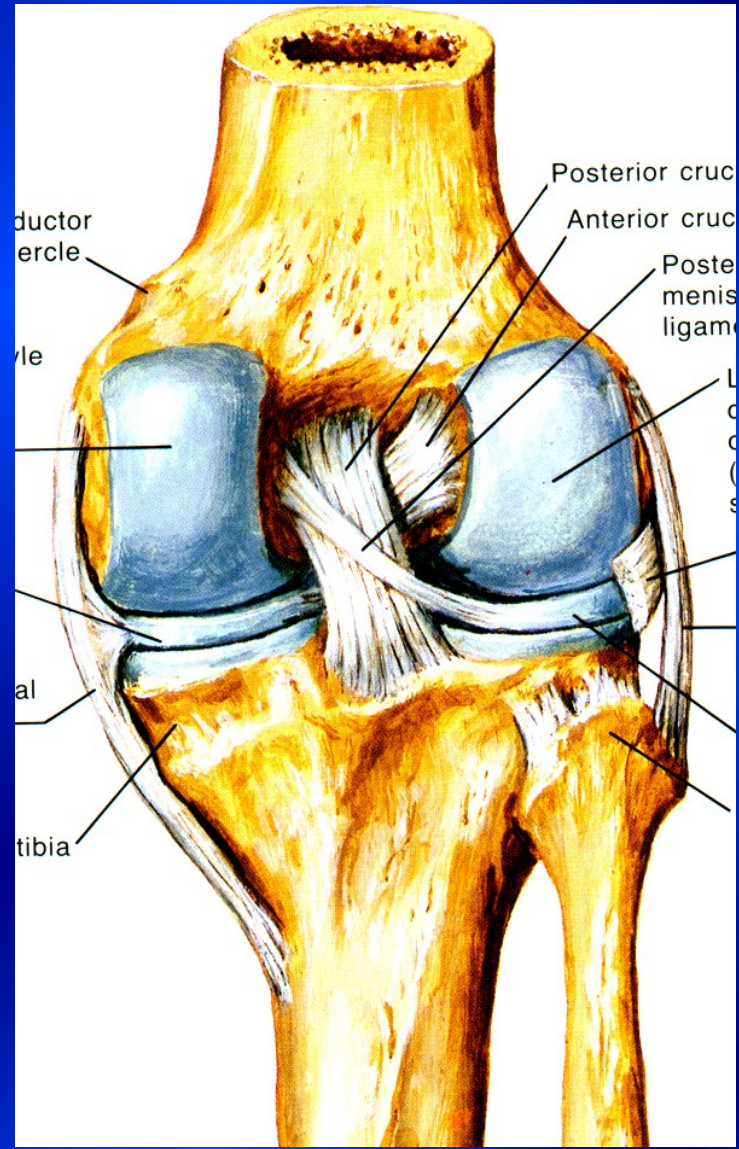
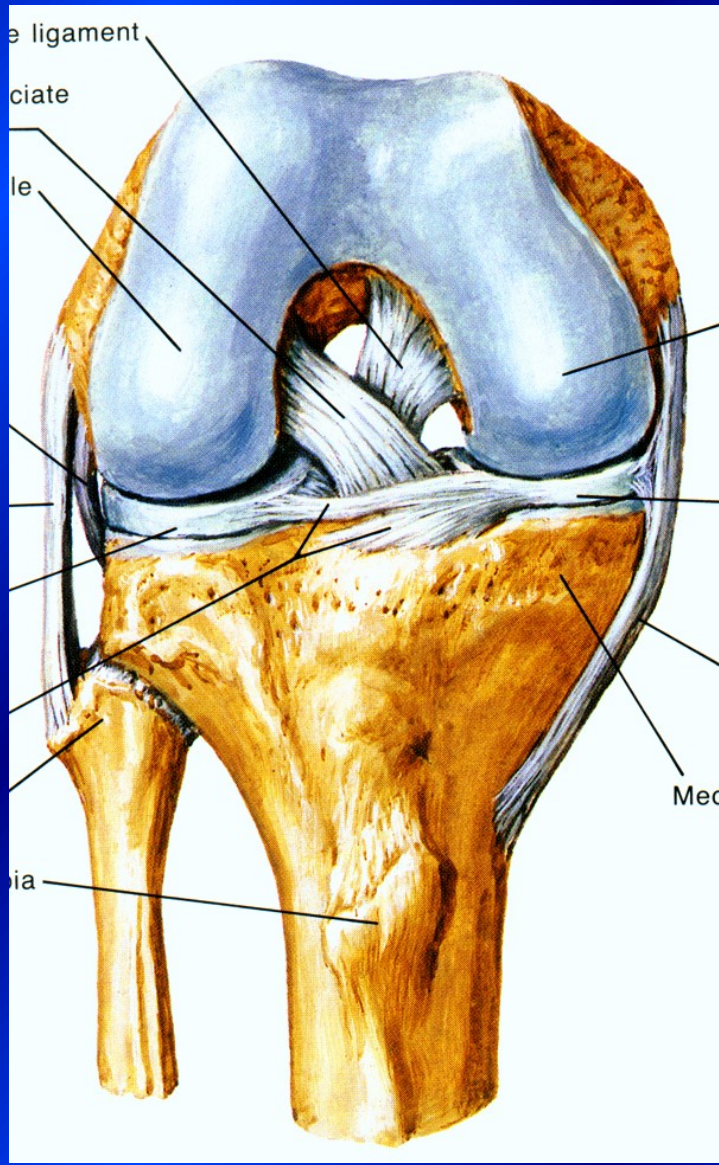
Complicated osseous structure- soft tissue for stability is needed



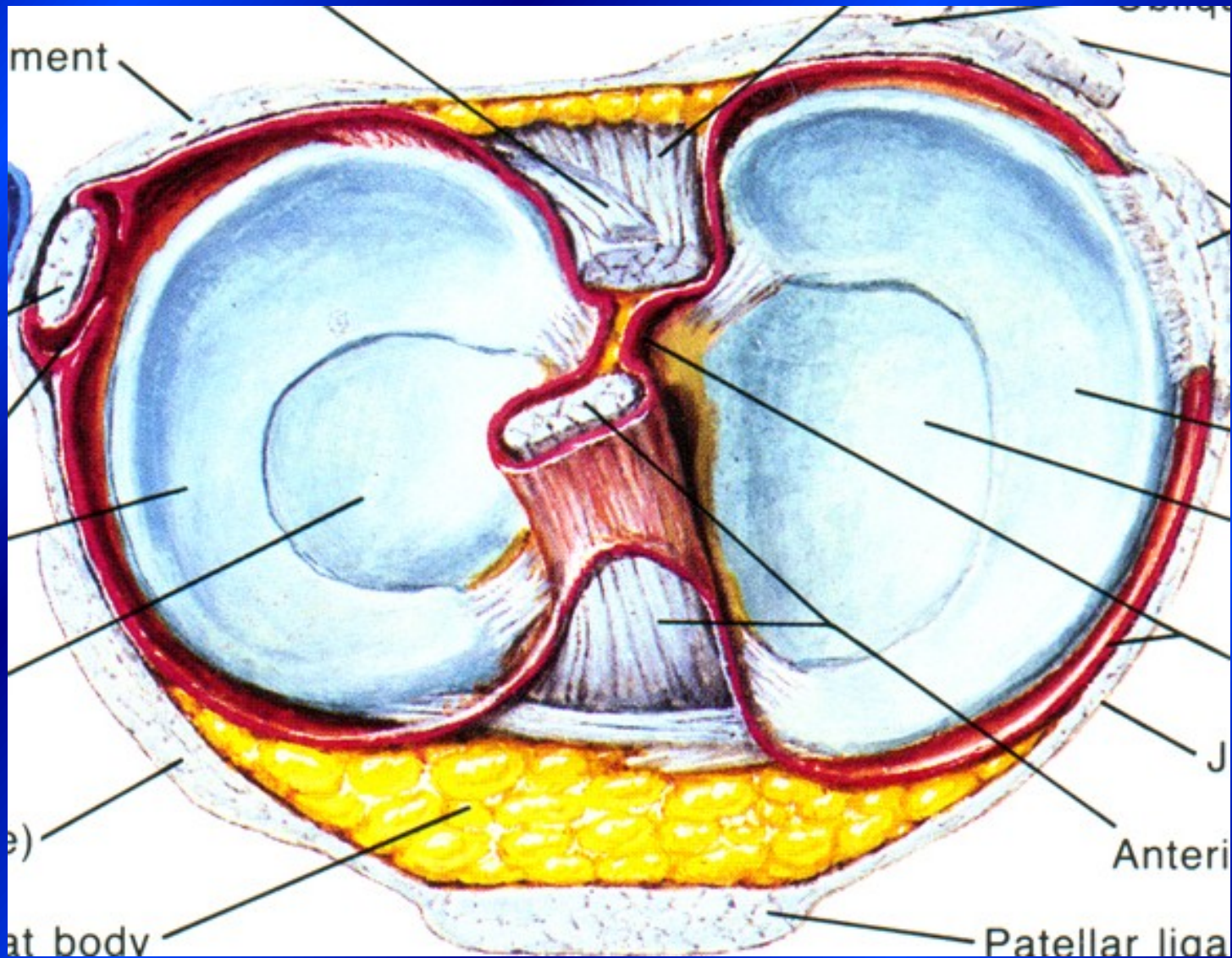
Medial side



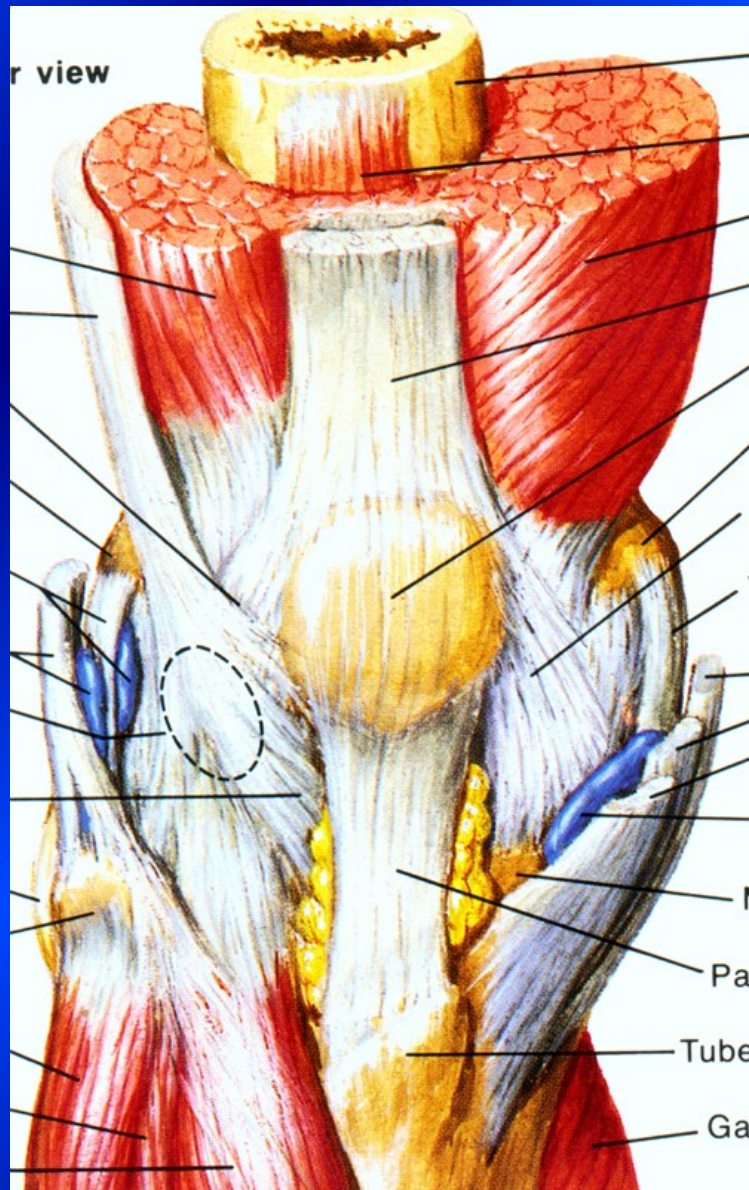
Lateral side



Cruciate ligaments

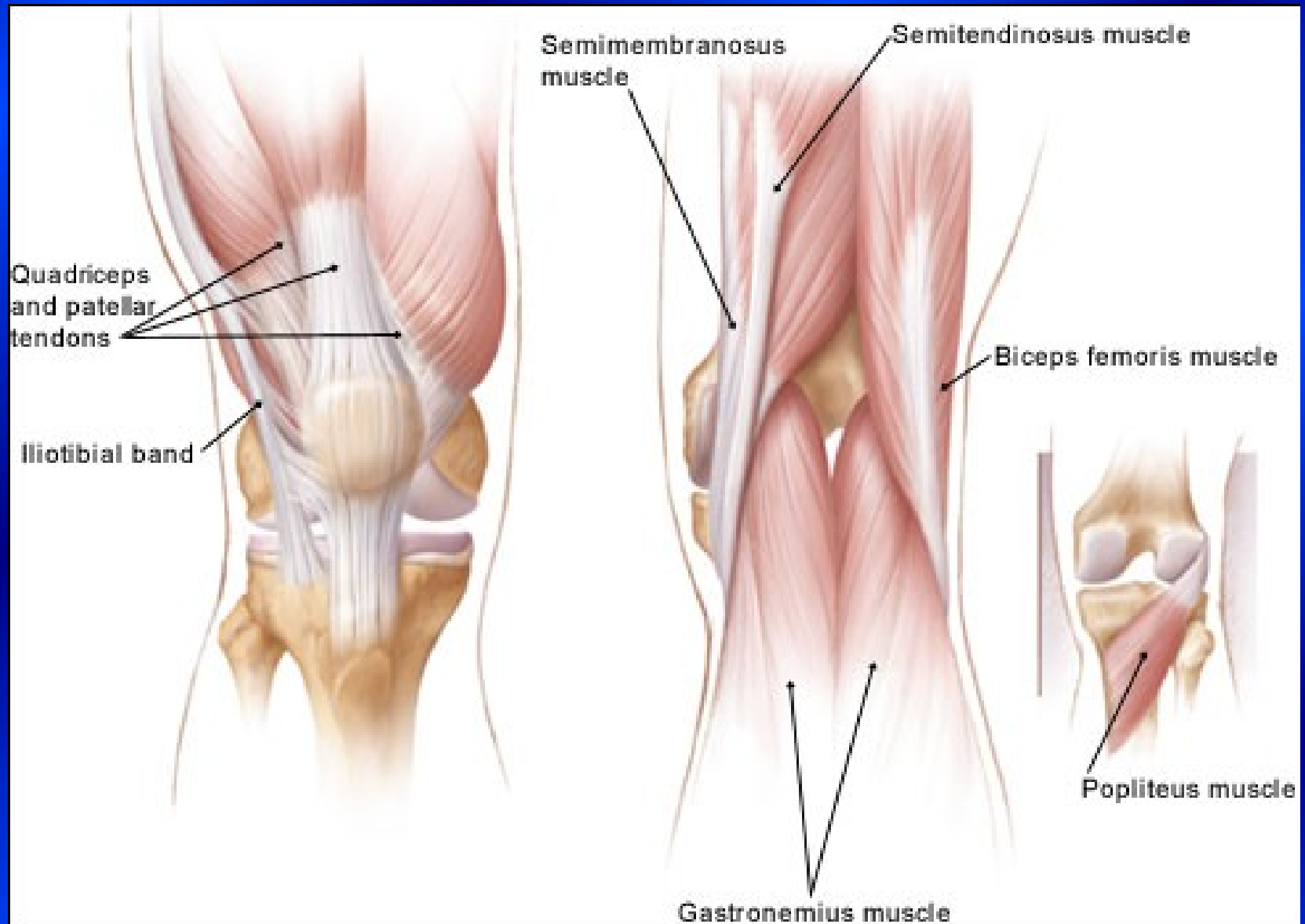


Menisci

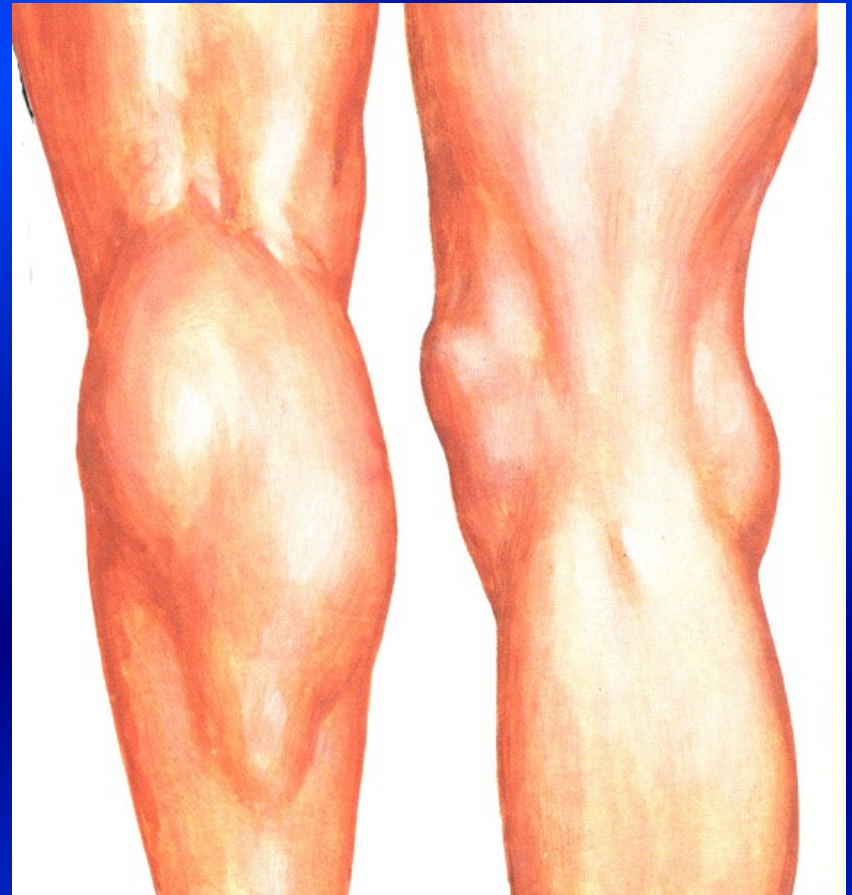
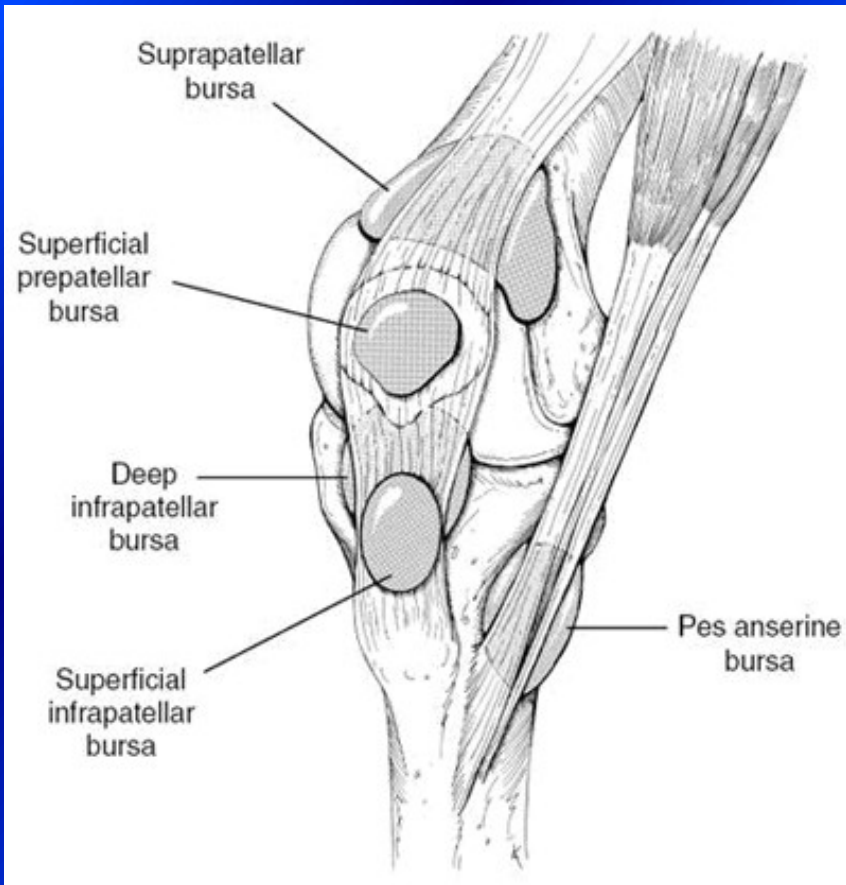


Muscles

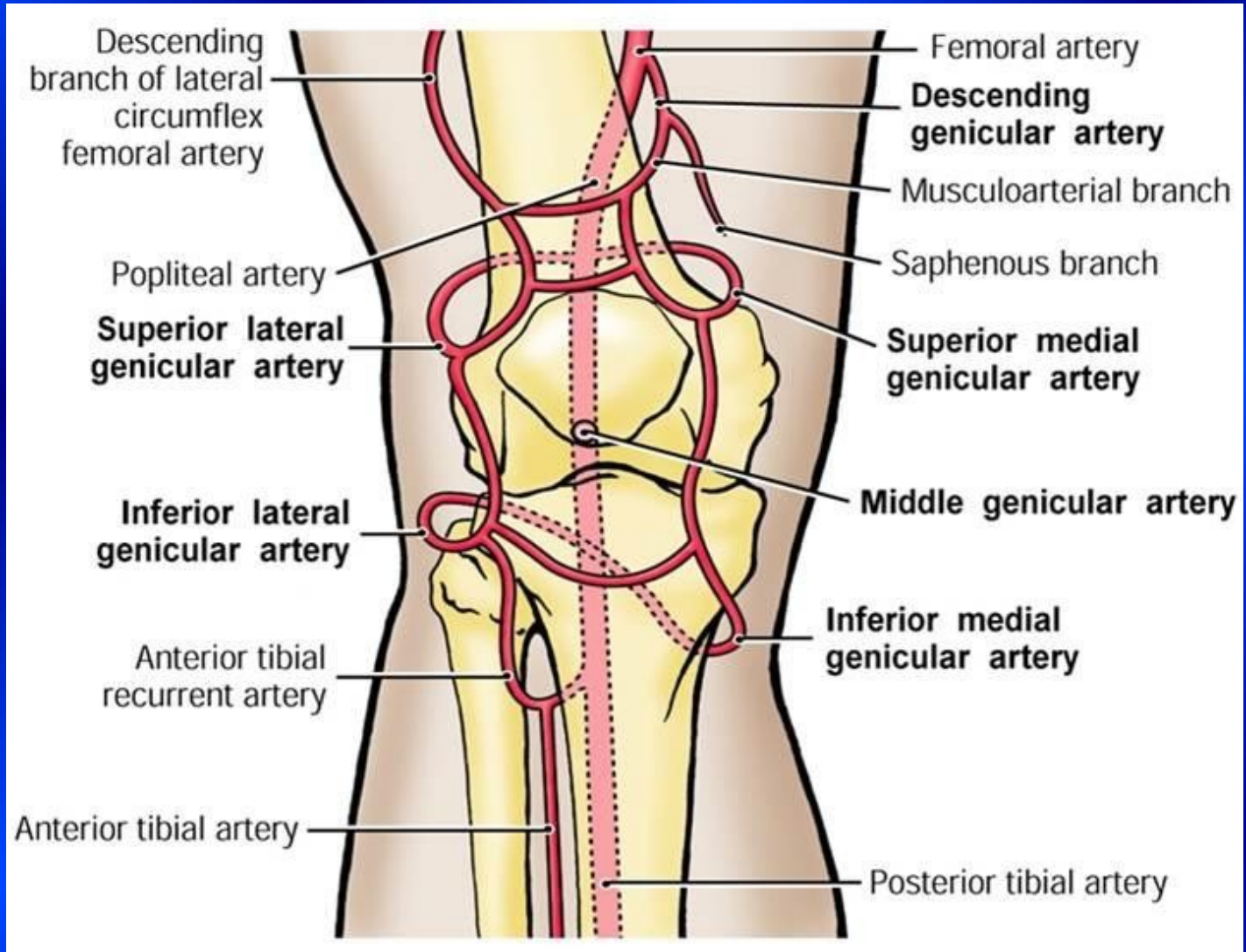
Stability of the knee- muscles



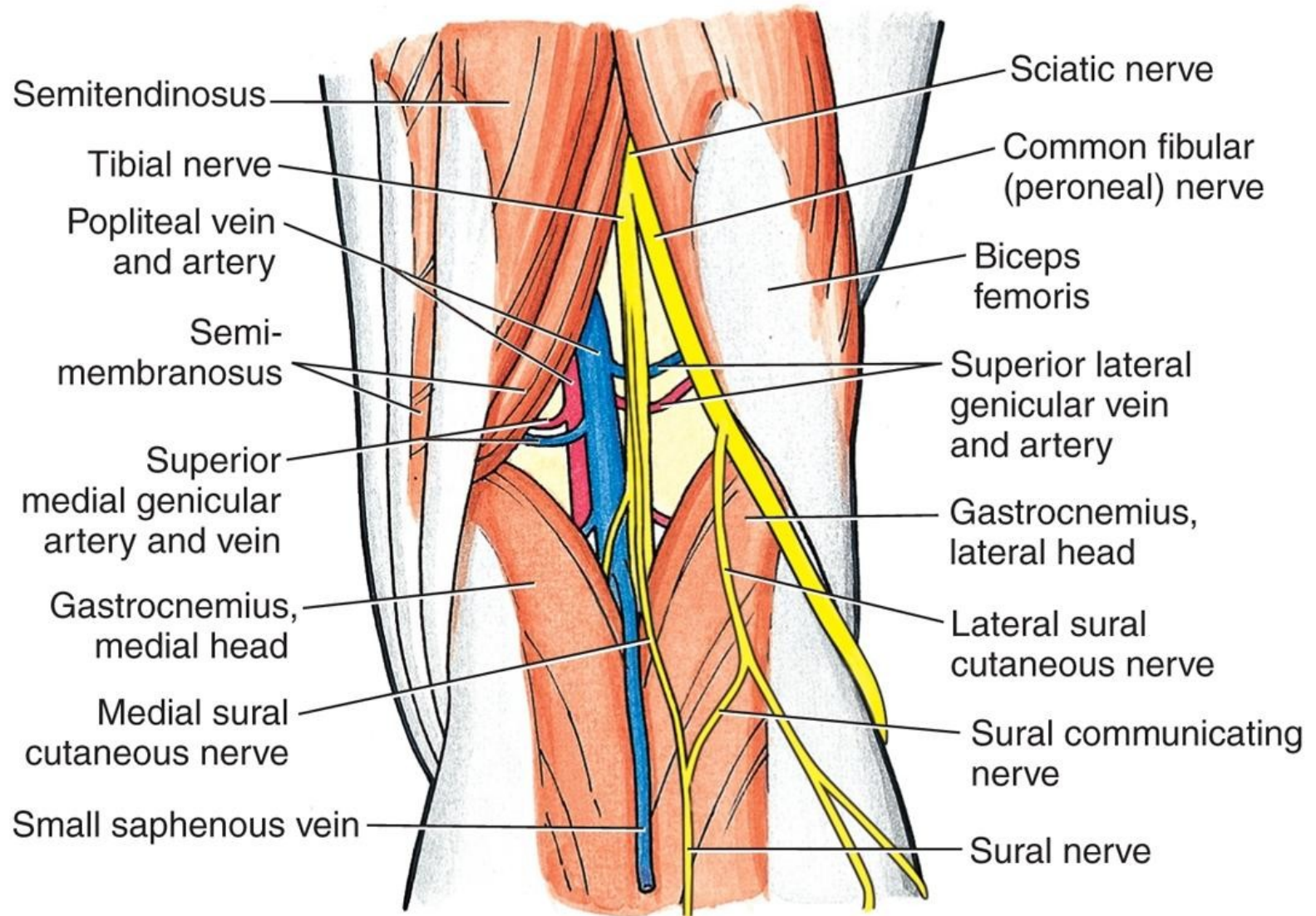
Anatomy- bursae



Anatomy- vessels



Anatomy- nerves



Biomechanics

Level

Movement

Sagittal

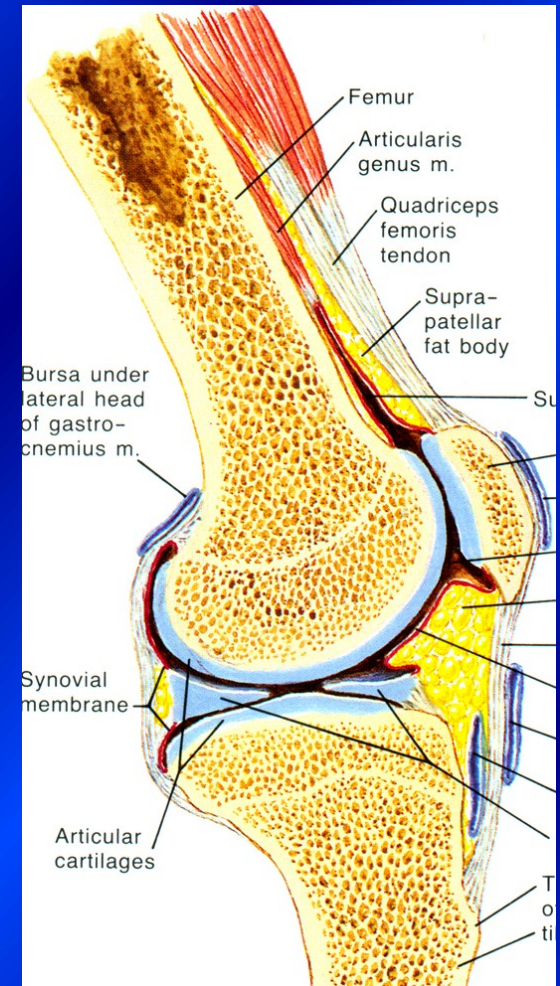
flexion/extension
- rolling
- gliding

Transversal

ext/ int rotation

Frontal

adduction/abduction



Clinical examination

- skin
- swelling
- alignment
- deformity
- contracture
- active and passive movement
- stability
- meniscus maneuvers
- femoropatellar joint

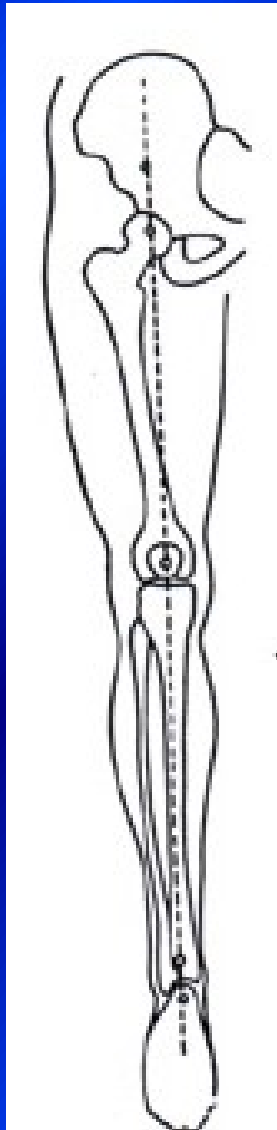


Swelling in the knee region

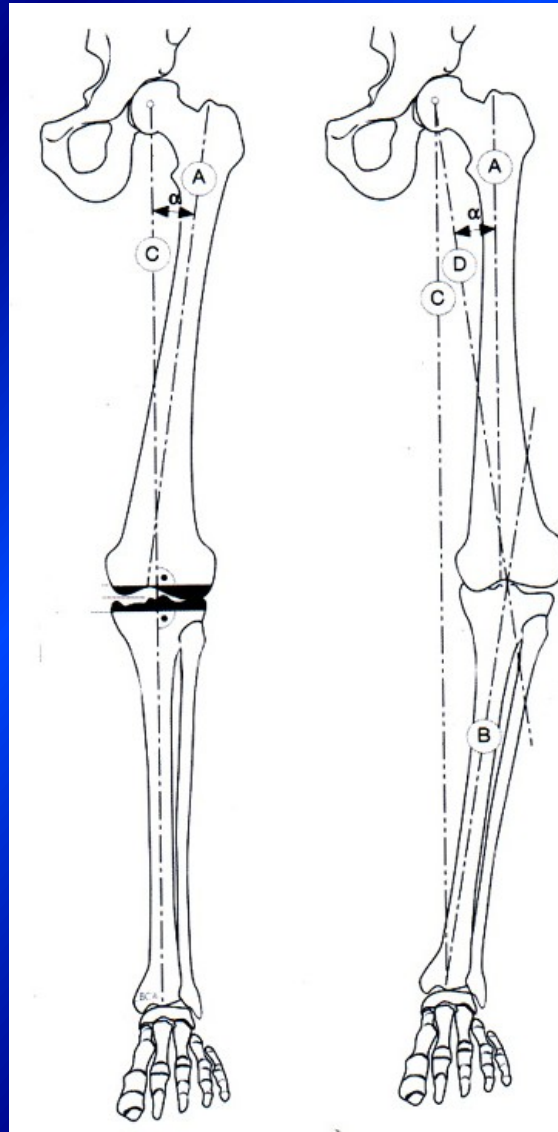
- Effusion
- Synovitis
- Cysts, ganglion
- Tumors
- Haematoma



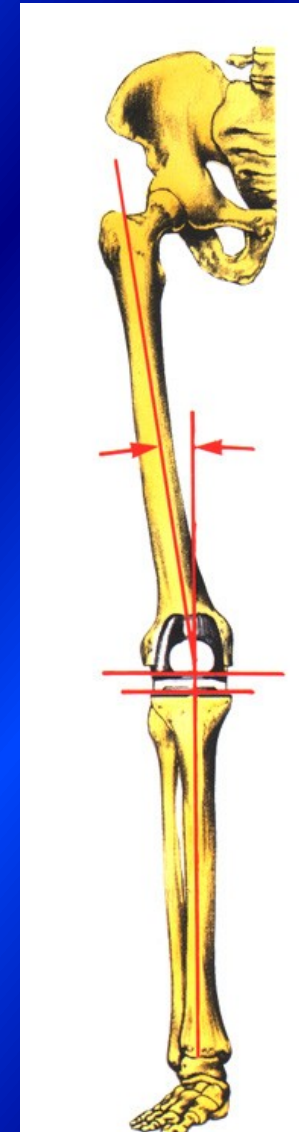
Alignment of lower extremity



Mikulicz line

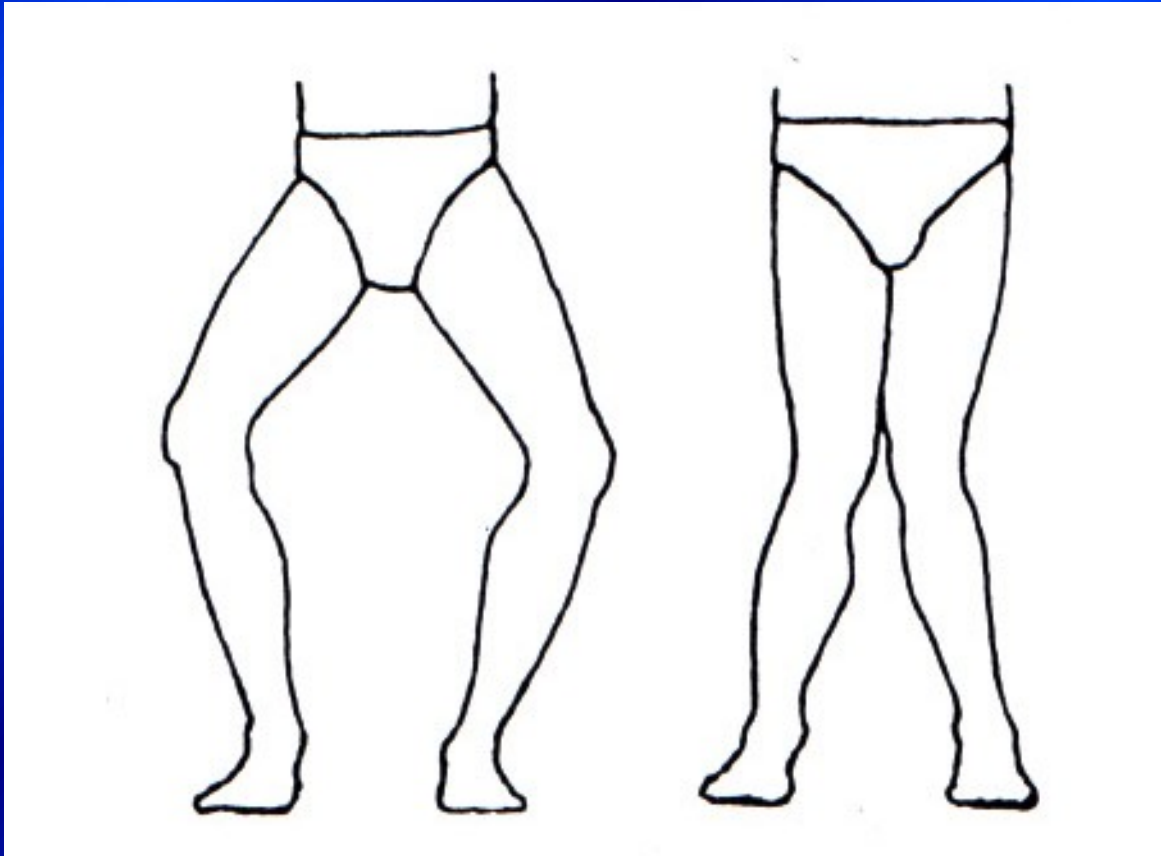


Mechanical



Anatomical

Deformity of the knee joint



Genu varum

- M.Blount
- rachitis
- posttraumatic
- O.A.

Genu valgum

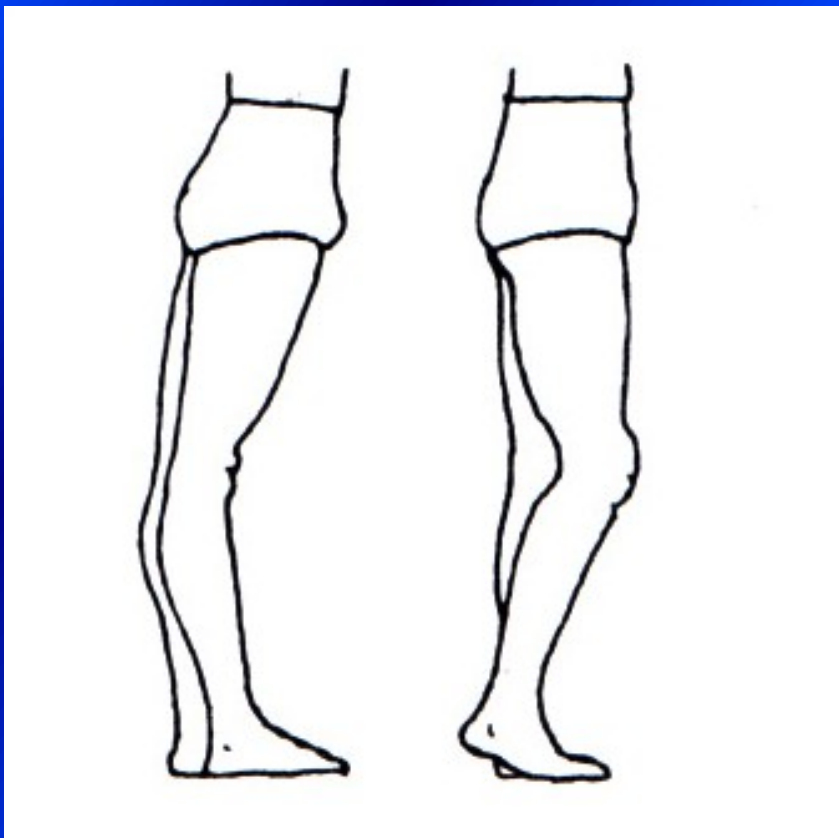
- rachitis
- posttraumatic
- R.A.
- O.A.

M. Blount



Disorder of the growth plate of proximal tibia

Deformity of the knee joint



Genu recurvatum

- congenital
- aplasia of ext. apparatus
- laxity of mesenchyme

**Genu recurvatum
congenitum**



Genu flectum

- cerebral palsy
- other neurological disorders
- O.A., R.A, post infection

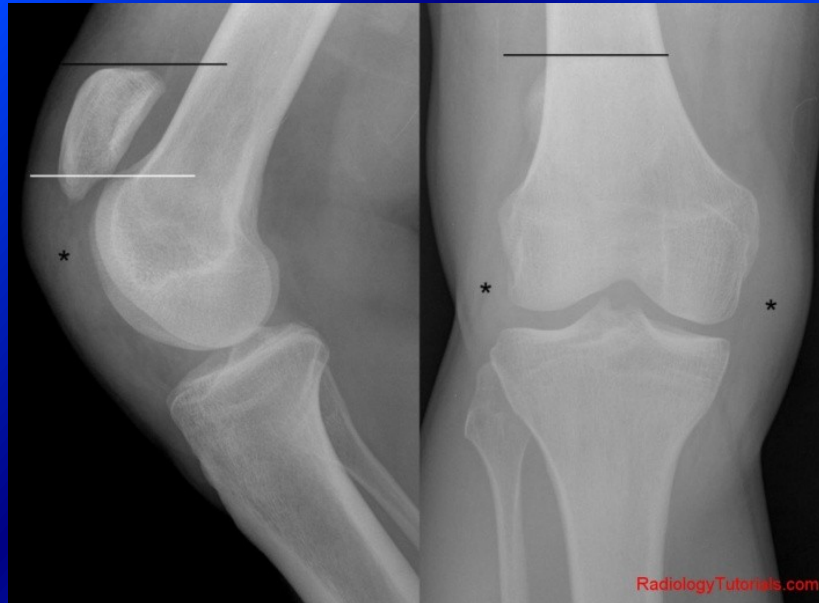
Position of the knee joint

- **Semiflexion**
 - antalgic
 - extension blockage
 - Rupture of meniscus
 - Loose body
 - Entrapement of synovial plica

Flexion contracture in cerebral palsy

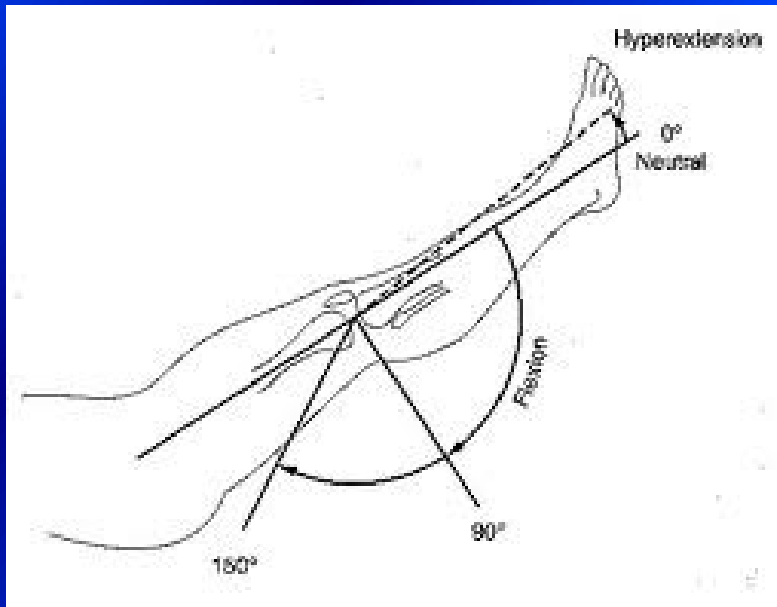


- **Contracture of hamstrings** (m. semitendinosus, m. semimembranosus, m. gracilis, m. biceps femoris)
- **Patella alta**



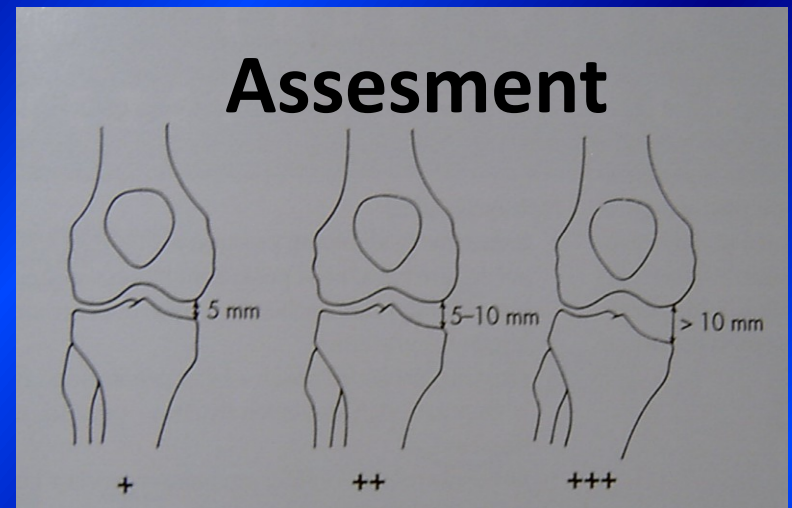
Movement in the knee joint

- active, pasive



S extension - 0 - flexion
S 0 - 0 - 140

Test for stability



Valgus stress test (LCM)

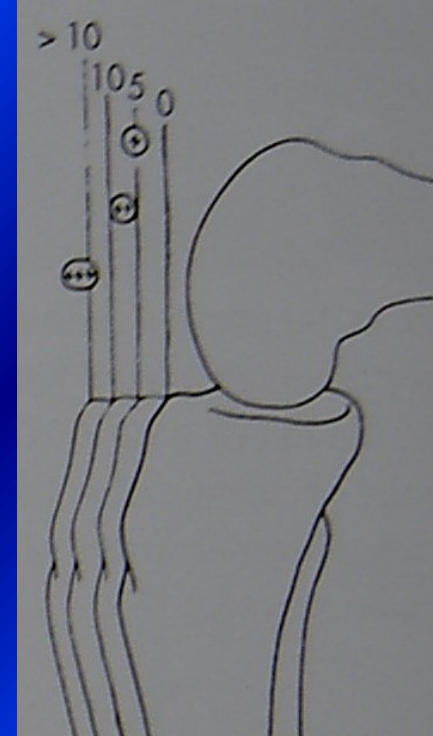


Varus stress test (LCL)

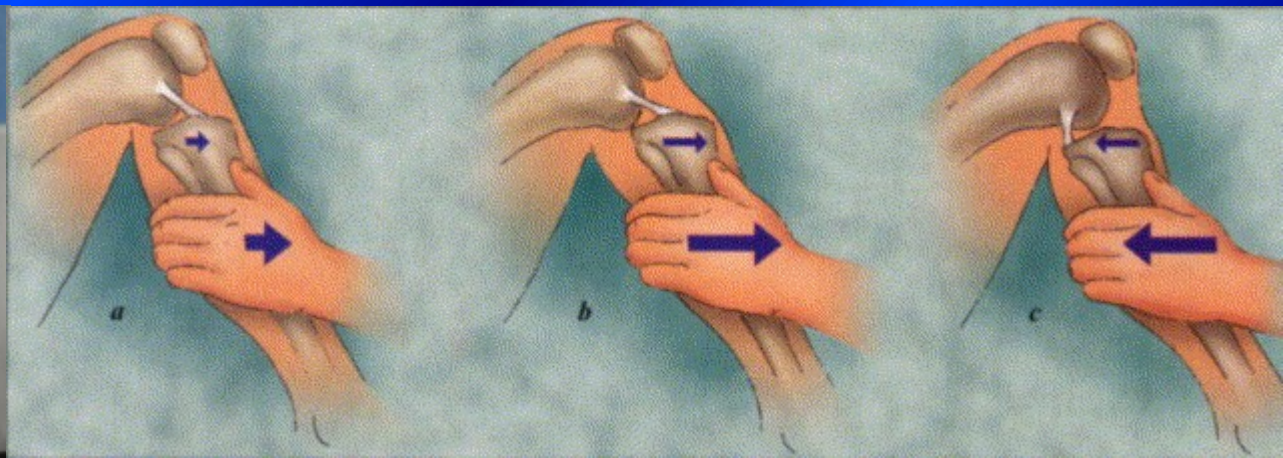
Cruciate ligaments



Lachmann test



Ant. drawer sign , post. drawer sign



normal

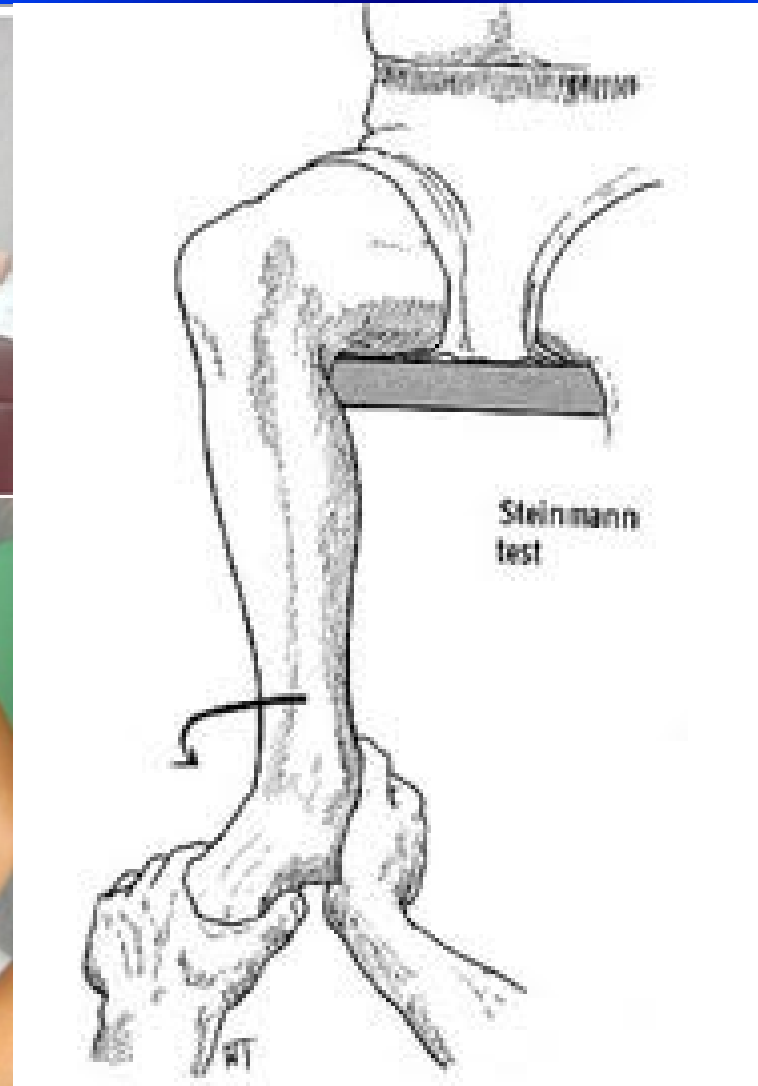
ant

post

Meniscus manoeuvres

McMurray test

Steinmann test

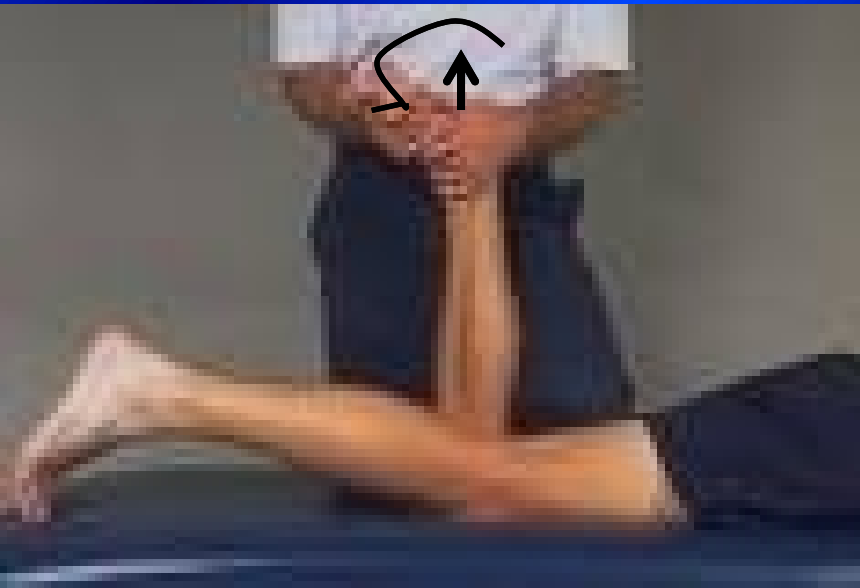


Meniscus manouevres

Payer test



Appley test

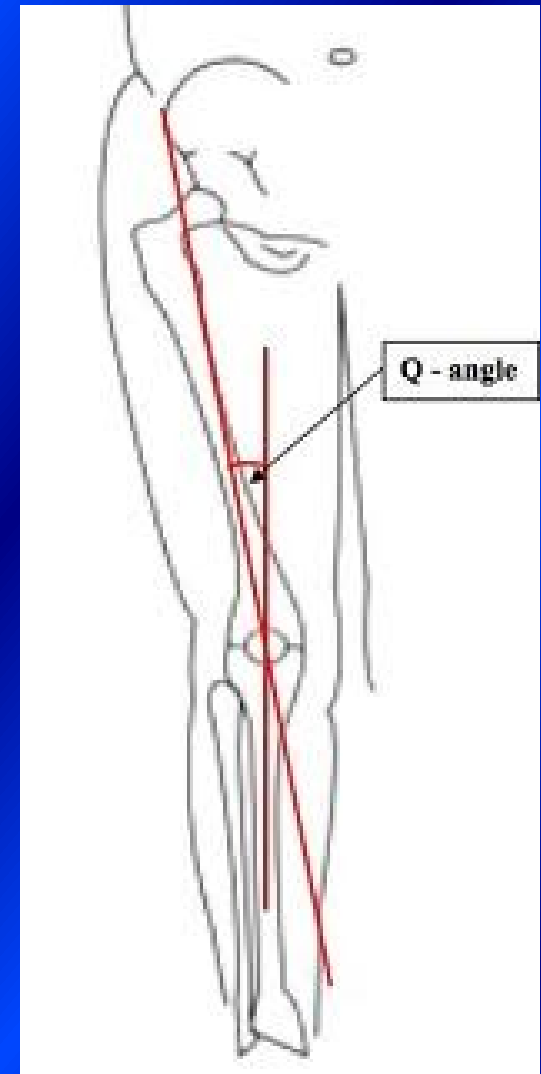


Childress test



Patella

- history- retropatellar pain
- kneeling, squatting, down hill gait
- giwing away phenomenon
- position of the patella
 - alta / baja)
 - lateral
- patelar tracking
- stability
- Patellar retinacular ligament
- Patellar facets, base, apex
- FP manoeuvres (Zohlen, grinding)
- Q- angle



M 8-10

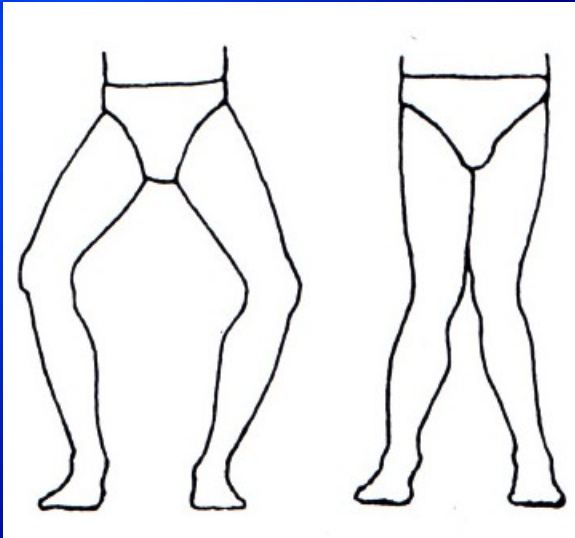
F 15 ± 5

Imaging methods

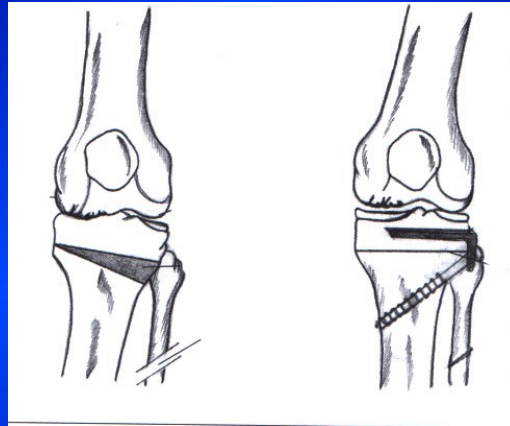
- X ray, AP, lateral, axial
- USG
- CT , MRI
- Scintigraphy
- Arthroscopy

Deformity of the knee joint

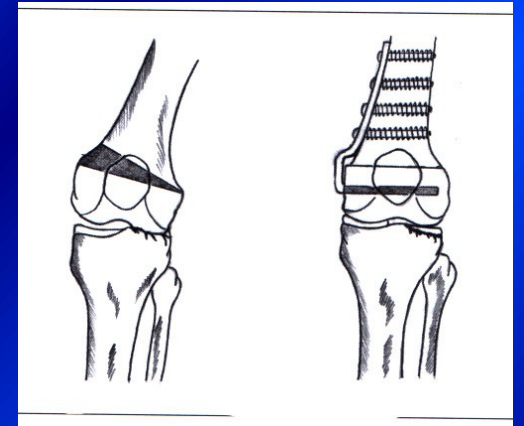
- in children- hemiepiphyseodesis
- in adults osteotomy



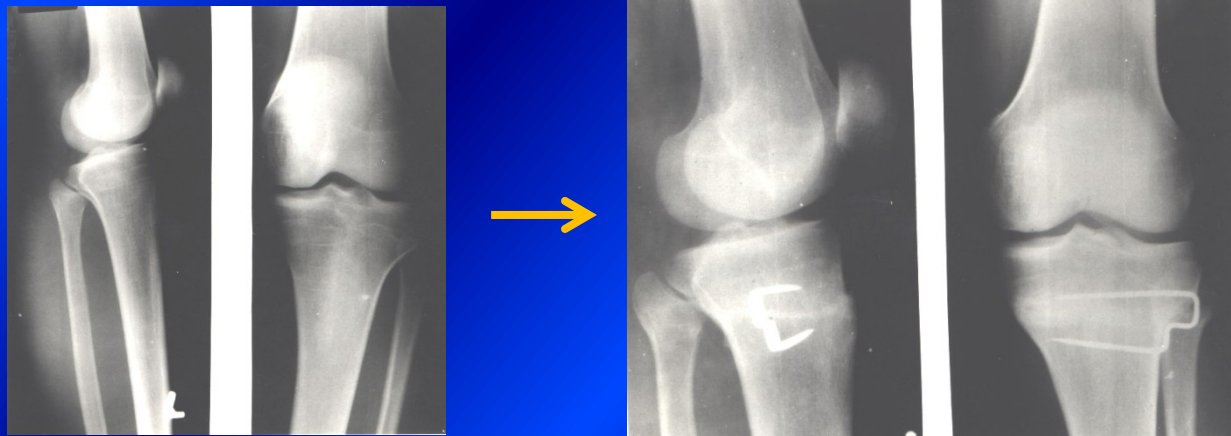
genu varum /genu valgum



Valgus OT



varus OT



Meniscus

Mechanism of injury

Tests: Mc Murray

Steinmann I

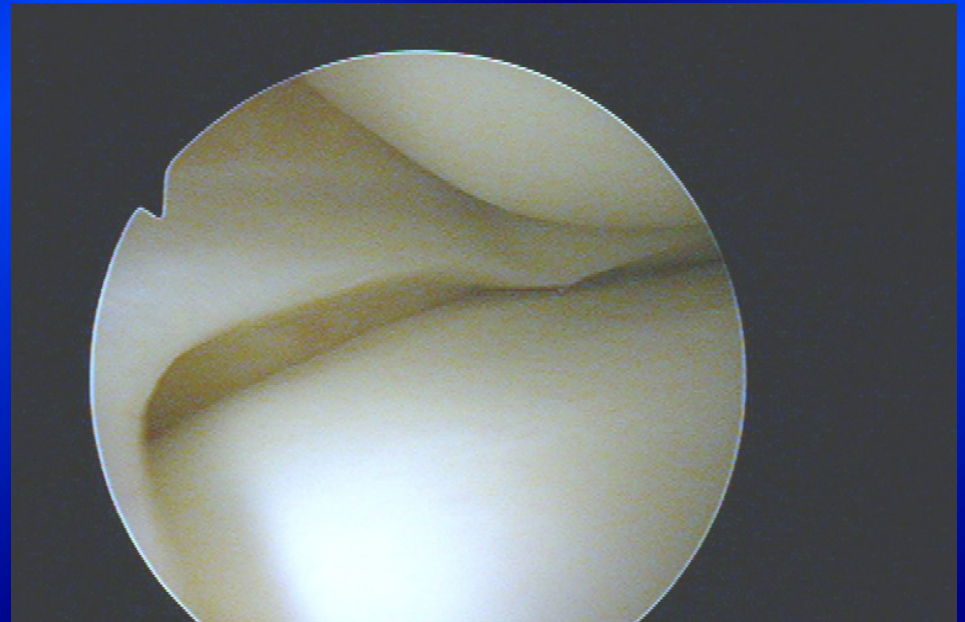
Steinmann II

Appley

Turner

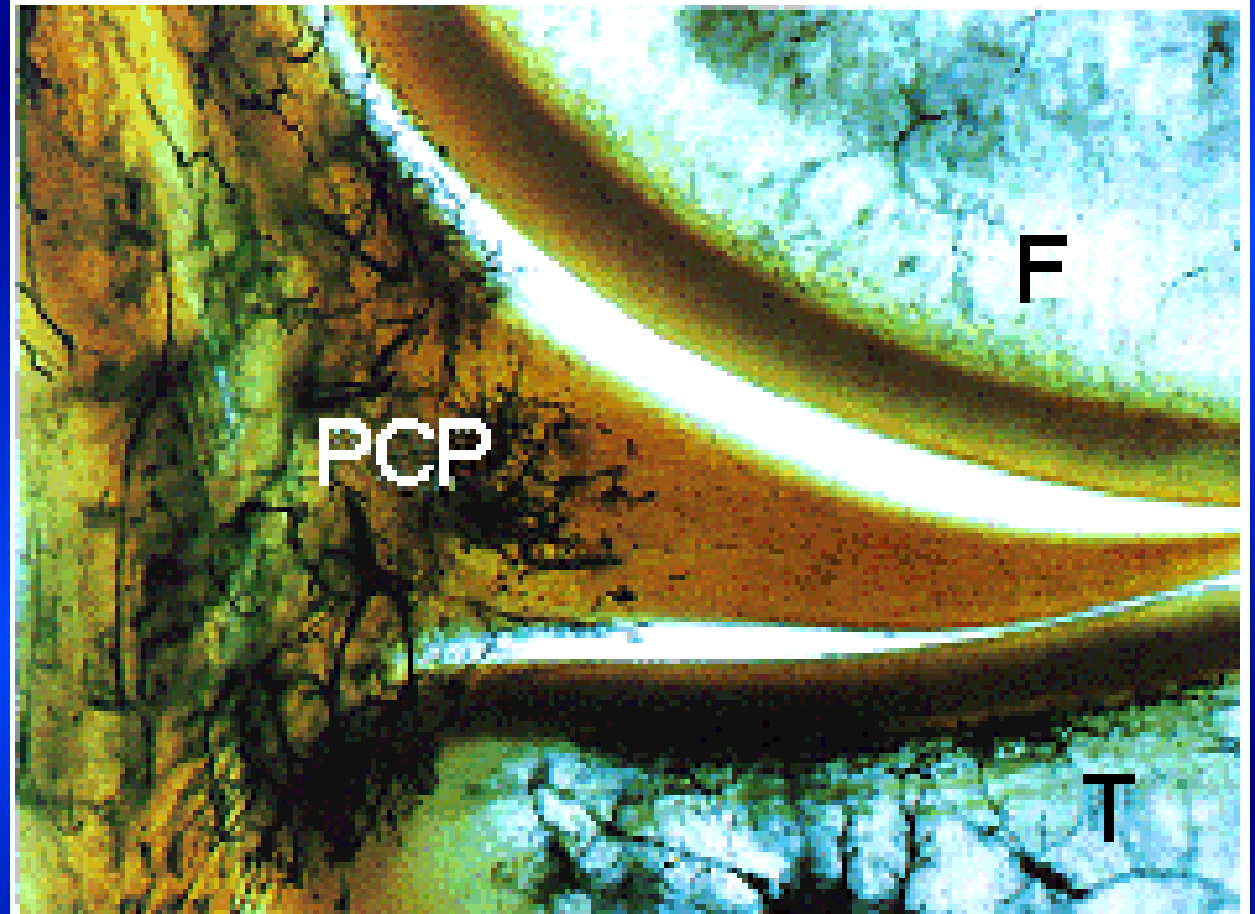
Payer

Childress- squat test



Meniscus

- Fibrocartilago
- High elasticity
- Paracapsular zone
- vessels



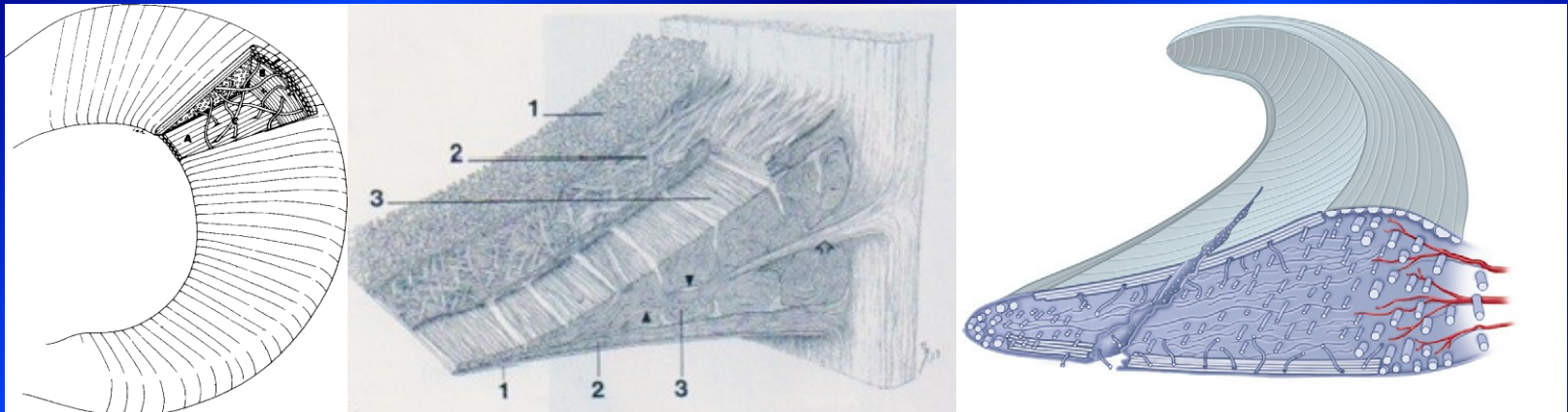
Red zone

red- white zone

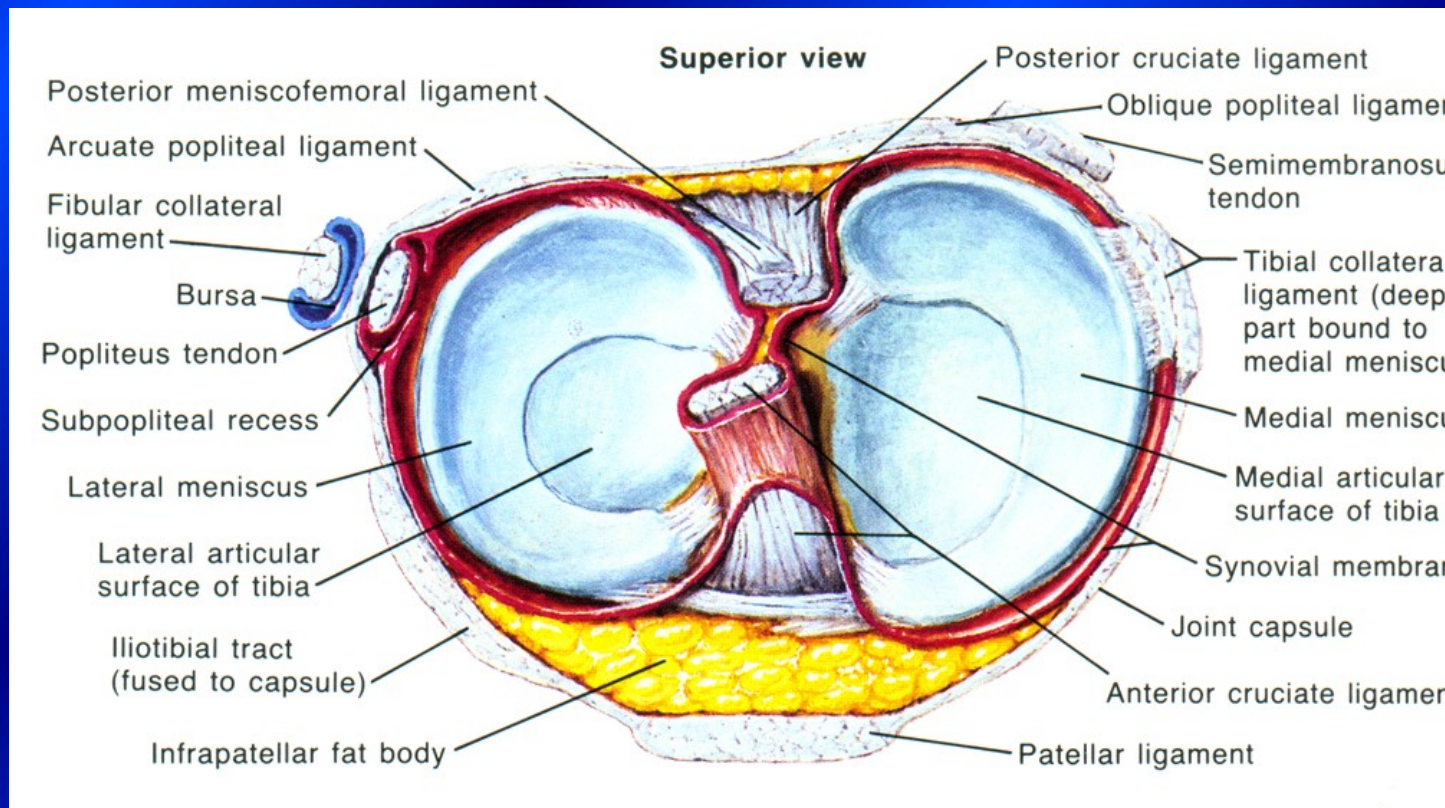
white zone

Struktura menisku

- Kartilaginózní struktura
- Relativně acelulární
 - vaskulární zóna – fibroblast-like cells
 - avaskulární zóna – chondrocytes-like cells
- Kolagen. vlákna v matrix -
 - rozložení k přenosu kompresního tlaku + hoop stresu



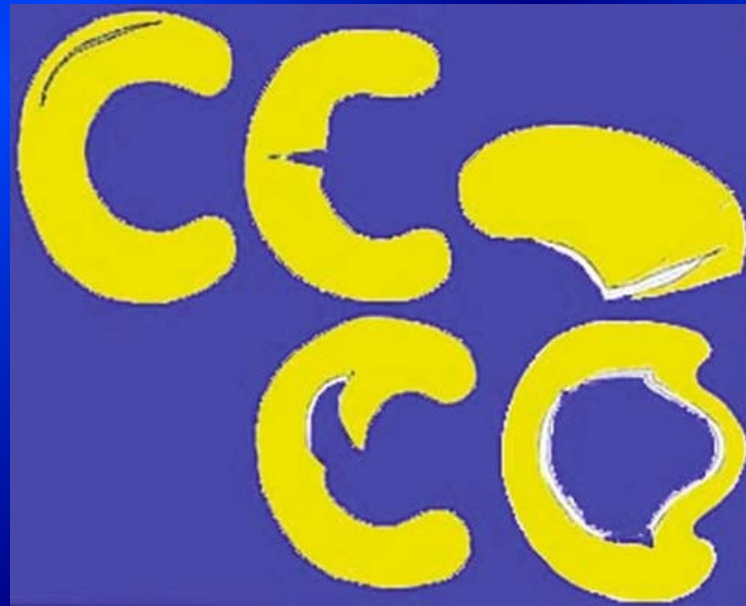
Functions



- Bumper
- Stabilisator
- More congruency
- Distribution of synovial fluid
- LM – more mobile
- MM – prone for injury

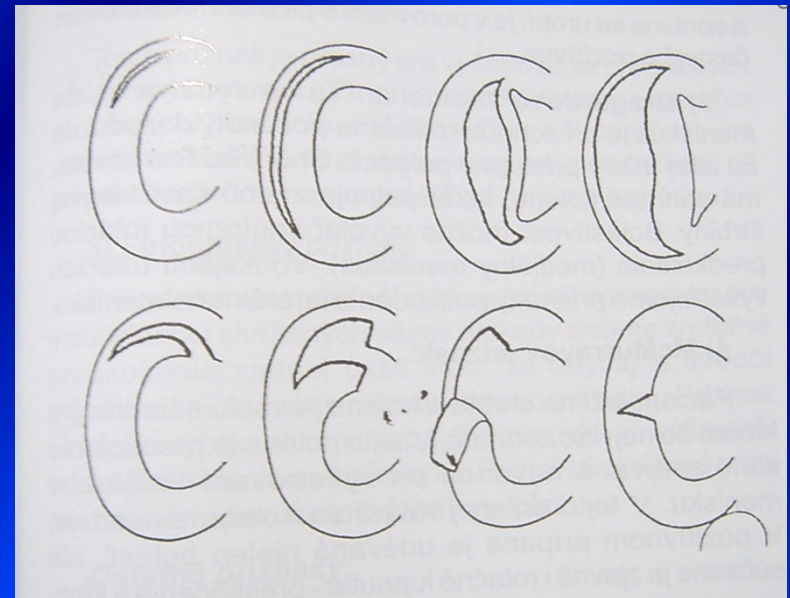
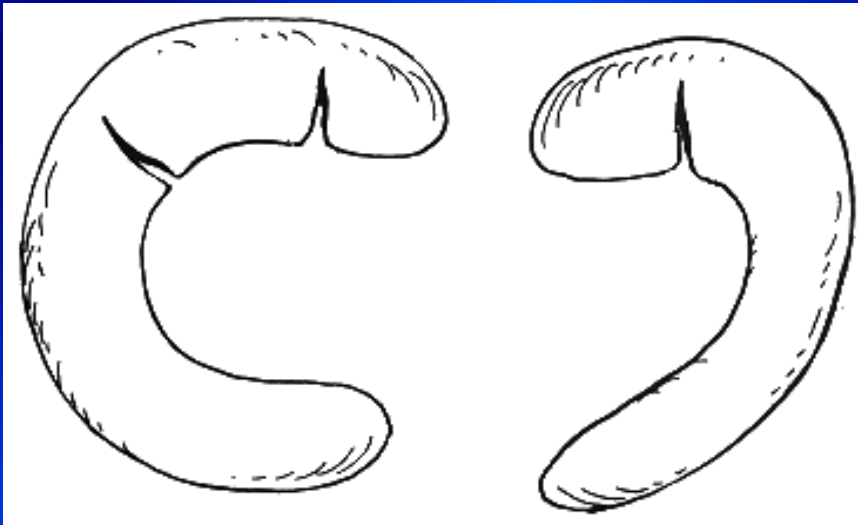
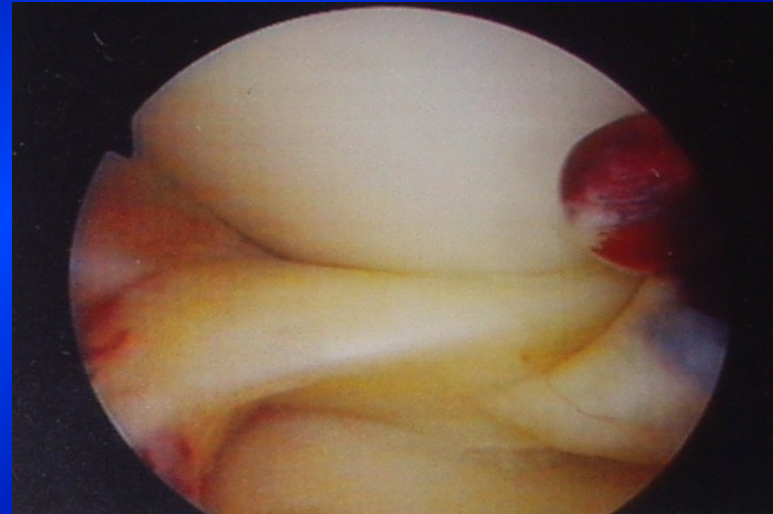
Typy ruptur menisku

- Longitudinální
- Radiální
- Horizontální
- Šikmá
- Bucket handle
- Komplexní



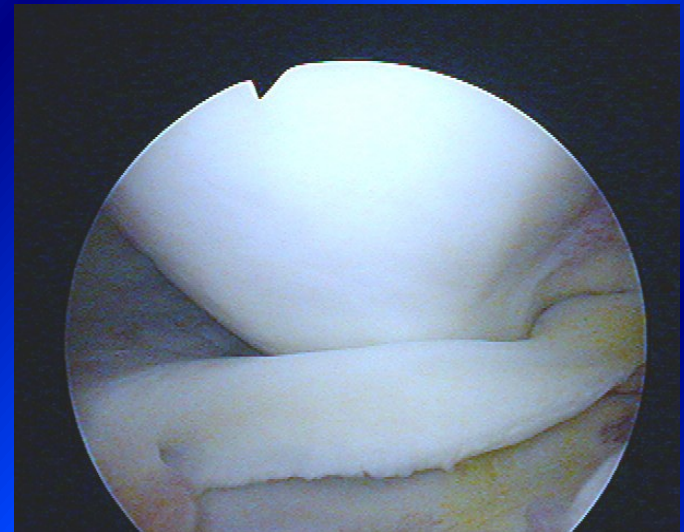
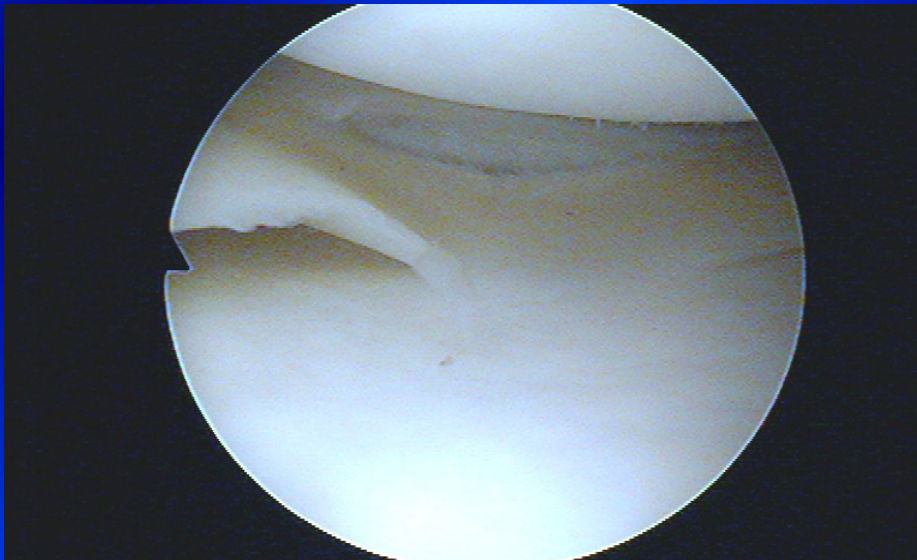
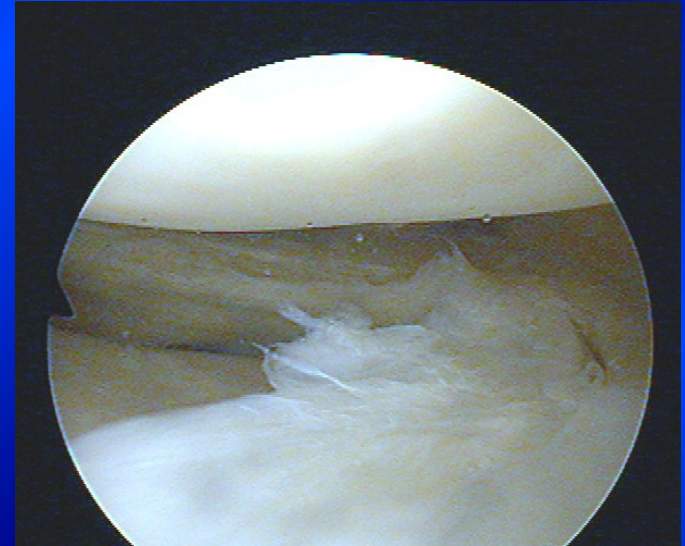
Ruptures of menisci

- Longitudinal, horizontal, radial
- „bucket handle type“
 - Typical blockage
- Degenerative lesions
- Discoid meniscus



Ruptures of menisci

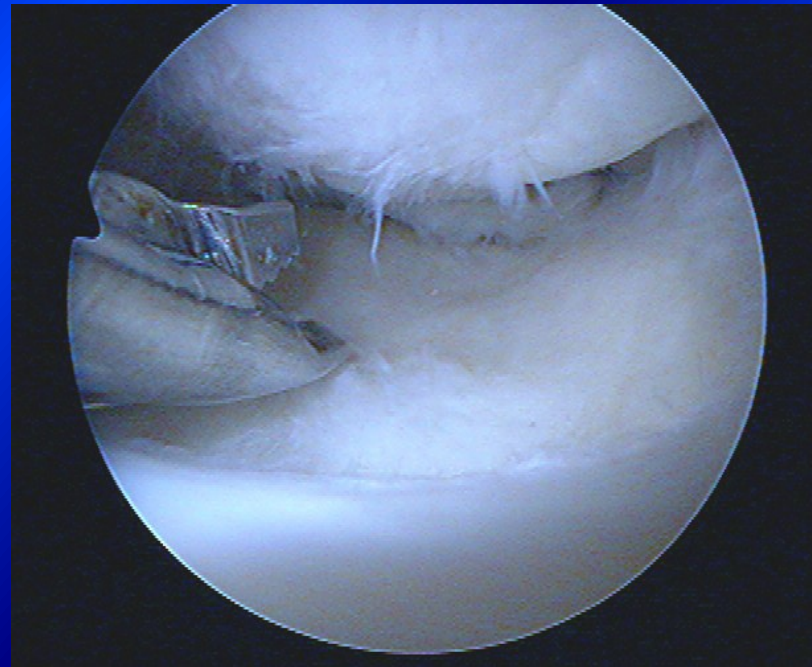
- Longitudinal, horizontal, radial
- „bucket handle type“
 - Typical blockage
- Degenerative lesions
- Discoid meniscus



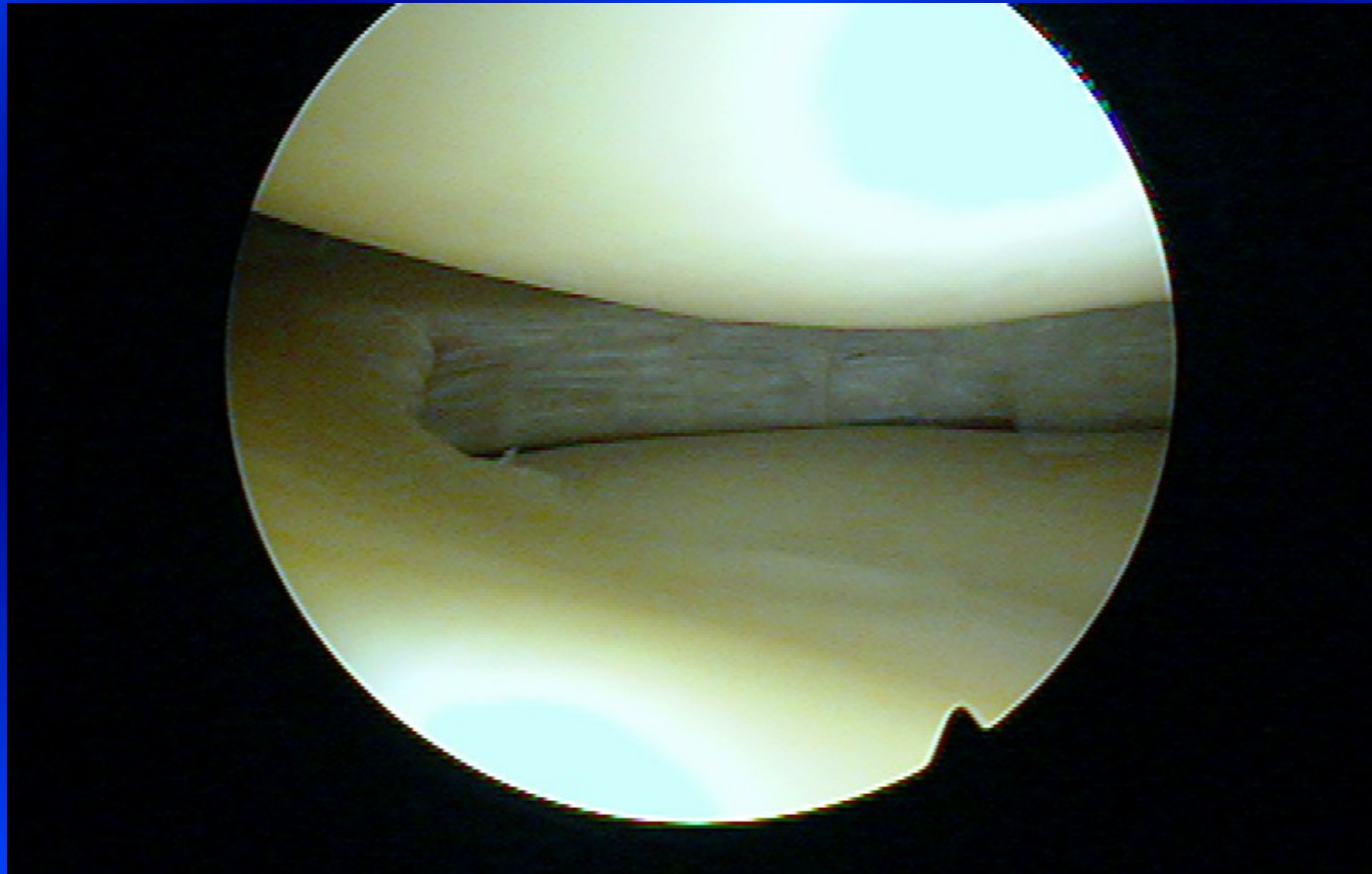
Meniscus treatment

Meniscectomy

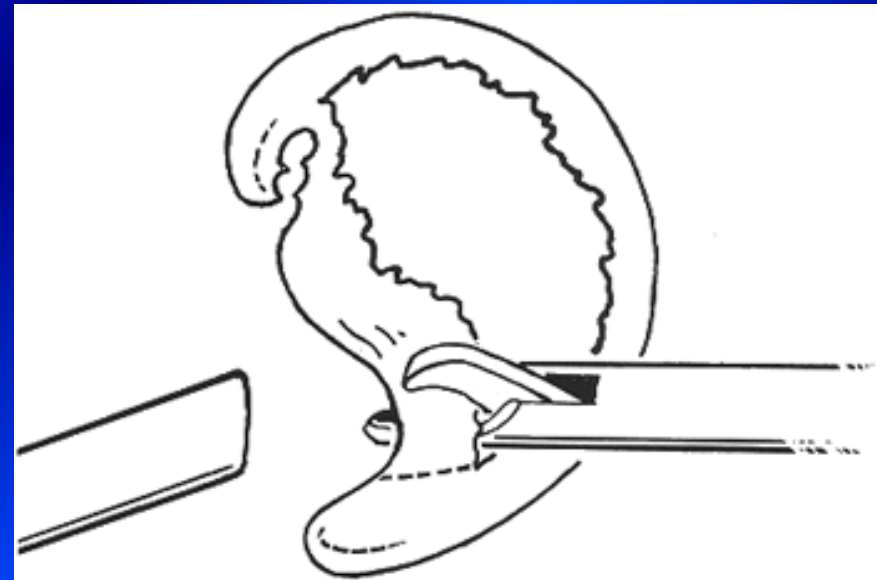
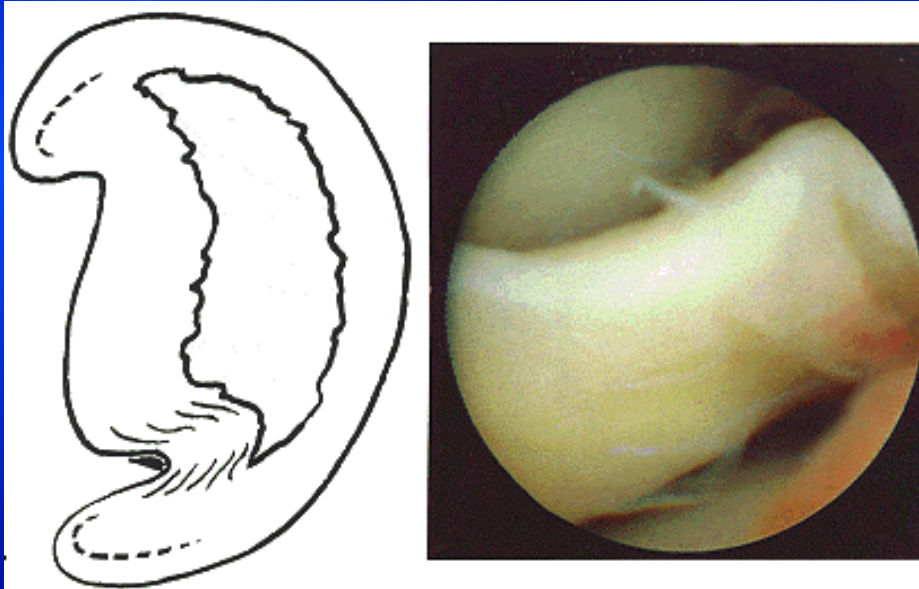
- partial
- subtotal
- complete



Partial meniscectomy

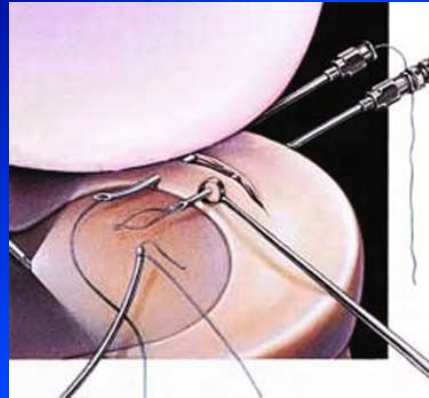


Subtotal meniscectomy

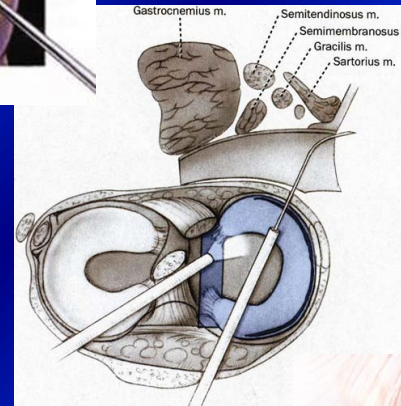


Techniky sutury

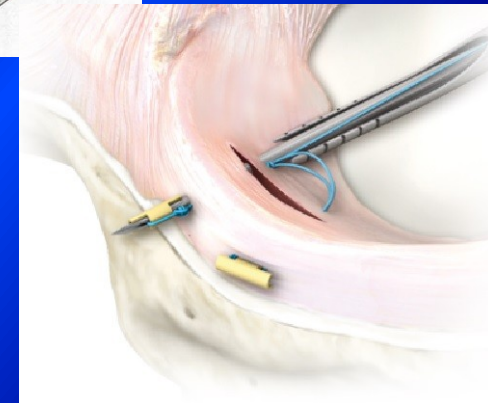
Outside – in



Inside – out



All – inside



- Excelentní výsl. zhojení u mladých pac.
- All – inside – kompresní cirkumferentní steh po obvodu léze



Radiální ruptura

- Rpt. 60 % centrální zóny nemá vliv na \uparrow tlaku / kandidát parc. menisektomie /
- Rpt 90 % signifikantně \uparrow tlak – sutura
- Inside-out, All-inside, transtibiální technika / TT /
- Chronická léze – retrakce okrajů – gapping / \downarrow TT /



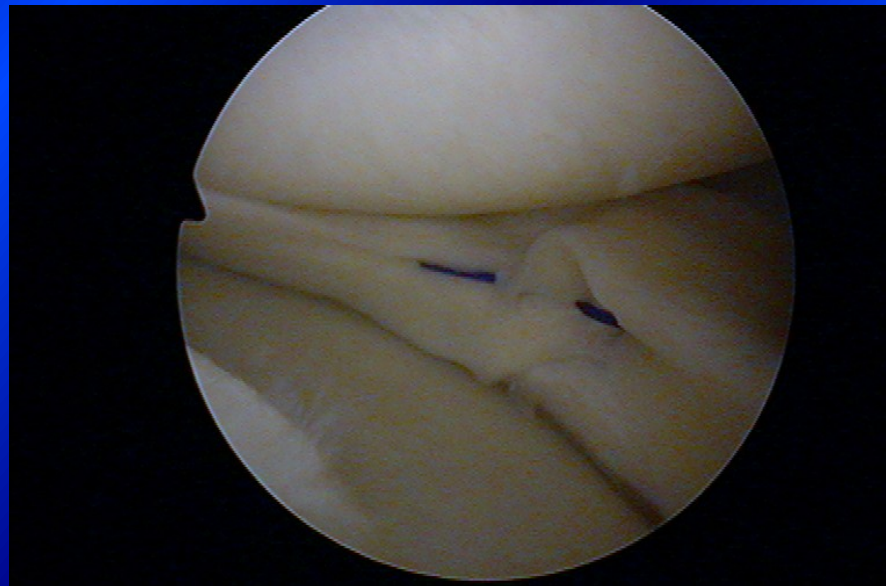
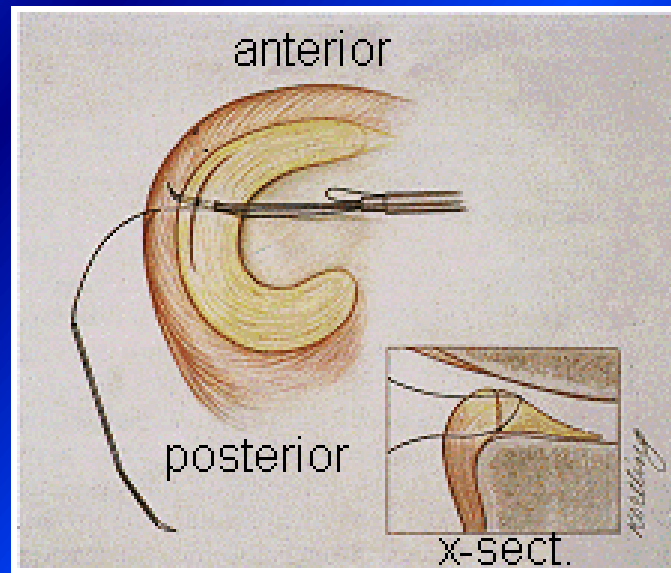
- A: Inside-out -horizontální matracový steh
- B: All-inside knot tying
- C: Transtibiální technika

Suture of meniscus- meniscopexis

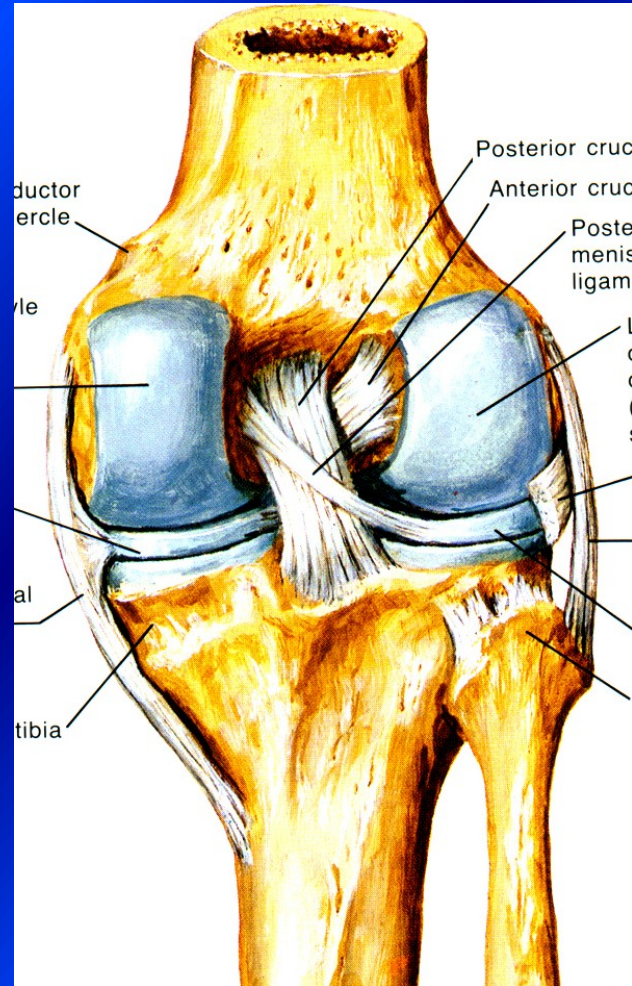
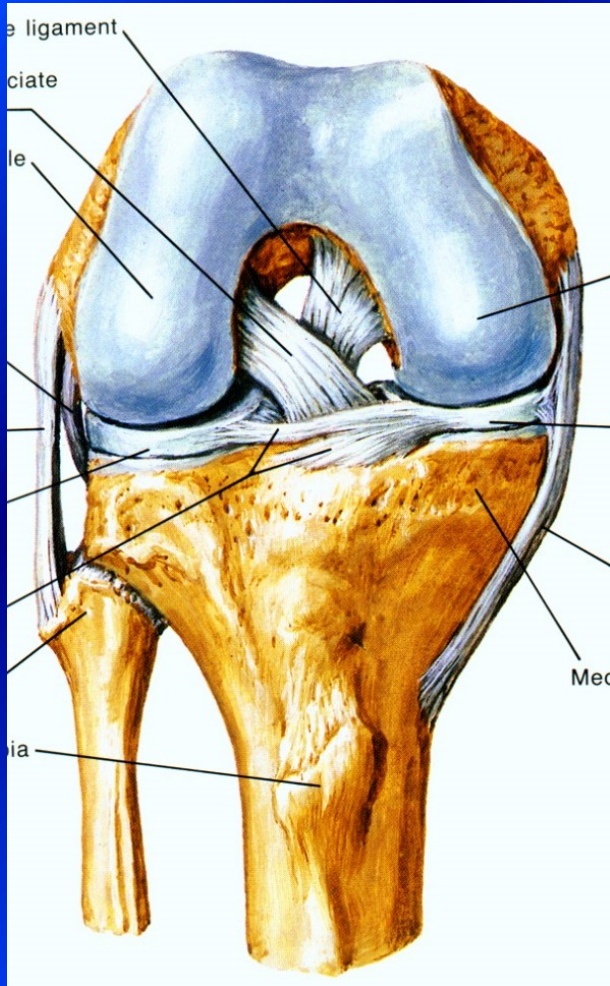
outside-in

inside-out

all-inside



Ligaments- ACL, PCL



Rupture of ligaments

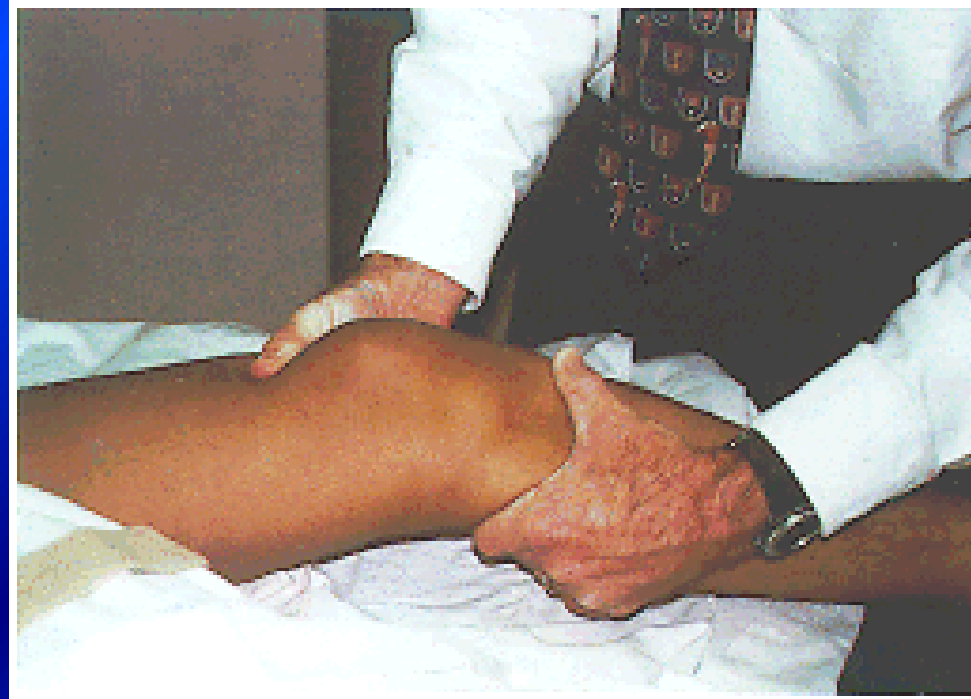
- **Sprain**
- **partial rupture**
- **total rupture**
- Mechanism of injury
- Tests of stability



Unhappy trias

Rupture of ACL

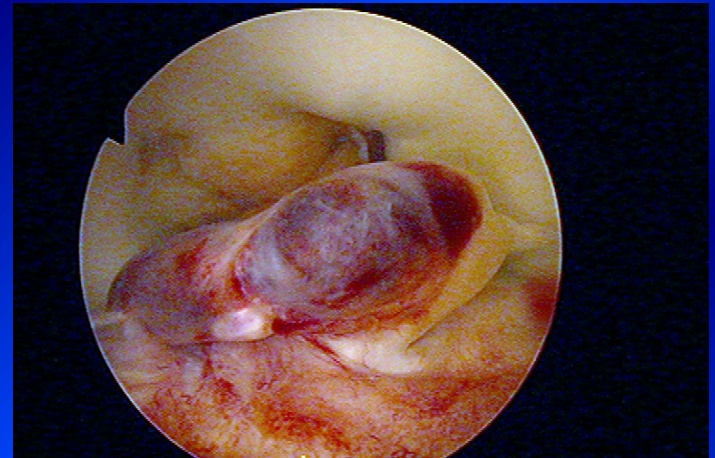
- Tests of stability
- Lachman test
- Anterior drawer sign
- Pivot-shift test



Lachmann test

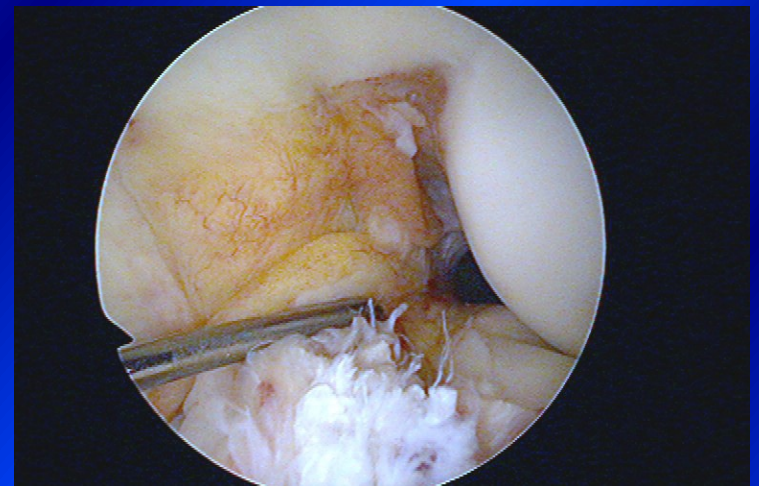
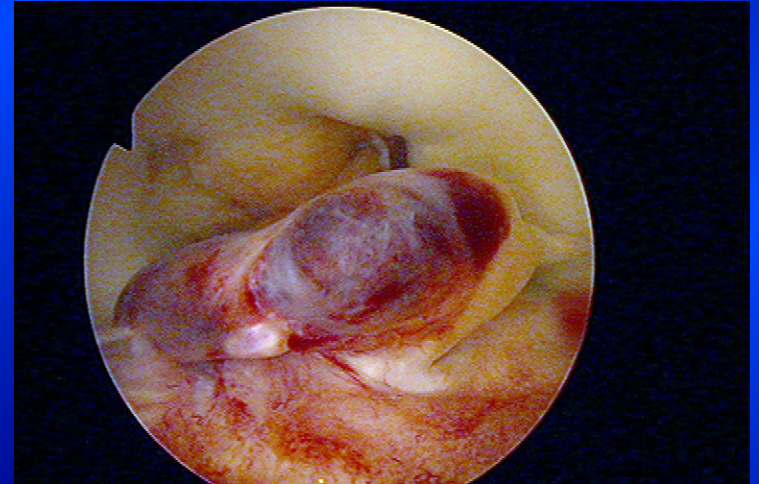
Rupture of ACL

- Frequent injury



Rupture of ACL

- Debridement
- Physiotherapy
- Limited activity
- Orthosis





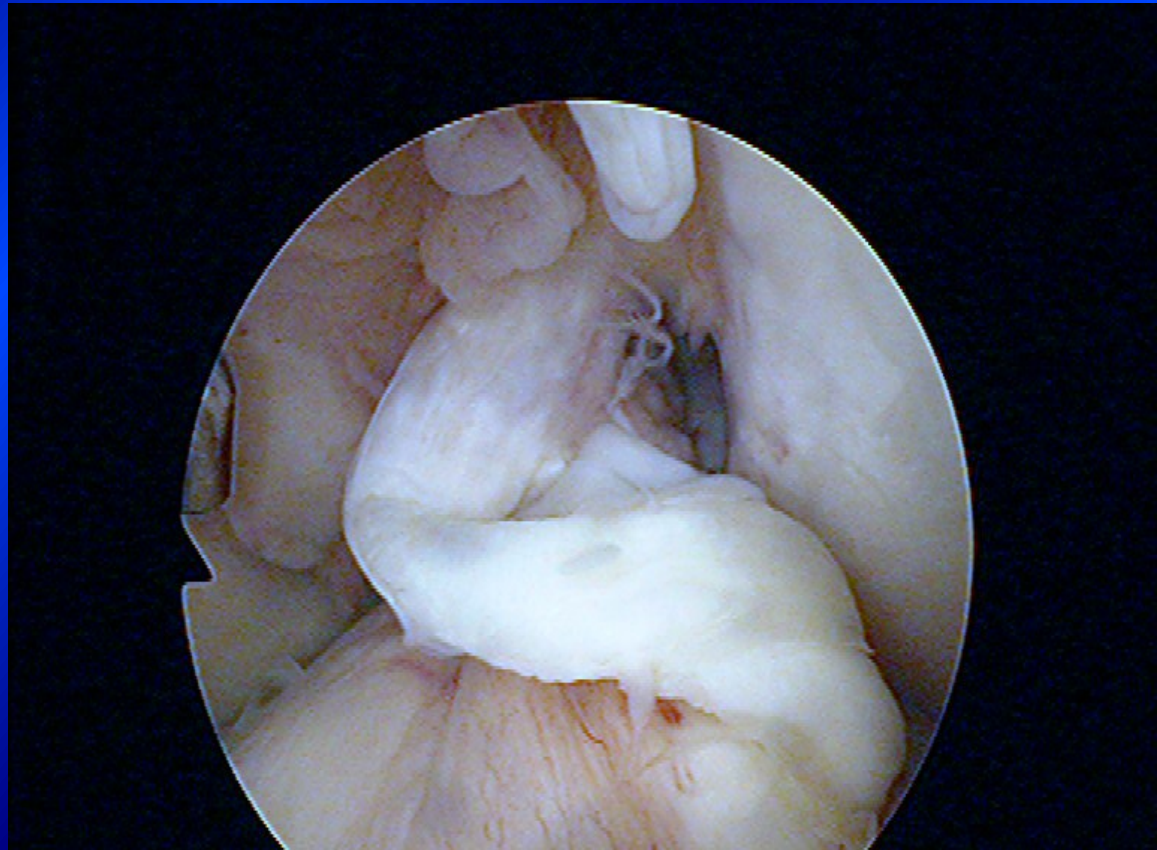
Physiotherapy



Orthosis

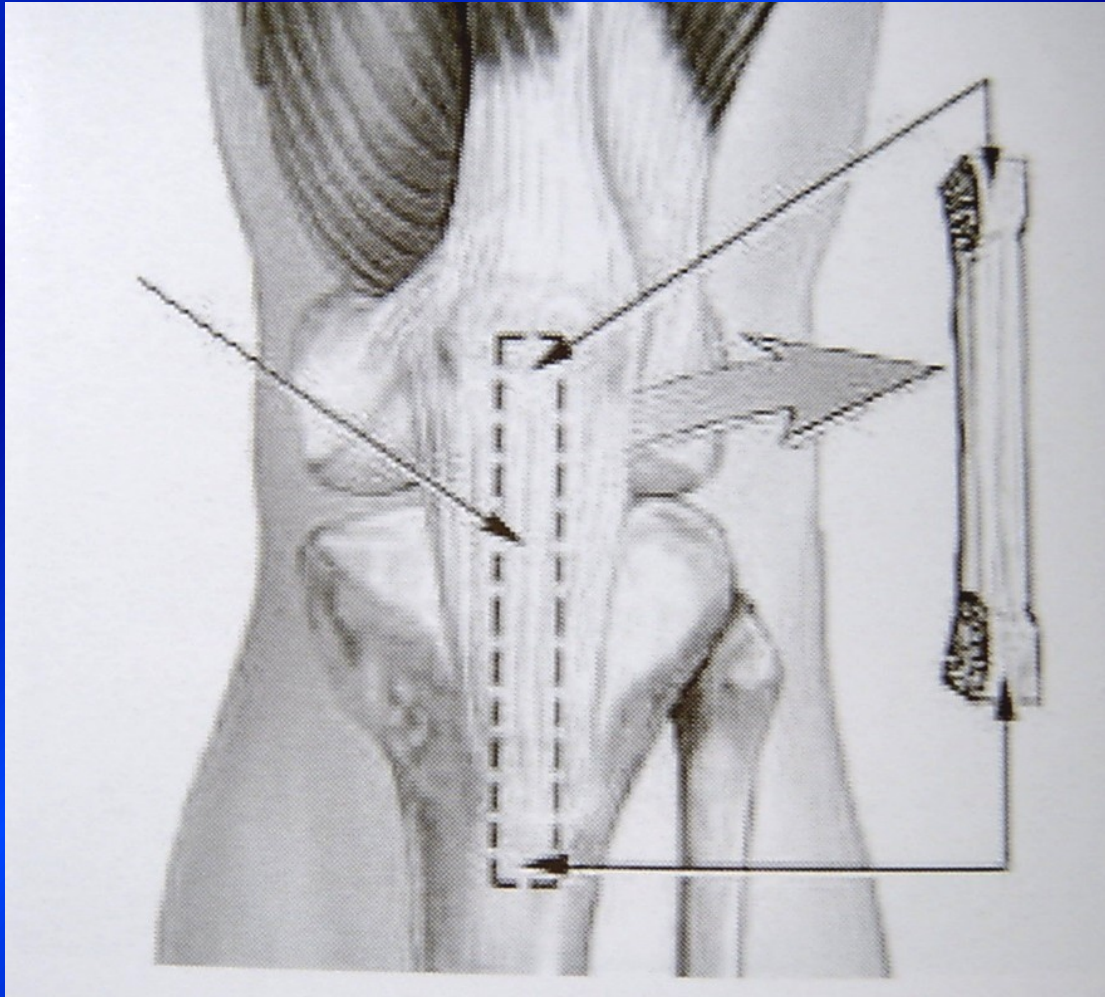
Indication for reconstruction

- 1/3 of cases



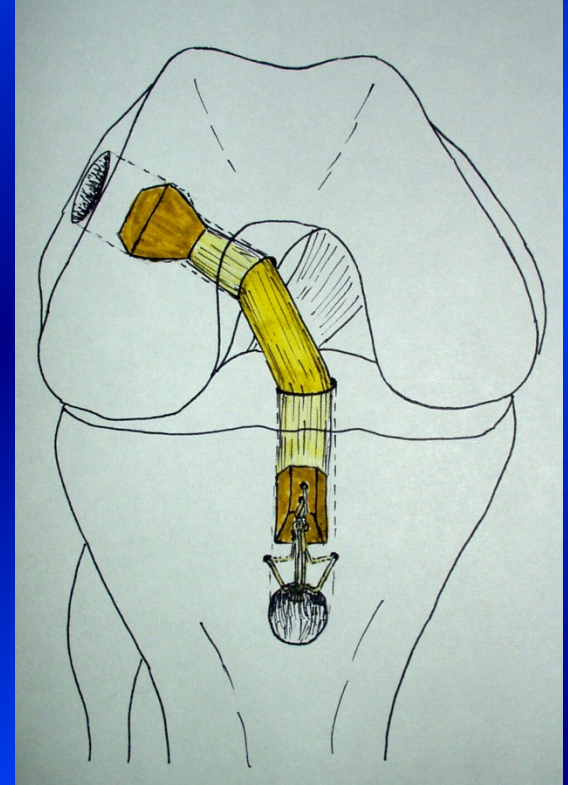
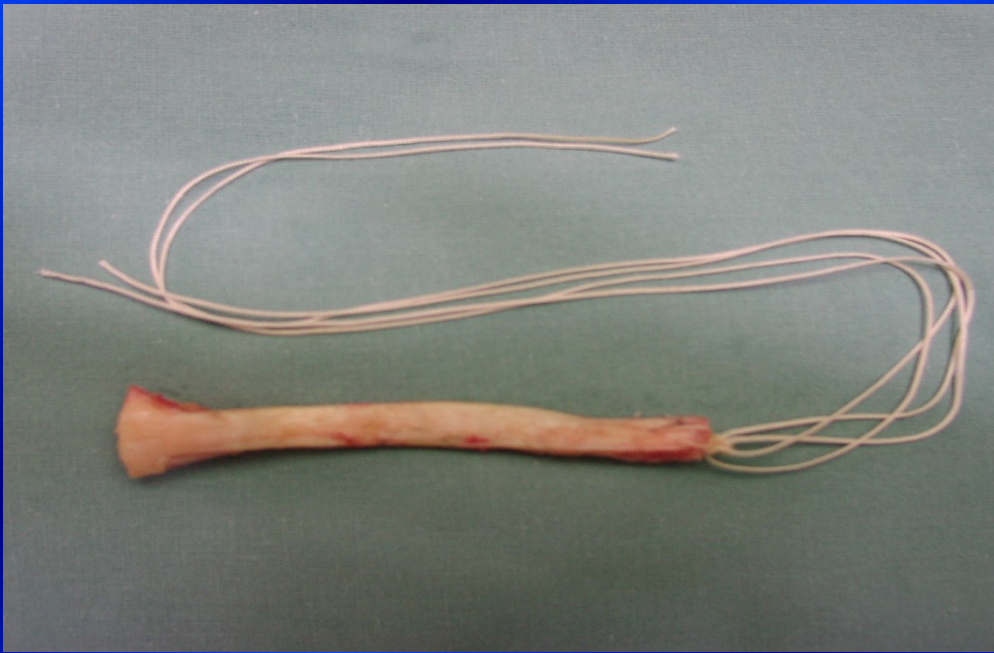
BTB graft

- Bone-Tendon-Bone



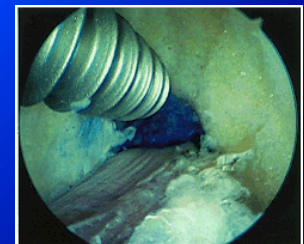
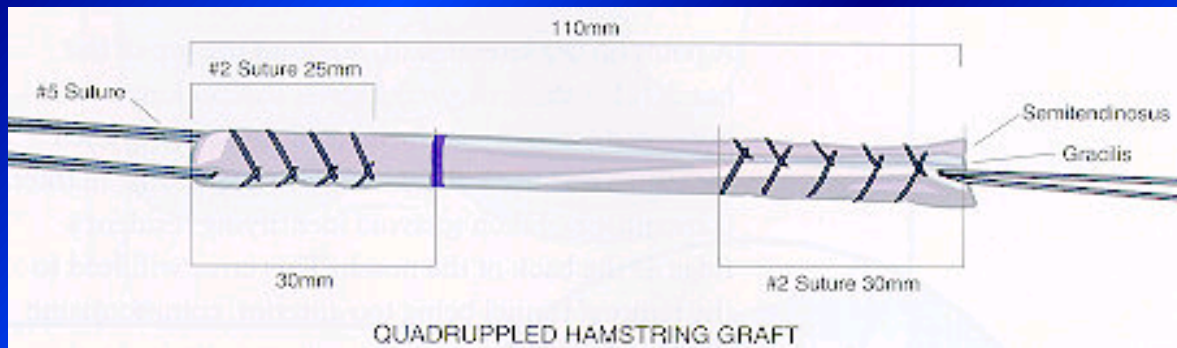
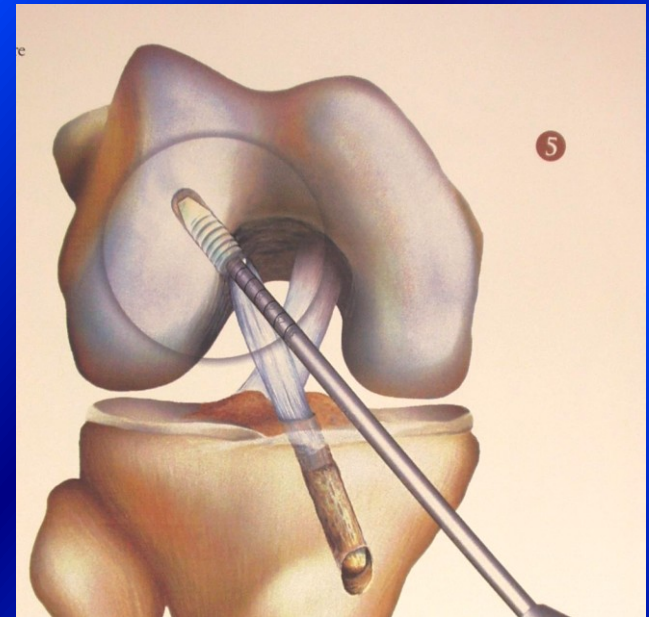
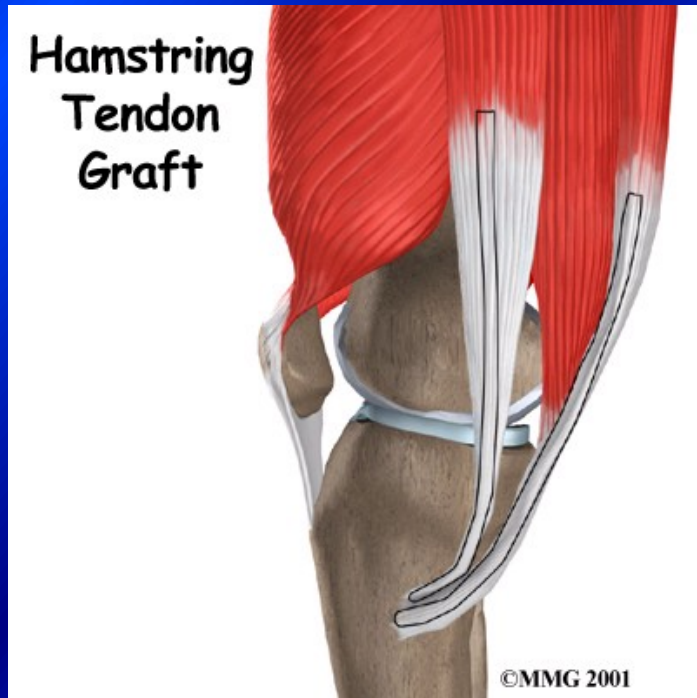
BTB graft

- Bone-Tendon-Bone



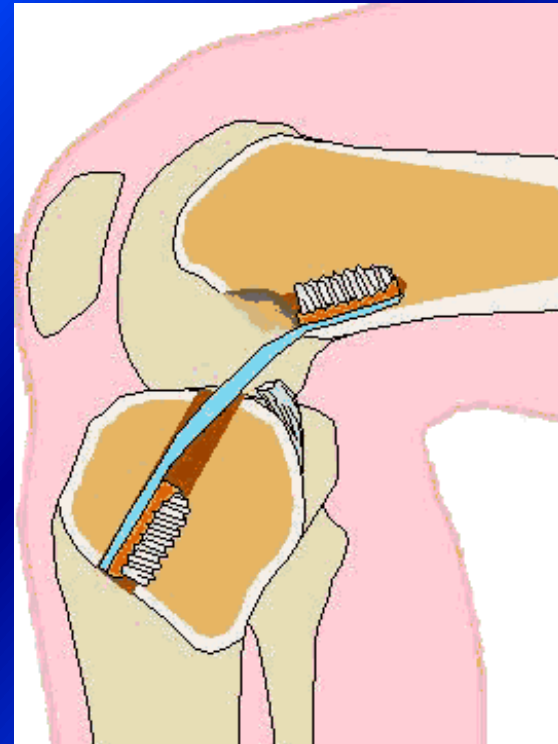
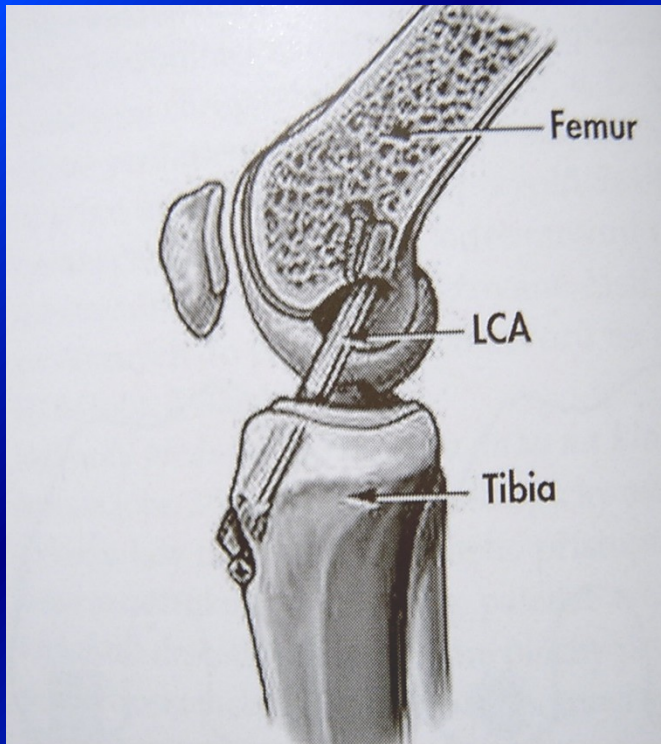
Press fit technique

Hamstrings (m. semitendinosus + m. gracilis)



Fixation by screws

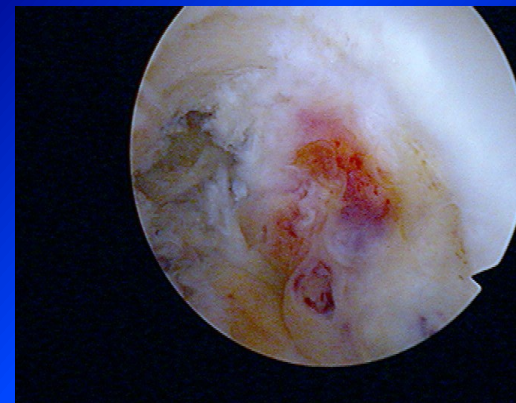
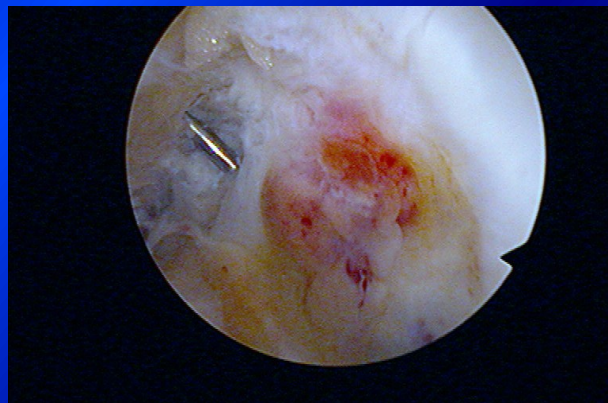
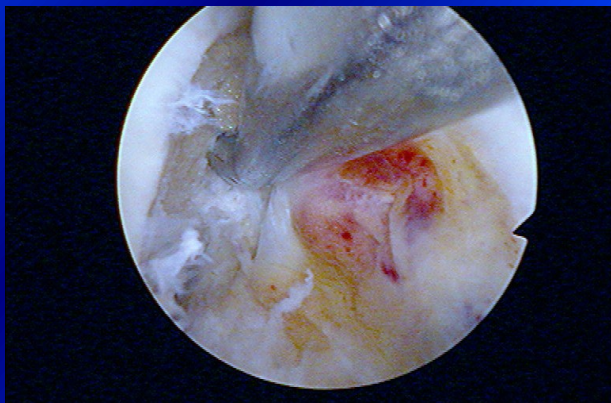
Technique



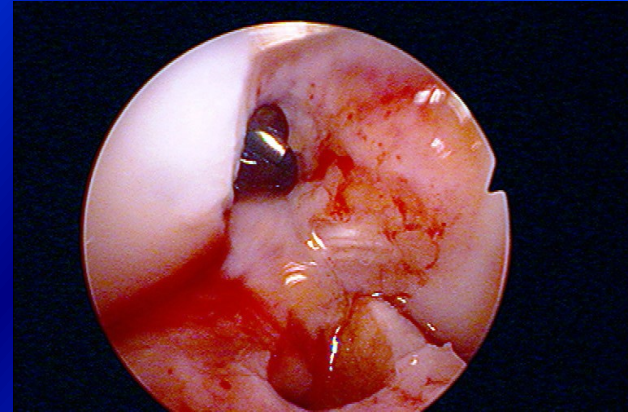
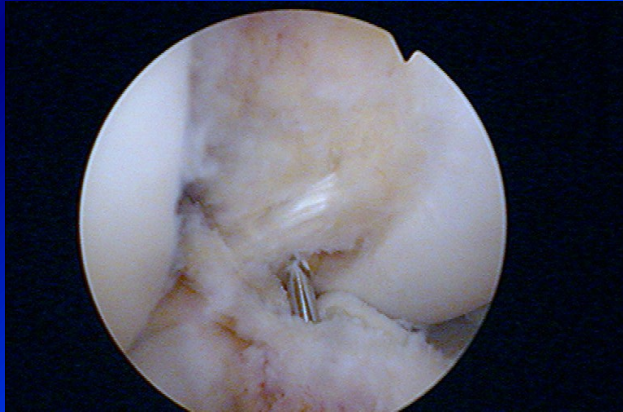
ACL plasty- press fit technique



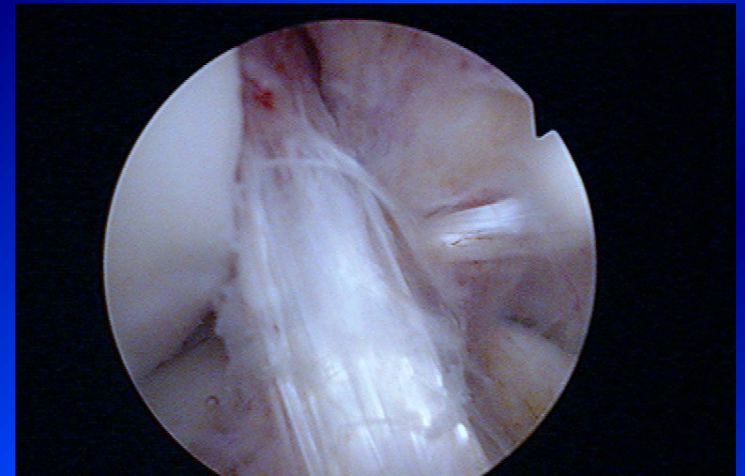
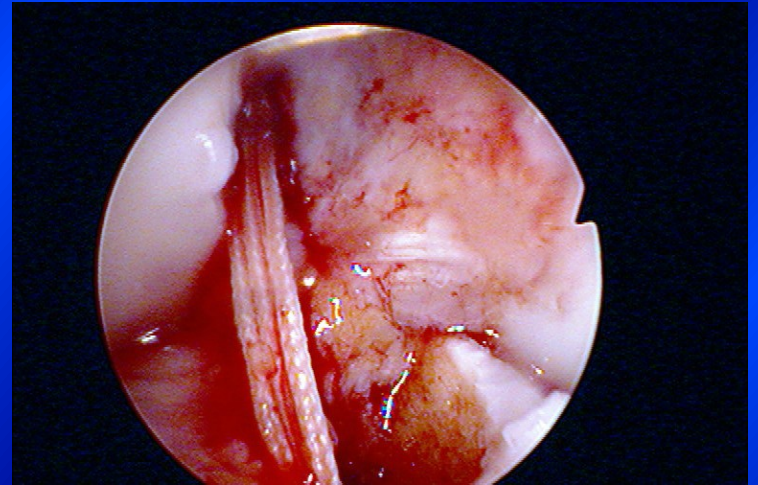
Femoral canal



Tibial canal



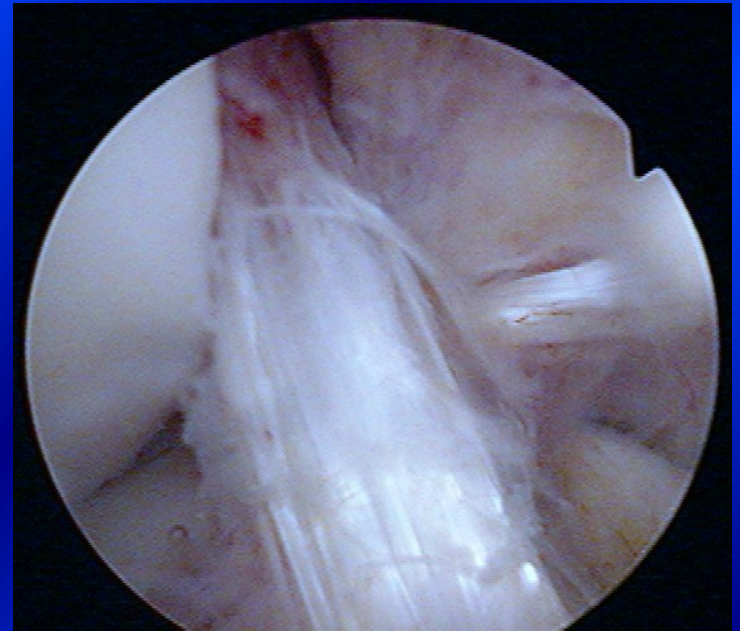
Tightening of the graft



Graft in situ

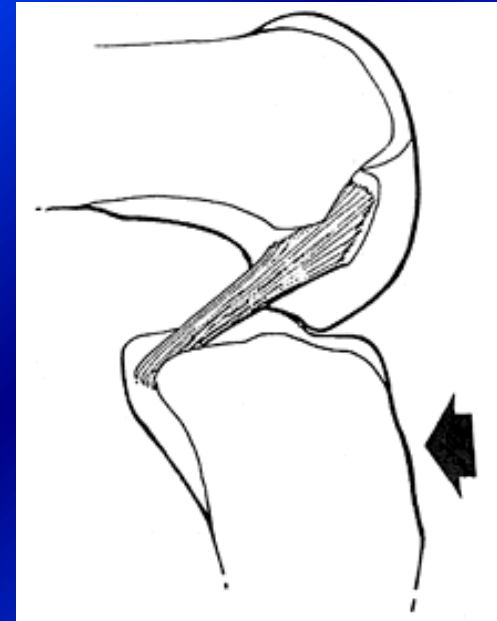
Aftertreatment

- 6 weeks orthosis
- Weight bearing after 6 weeks
- Sports activity after 9 months



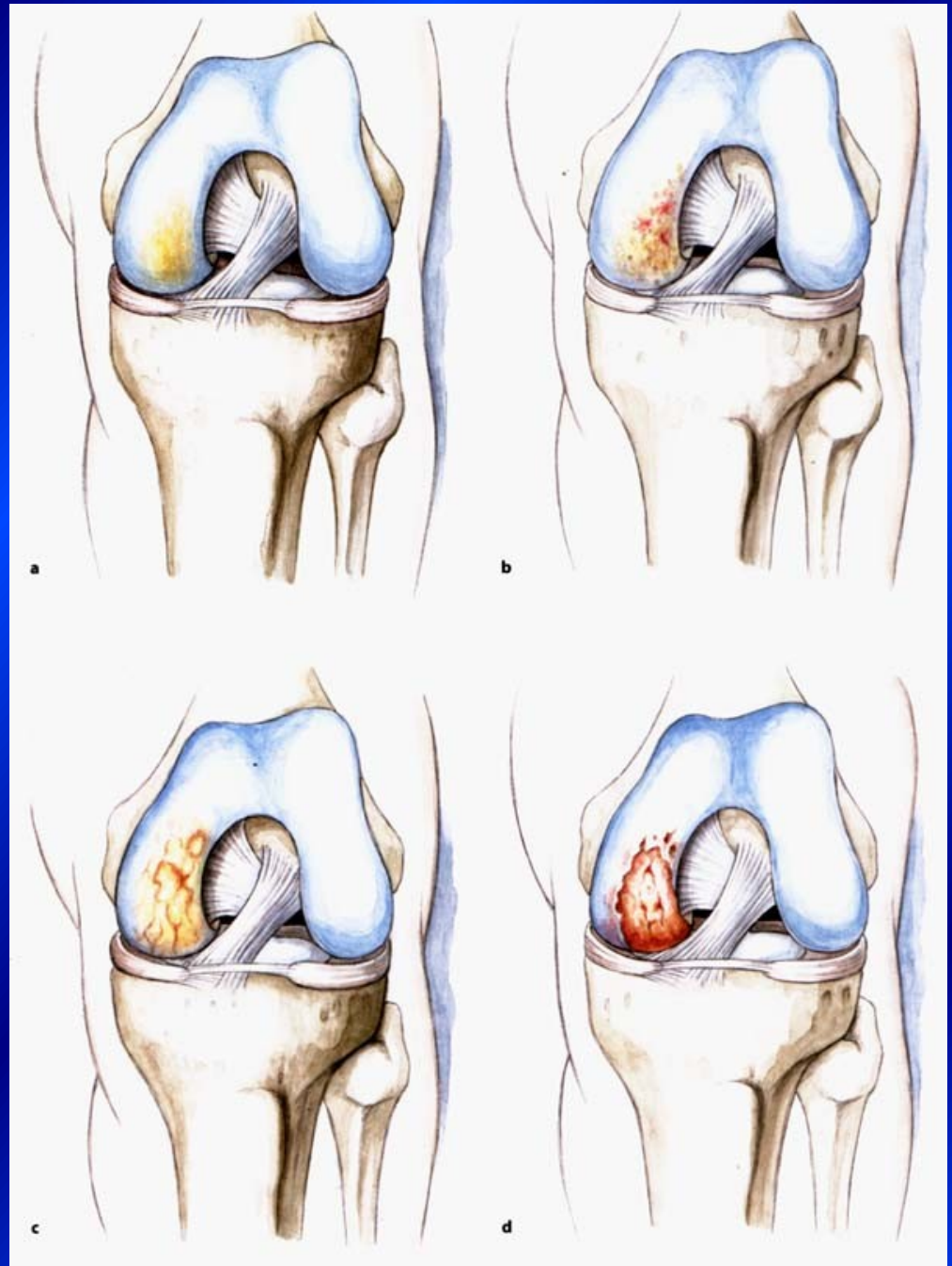
Rupture of PCL

- In **dashboard injury**
- **Posterior drawer sign**

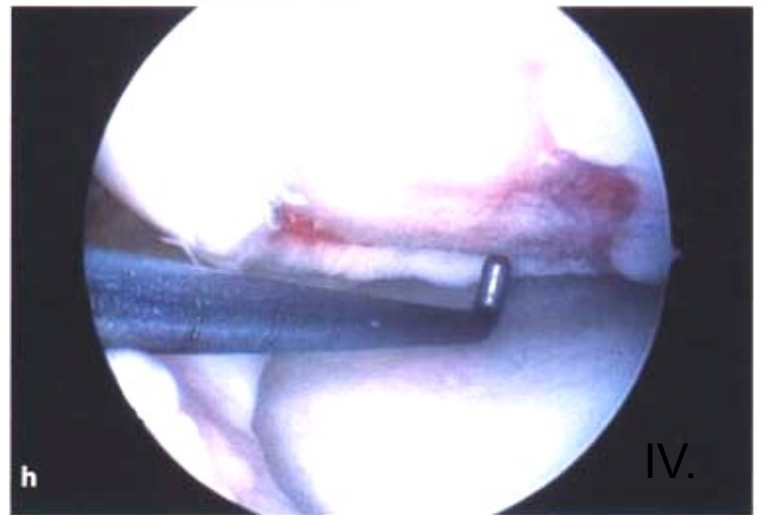
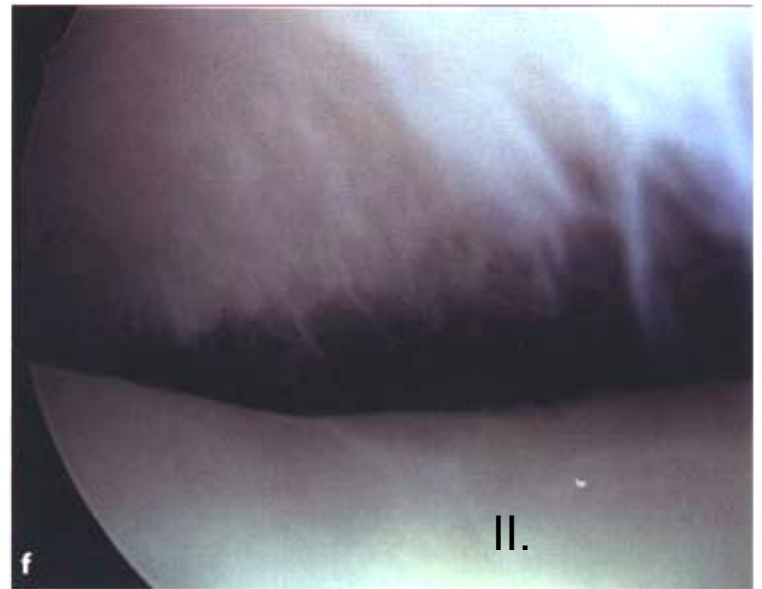


Chondropathy

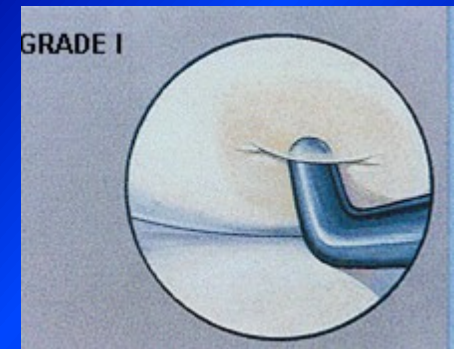
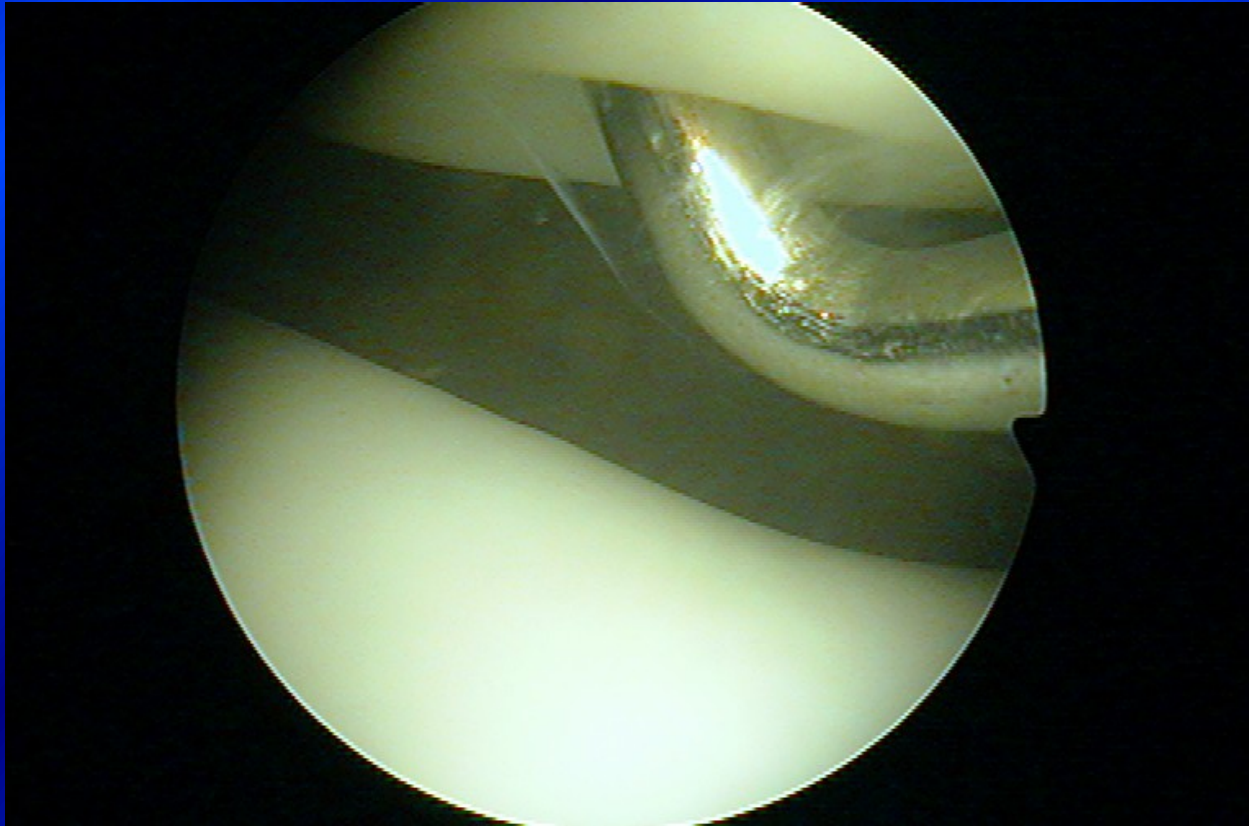
Outerbridge. H.K.



Chondropathy

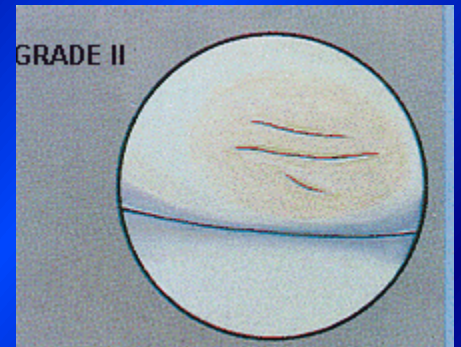
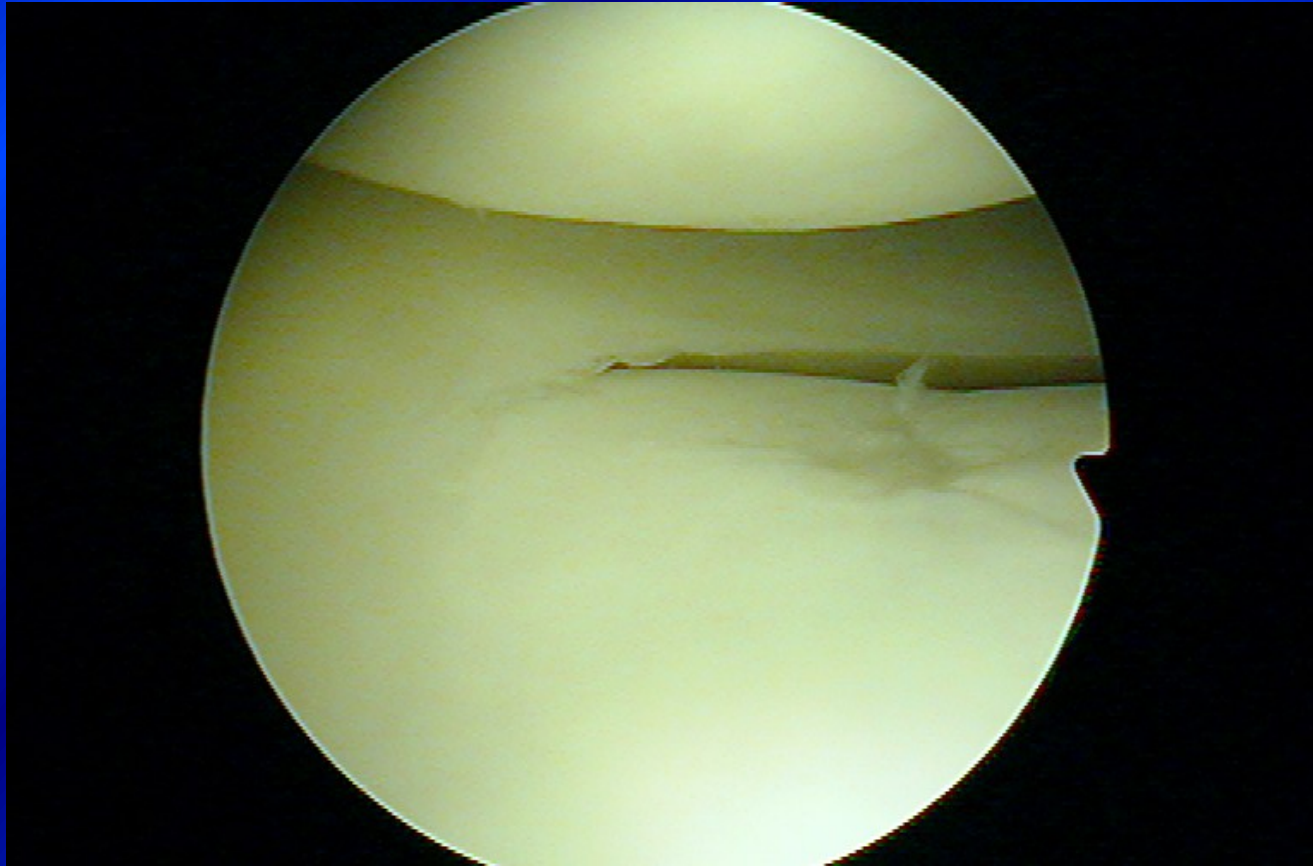


Chondropathy I. st.



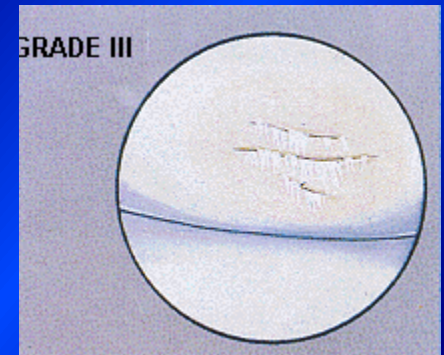
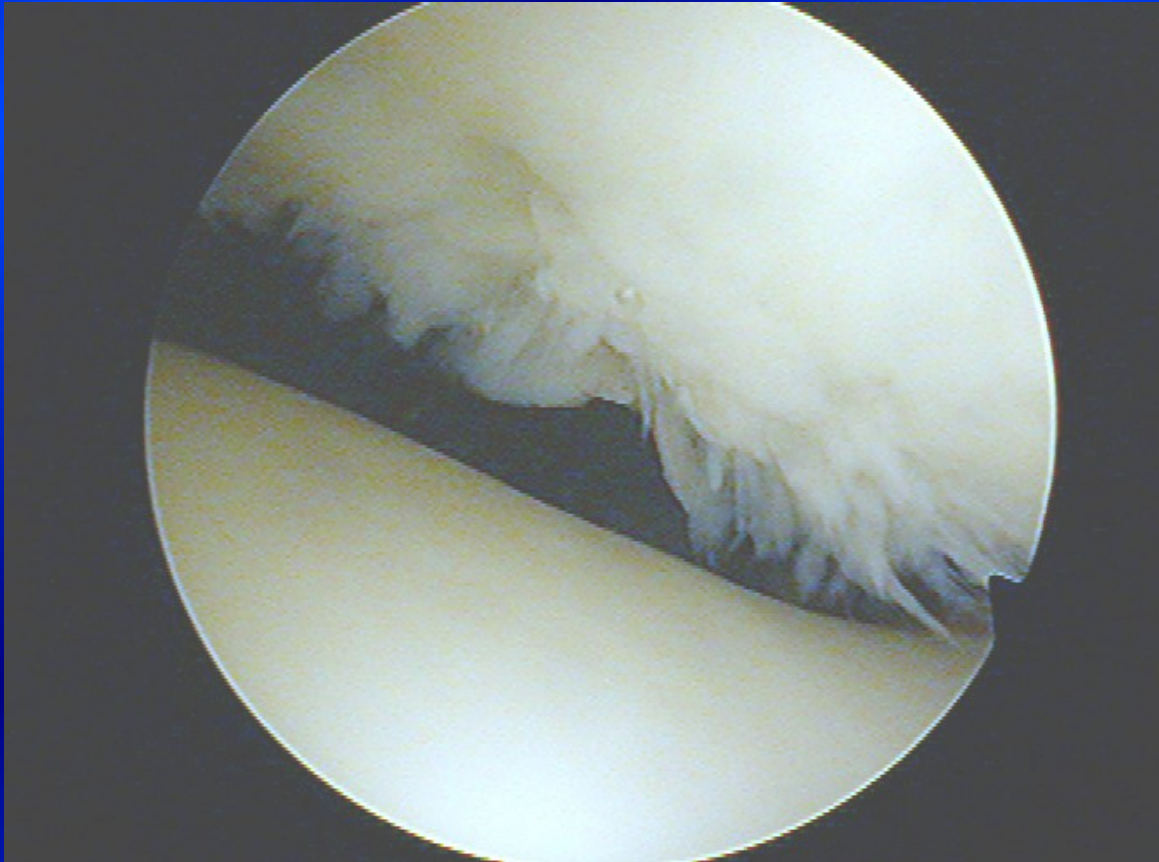
Soft cartilage, chondromalacia

Chondropathy II. st.



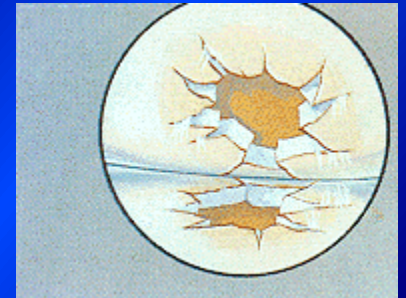
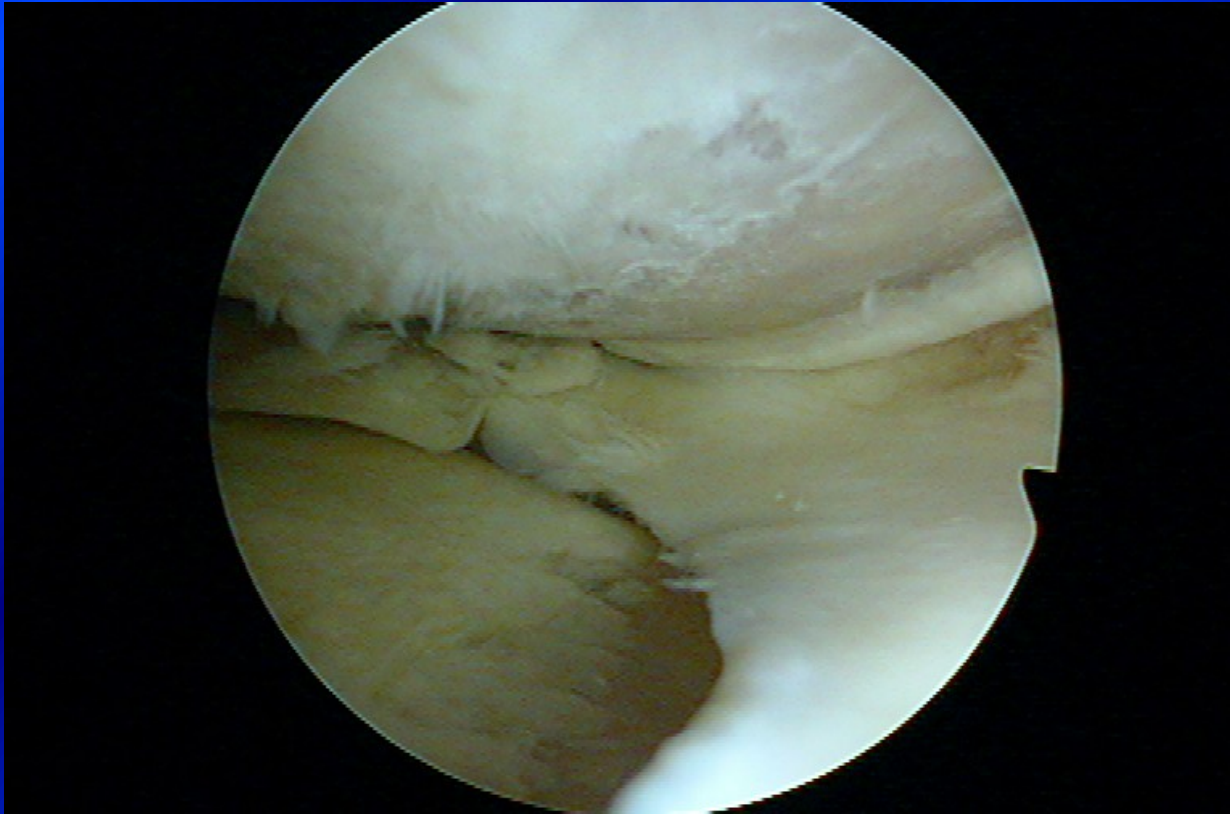
Fissures in the cartilage

Chondropathy III. st.



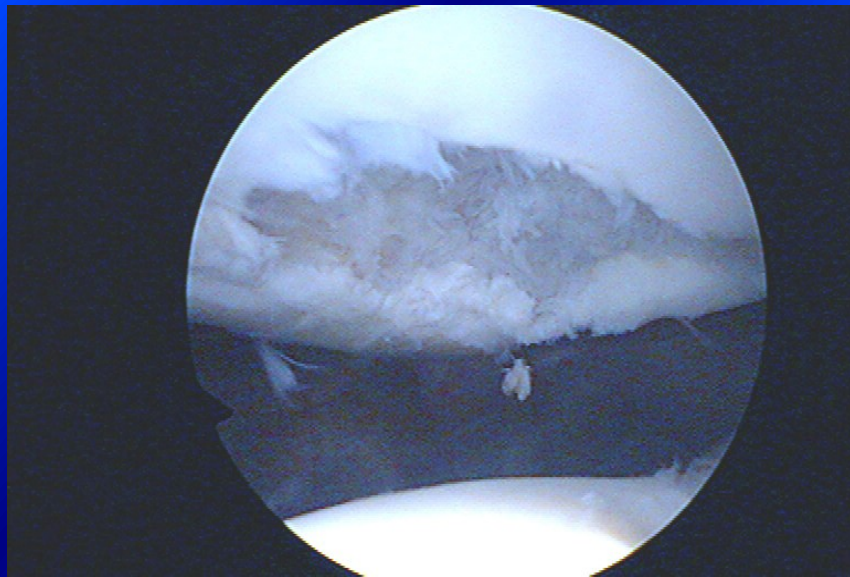
Fibrillation- „crab meet“

Chondropathy IV. st.

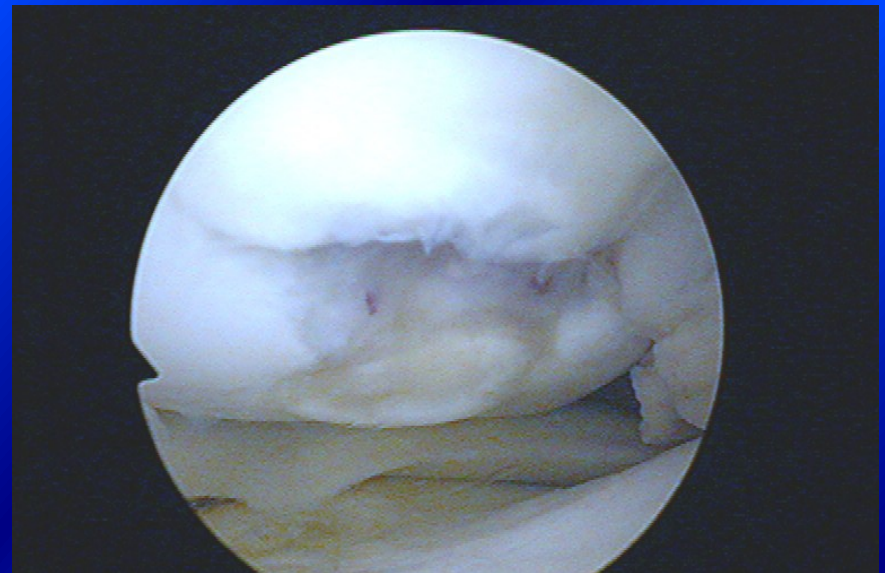


Defects to subchondral bone

Defects of cartilage

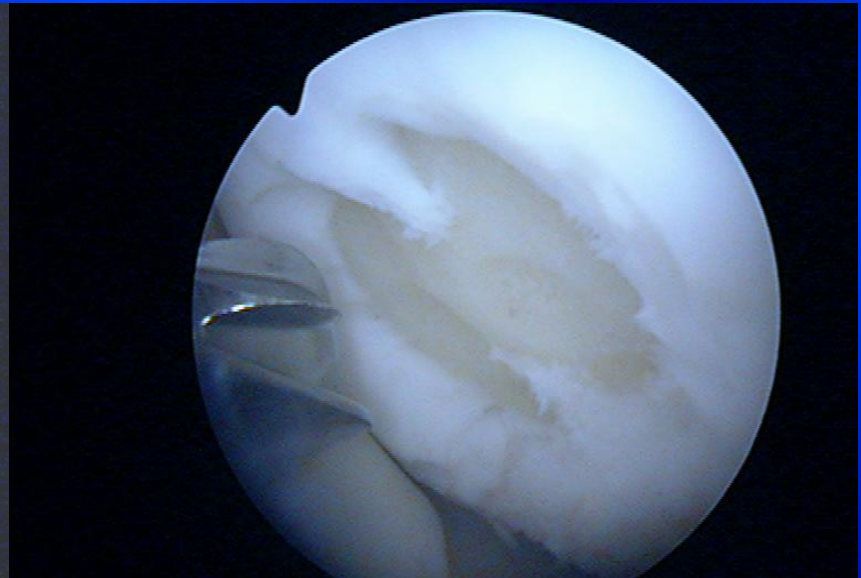
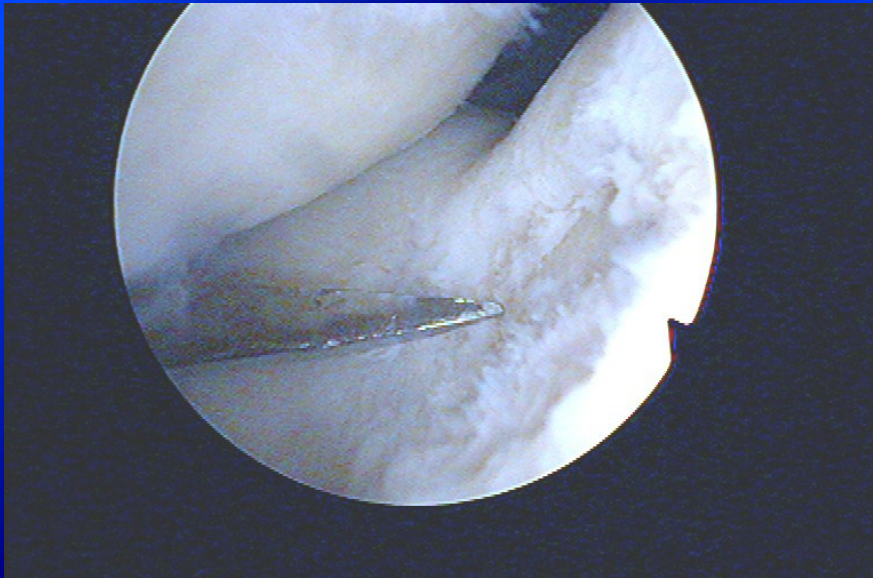


Patella



Medial condyle

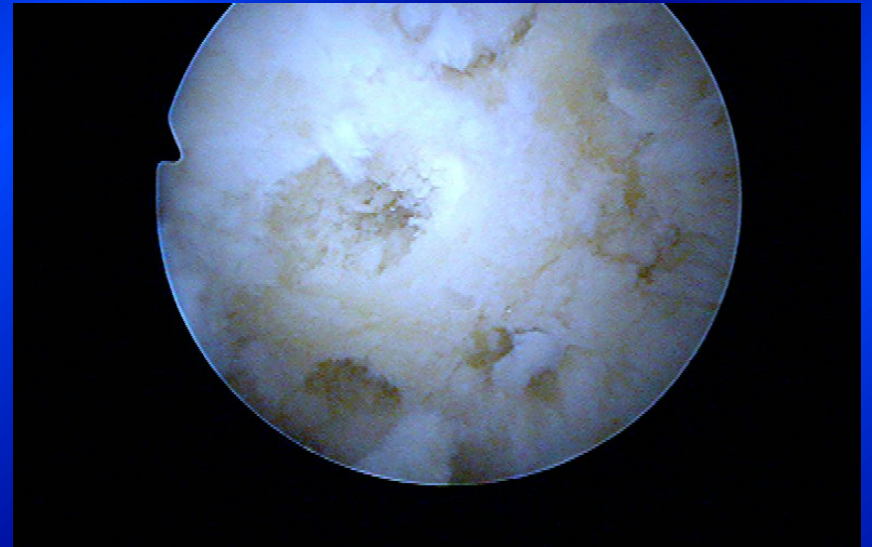
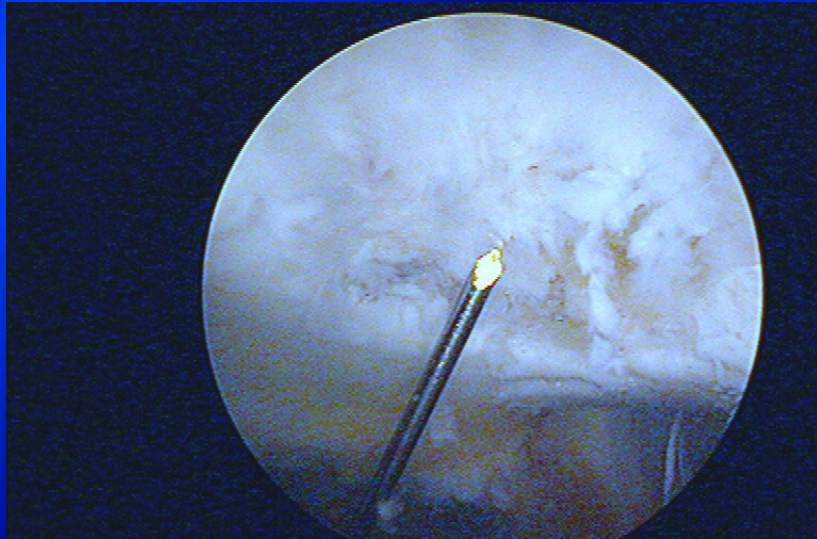
Shaving and drilling



-

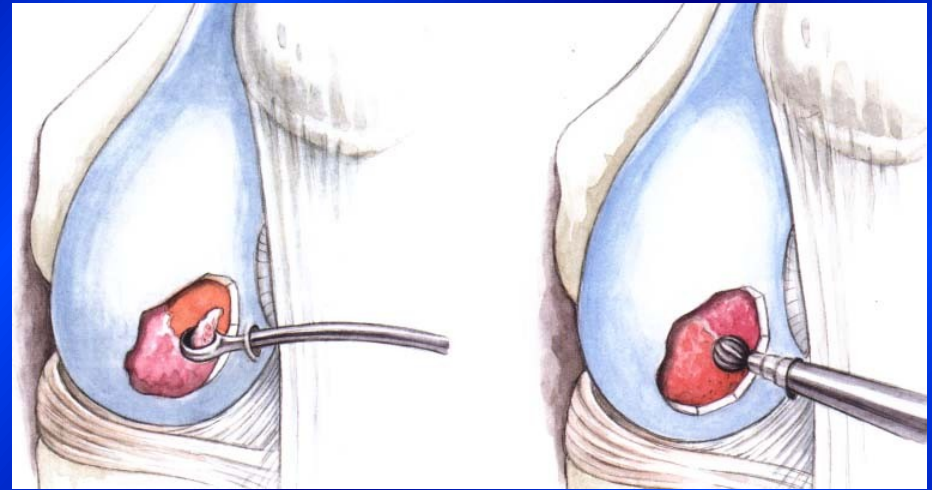
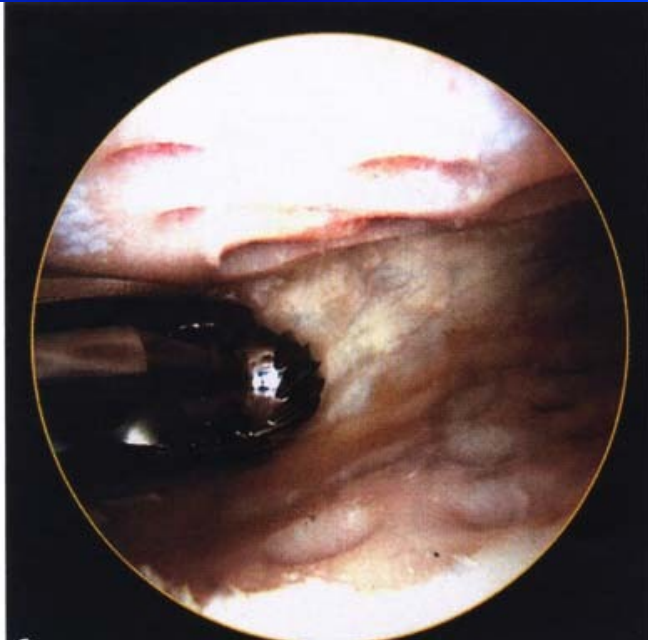
-

Drilling



Abrasion chondroplasty

Curretage
Shaver



Microfractures

Perforation of subchondral bone
- slight bleeding

Steadman, J.R., 1999

Multipotent stem cells into
the defects

The aim- to create fibrocartilago



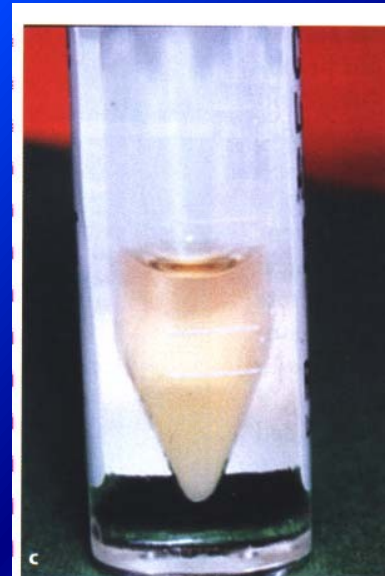
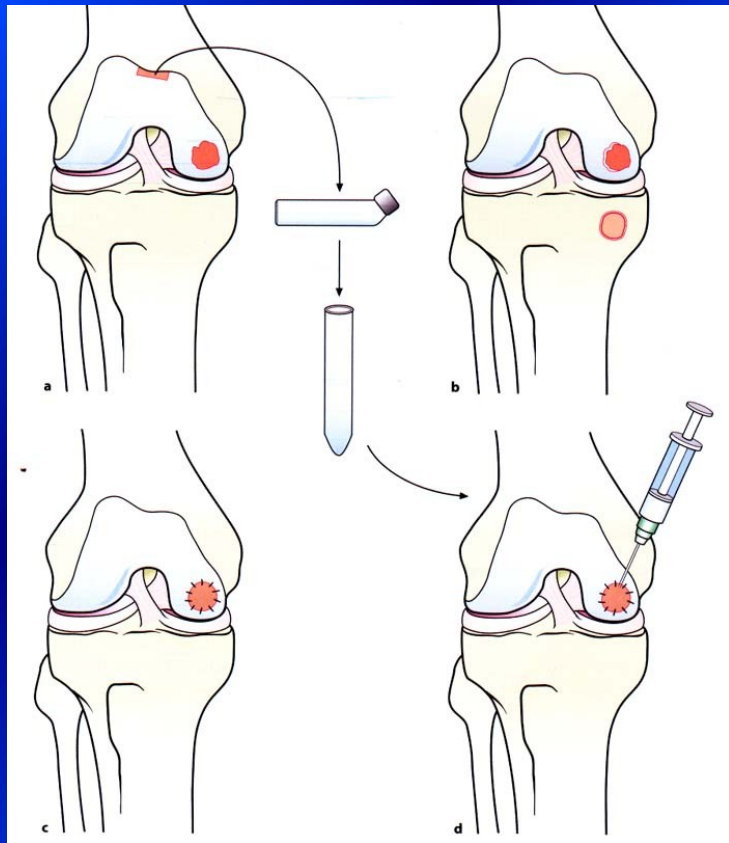
Microfractures



ACI – autologous chondrocyte implantation

Transplantation of autologous chondrocytes
into defects of cartilage

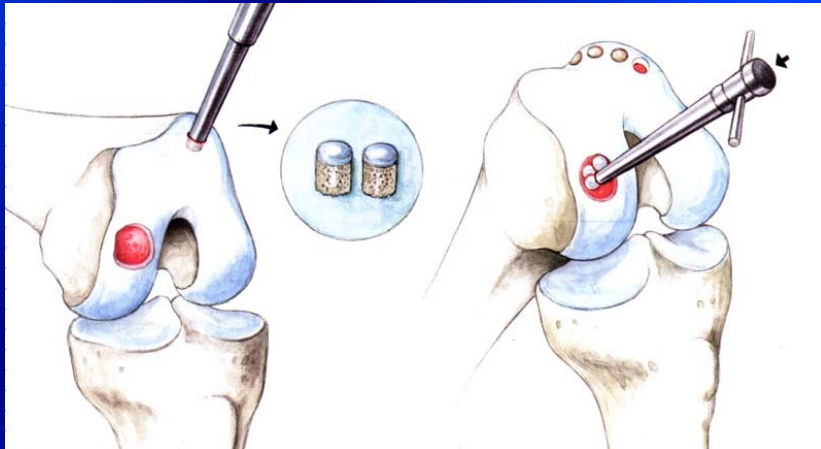
Chondrocytes in suspension under periosteal layer



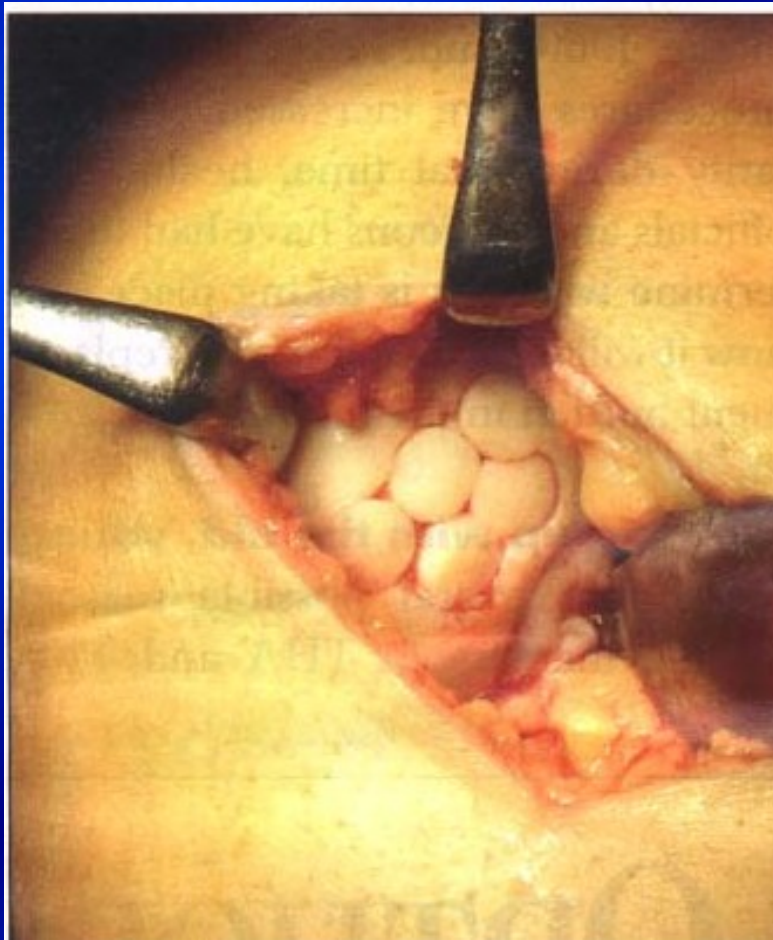
Osteochondral autograft transfer- OAT

Mosaic plasty

Hangody, L., 1992
Defects up to 2 - 4 cm²



OAT



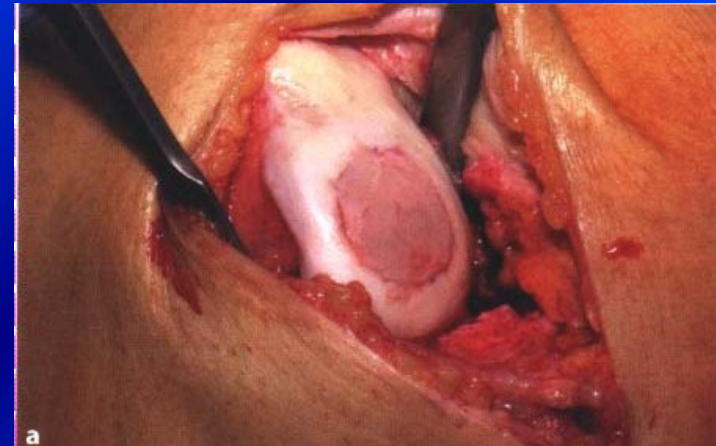
4 years after surgery

Hyalografts and chondrografts

Scaffolds- HyaloFast, Chondrotissue...

Biodegradable

Matrix for stem cells from bone marrow
after drilling or from serum



Collagen scaffolds

HyaloFast- scaffold

Polymer of HA

No special fixation

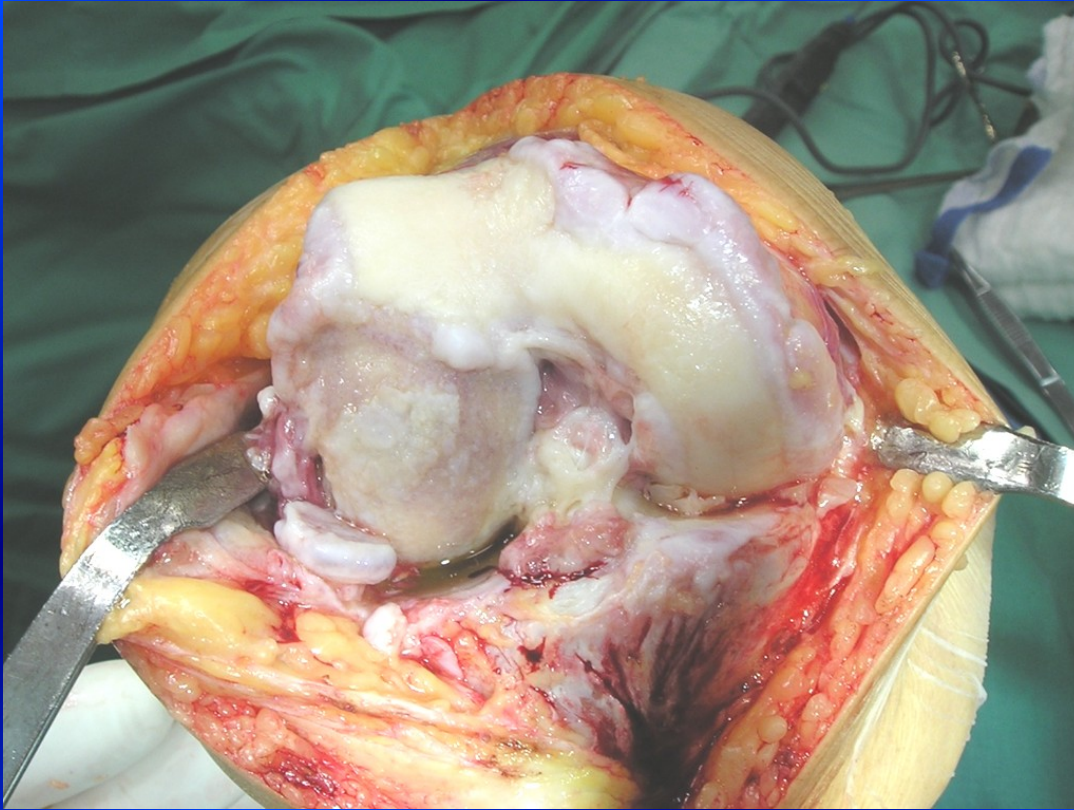
Scaffold serves for maintaining of stem cells from bone marrow

Supports viable cells

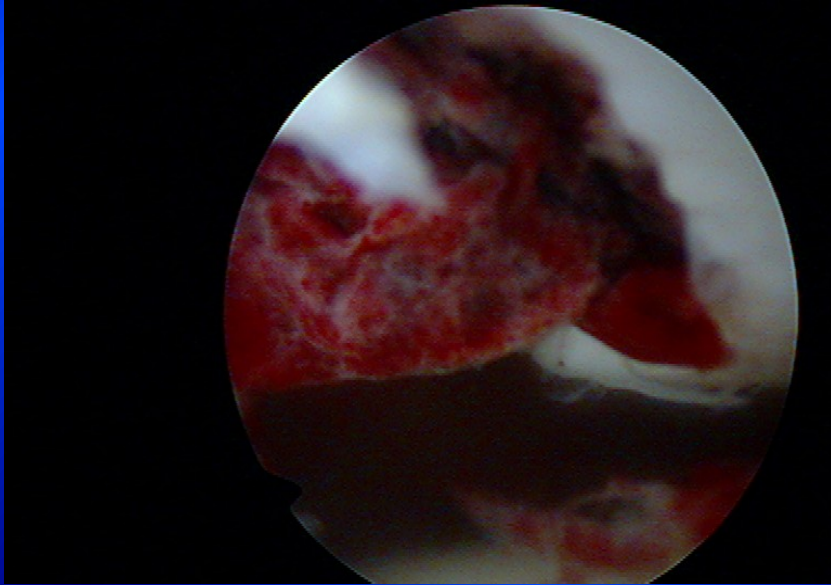
Fills the defects of hyaline cartilage



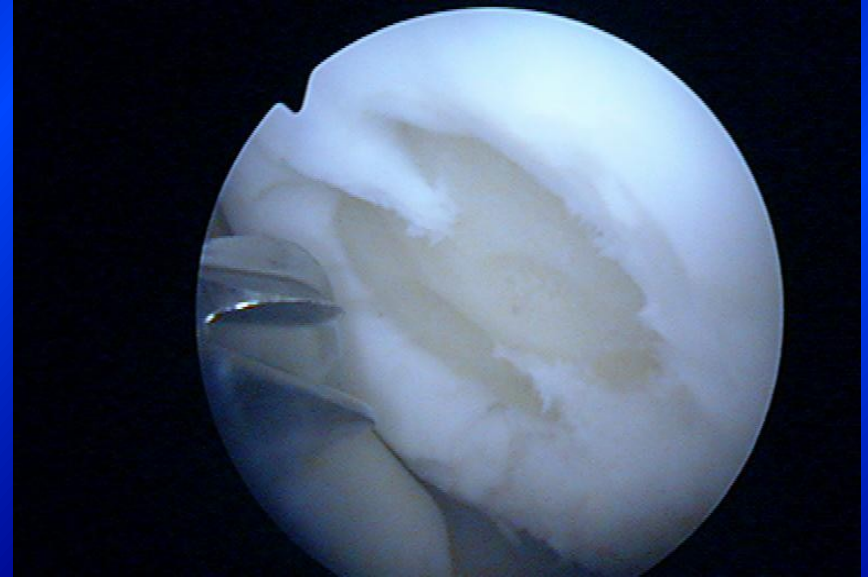
Osteoarthritis



Transchondral fractures



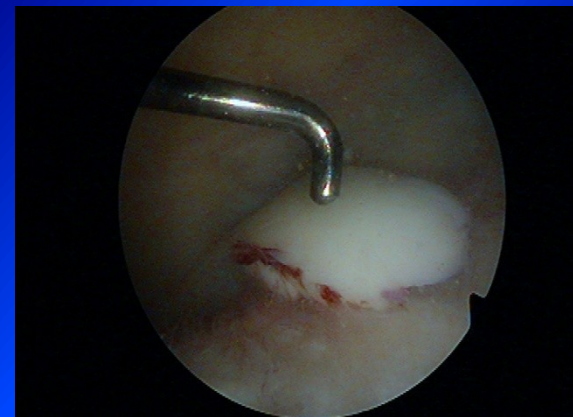
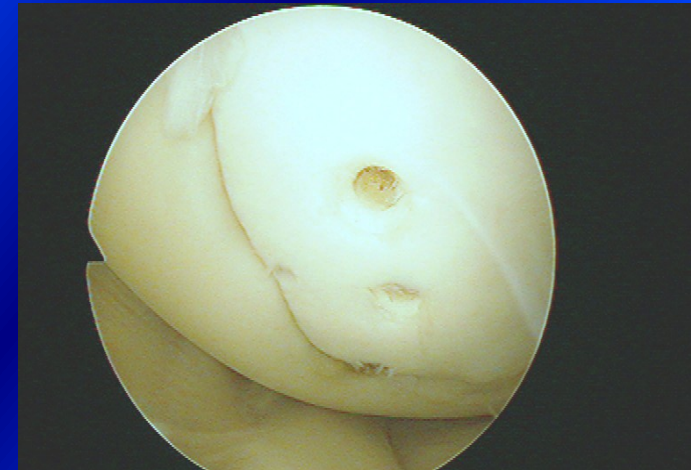
Removal



- **Subchondral abrasion**
- **Drilling**

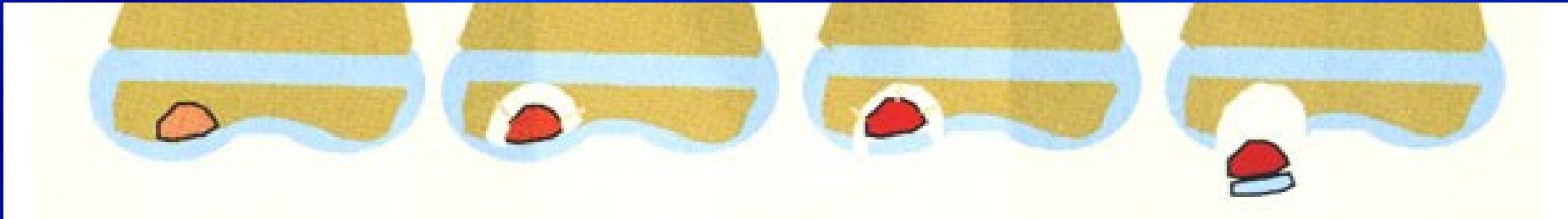
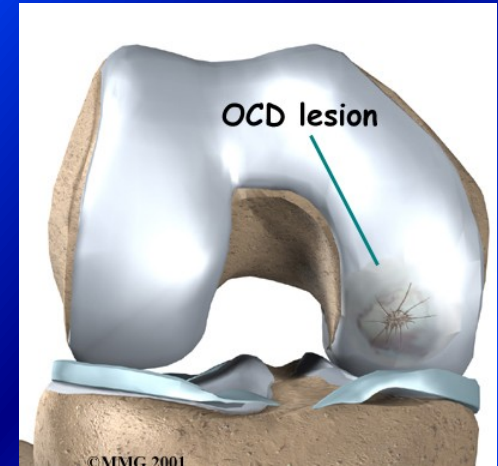
Osteochondral fractures

- Removal
- Fixation
- Loose body

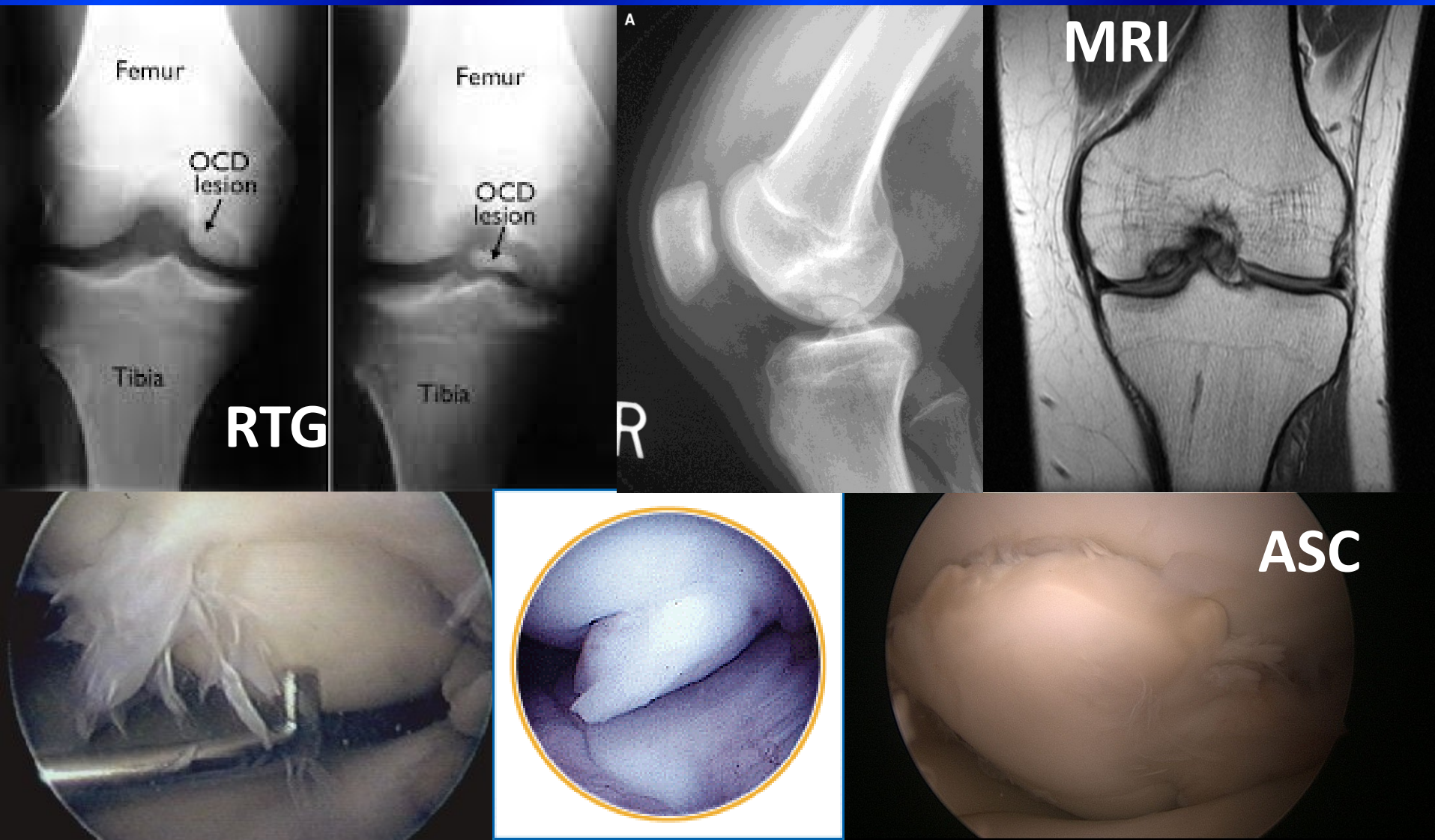


Osteochondritis dissecans

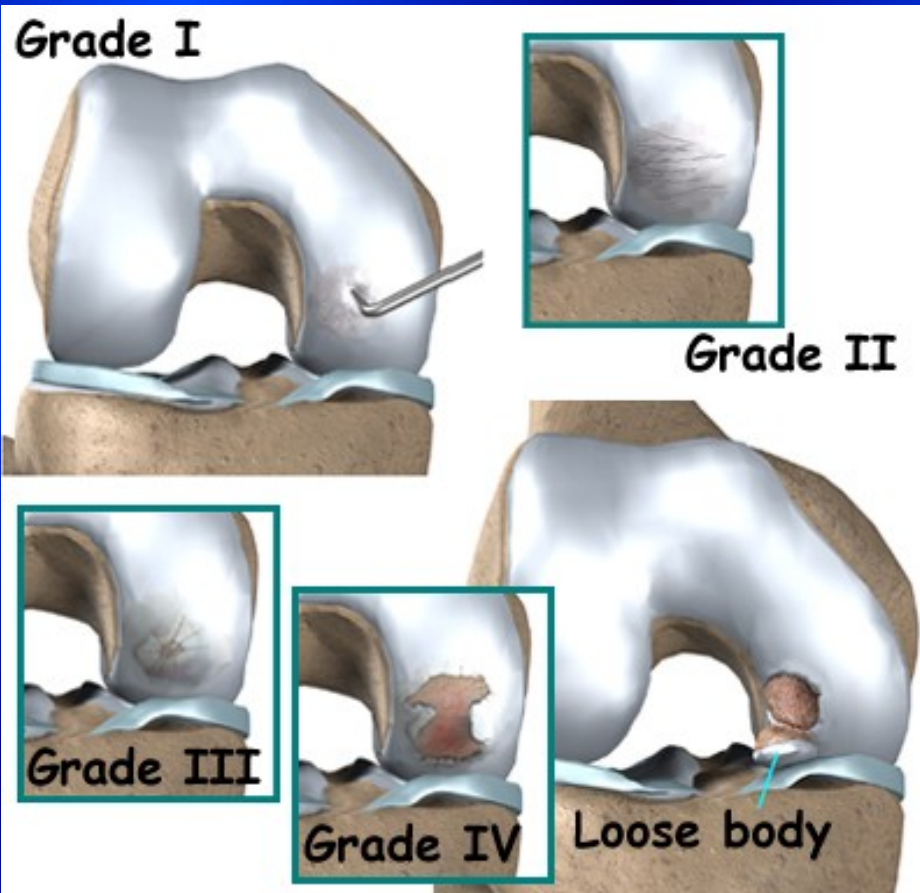
- Local necrosis in subchondral bone
- Mostly on medial femoral condyle
- Etiology- trauma, microtraumatisation
- vascular



- Diagnostics:
X ray, MRI, CT, arthroscopy



ASC classification



X ray classification

1. Negative
2. radiolucency
3. Sclerosis
4. Loose fragment

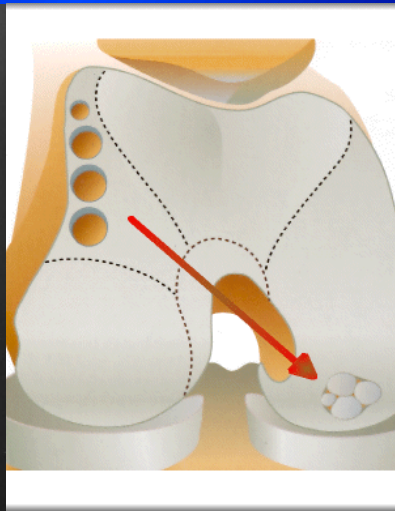
Therapy

Juvenile form

- conservative
- ASC drilling

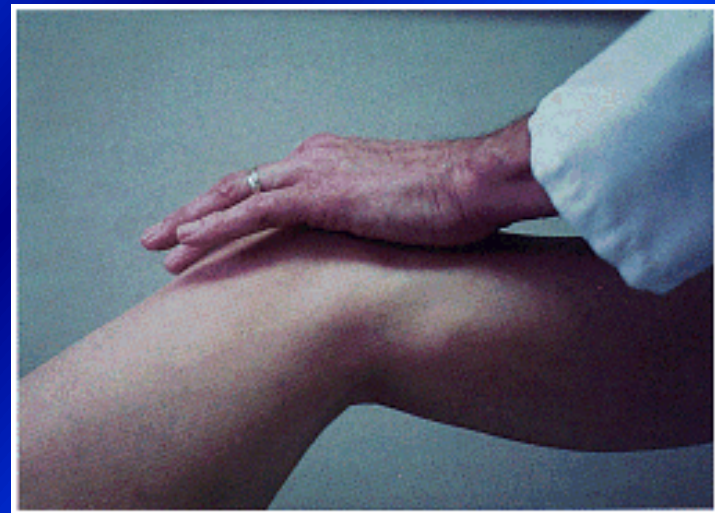
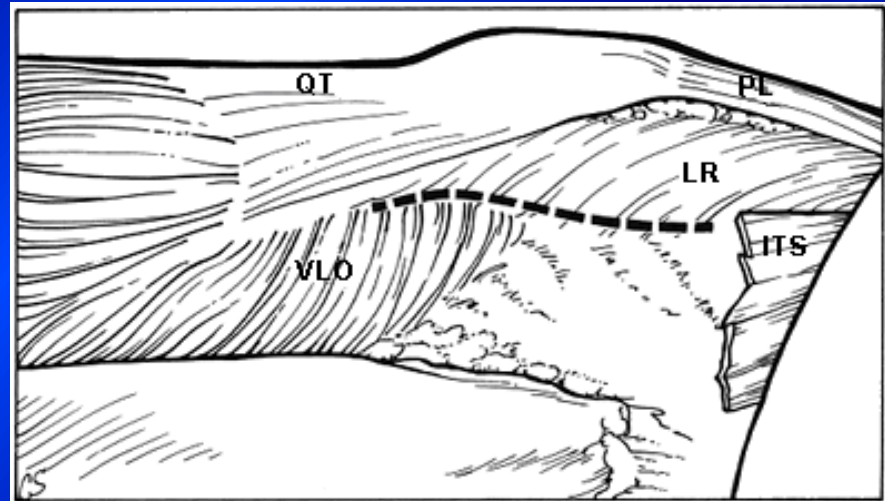
Adult form

- Drilling
- Fixation of the fragment
- debridement, drilling
- Bone grafting
- Mosaic plasty
- Chondrografts



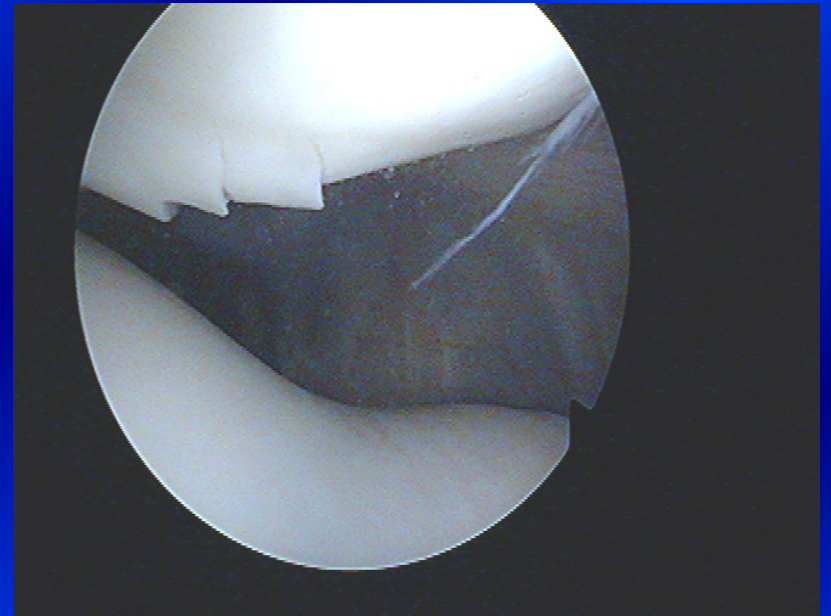
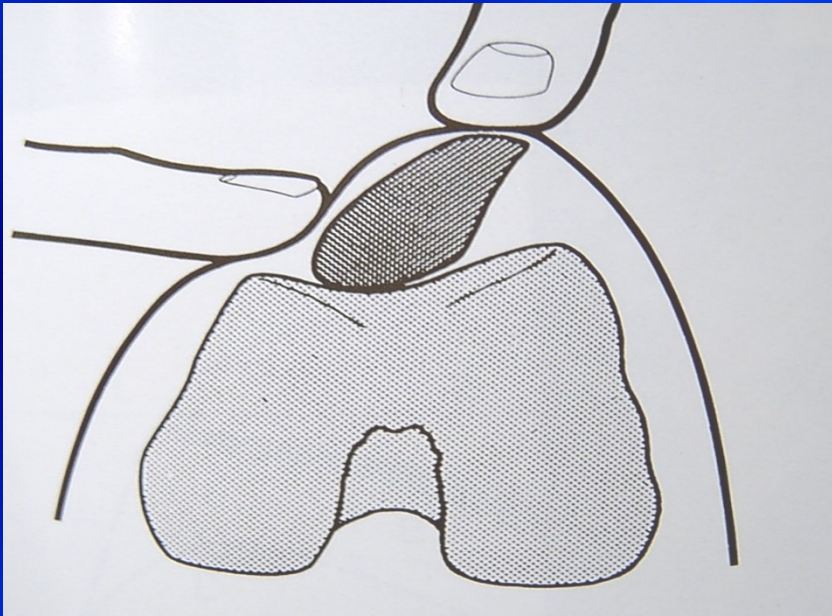
Patella

- Chondropathy
- Subluxation
- Dislocation



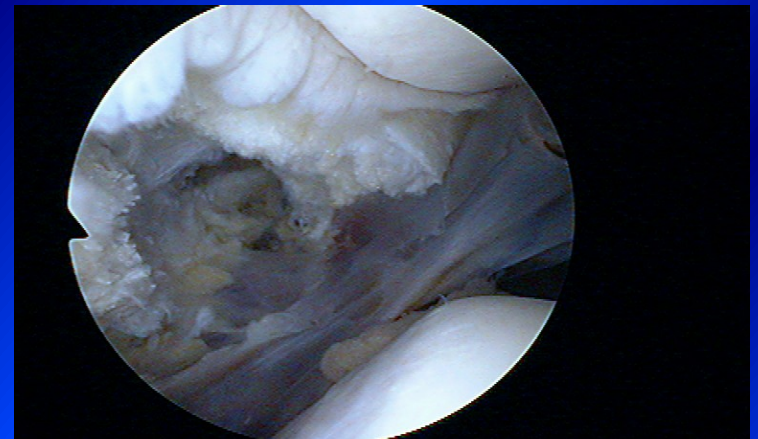
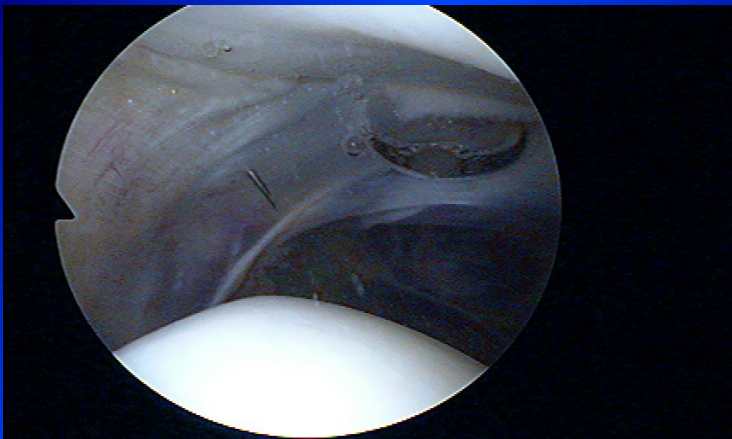
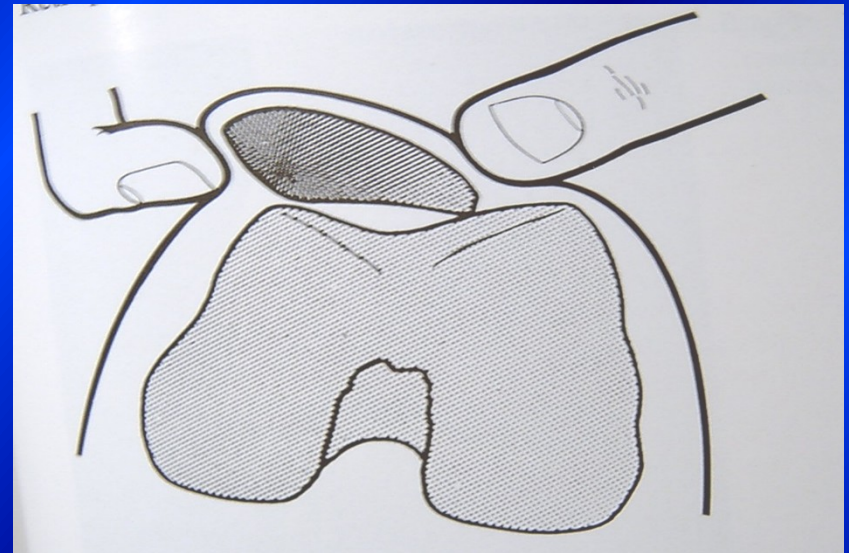
Chondropathy of the patella

Clinical symptoms



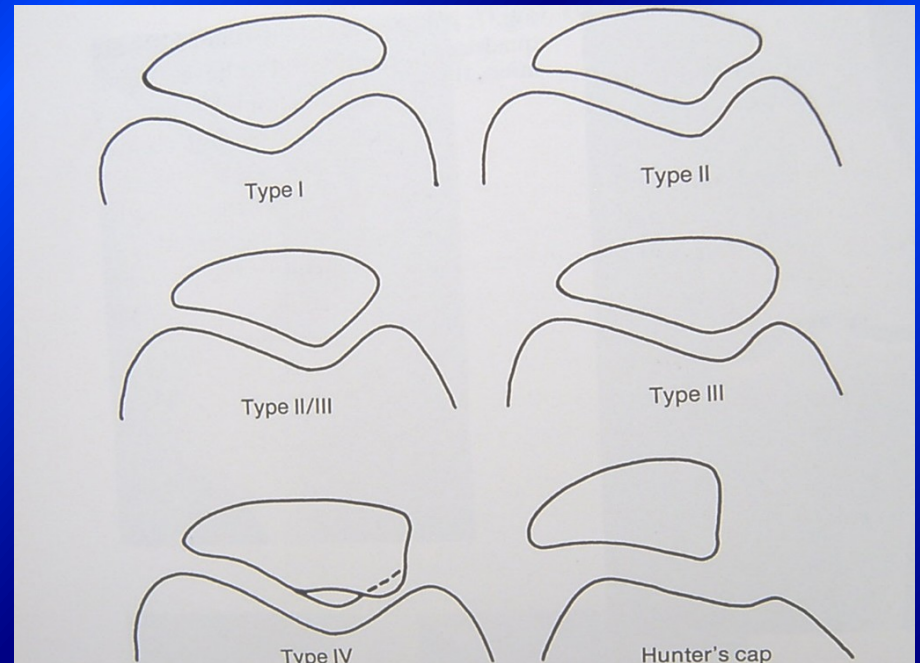
Chondropathy of the patella

- Conservative
- In lateral hyperpression lateral release



Traumatic dislocation of the patella

- Always laterally
- Conservative treatment
- Operative treatment



Types of patella

Recurrent dislocation of the patella

- posttraumatic
 - congenital
 - habitual
- ASK – lateral release + medial capsuloraphy
- Open surgery

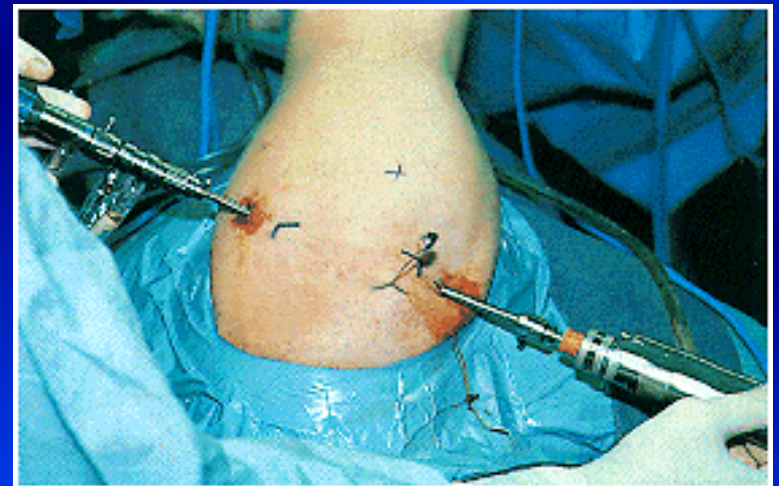
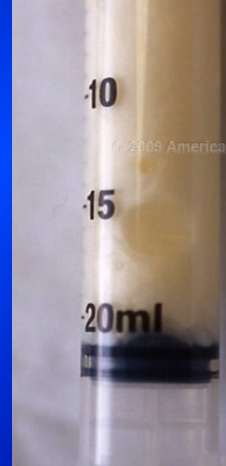
Tumors

- Osteosarcoma
- Ewing sarcoma
- Osteoclastoma
- Chondrosarcoma
- Soft tissue sarcomas
- Bone metastases



Pyogenic arthritis of the knee joint

- Aspiration- bacteriological exam.
- Laboratory tests
- X ray, ultrasonography
- **Therapy**
 - **ASC, lavage, antibiotics**
 - **orthesis**
 - **synovectomy**



Other disorders

- M. Osgood – Schlatter
- Jumper's knee
- Baker's pseudocyst
- Bursitis
- Ganglion of meniscus

