Universitatea de Medicina si

Farmacie “Victor Babes”

Timisoara

Sprains

Definition:

- Traumatic lesions of periarticular and capsulo-ligamentary soft tissue

- Produced due to stretching articulations beyond their physiological movement limits

- Without modifying the permanent contact between the articular surfaces of the bones making up the joint

- Most frequent injuries

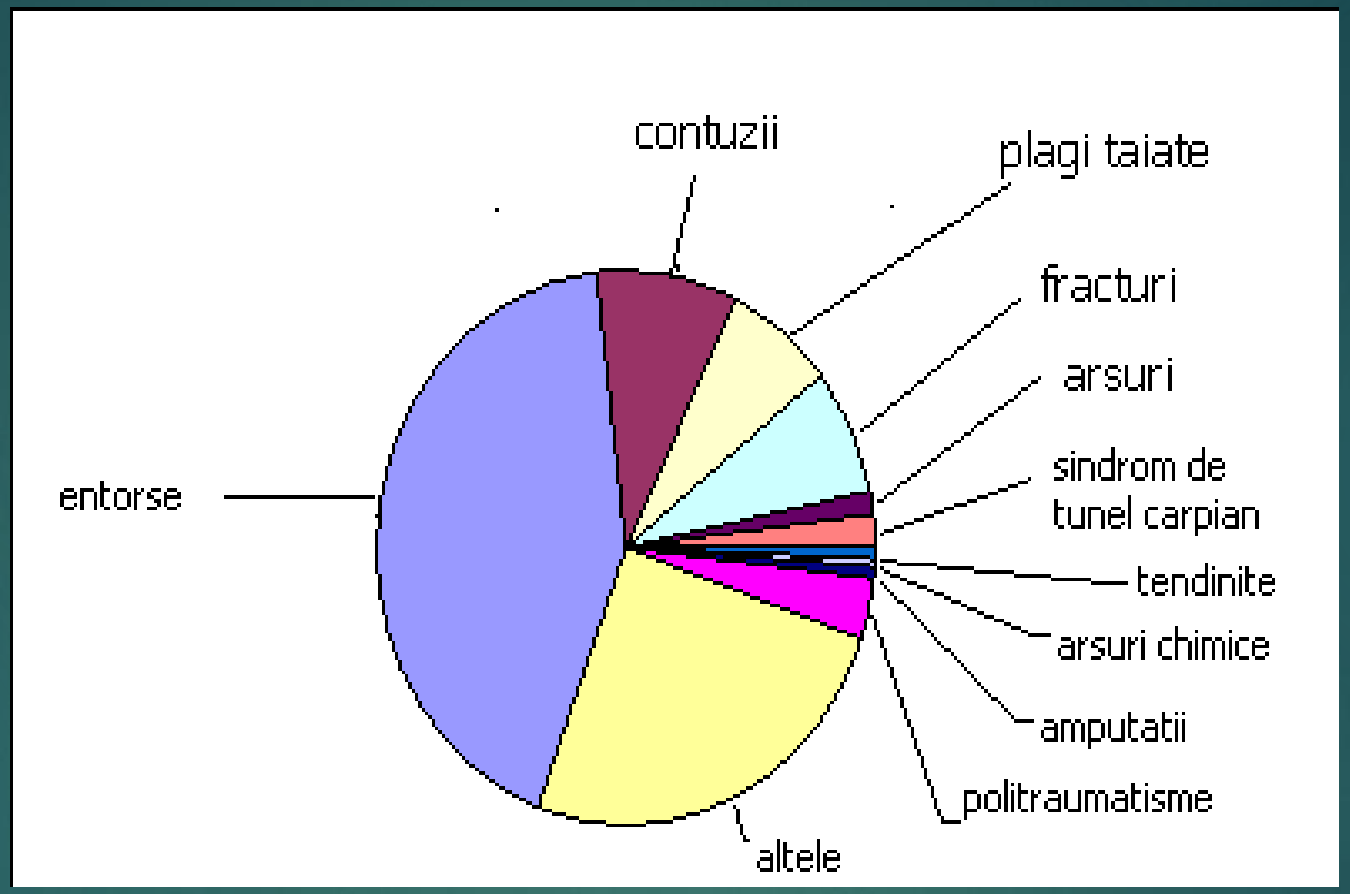
Sprains

Frequency:

- **More frequent in adults**

- **More rare at the extremes of the age spectrum:**
  - Children – increased joint capsule elasticity
  - The elderly – juxtaarticular or intraarticular fractures appear

- **More frequent in lower limbs (knee, ankle, medio-tarsus)**
  - Lower limb - interphalangeal
  - Upper limb - radiocarpal



Types of injuries by frequency in adult, active persons

(www.bls.gov ,USA,)

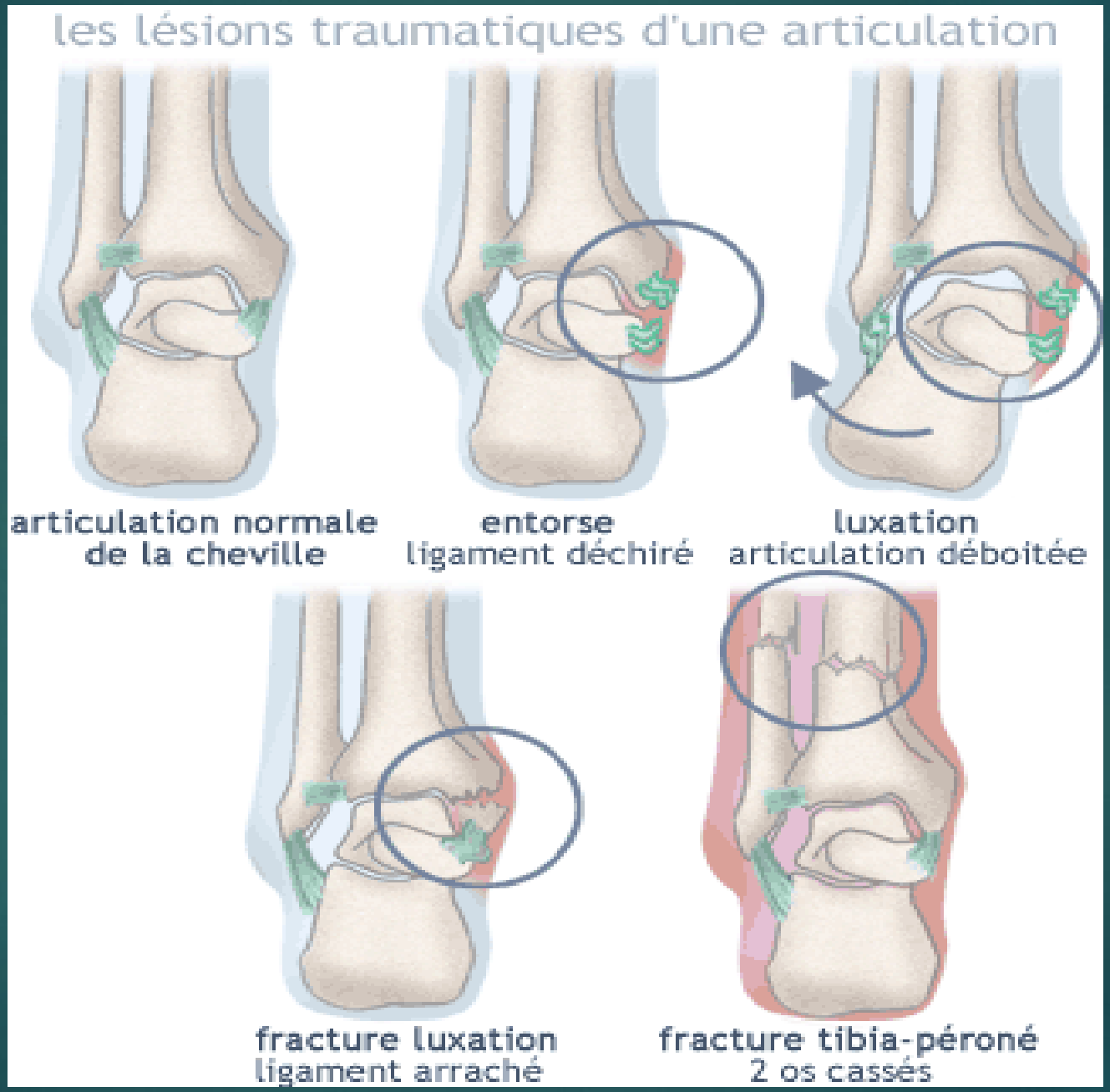
Causes

1. *indirect*
   - Most frequent
   - Rotation or torsion of adjacent segment
2. *direct*
   - More rare

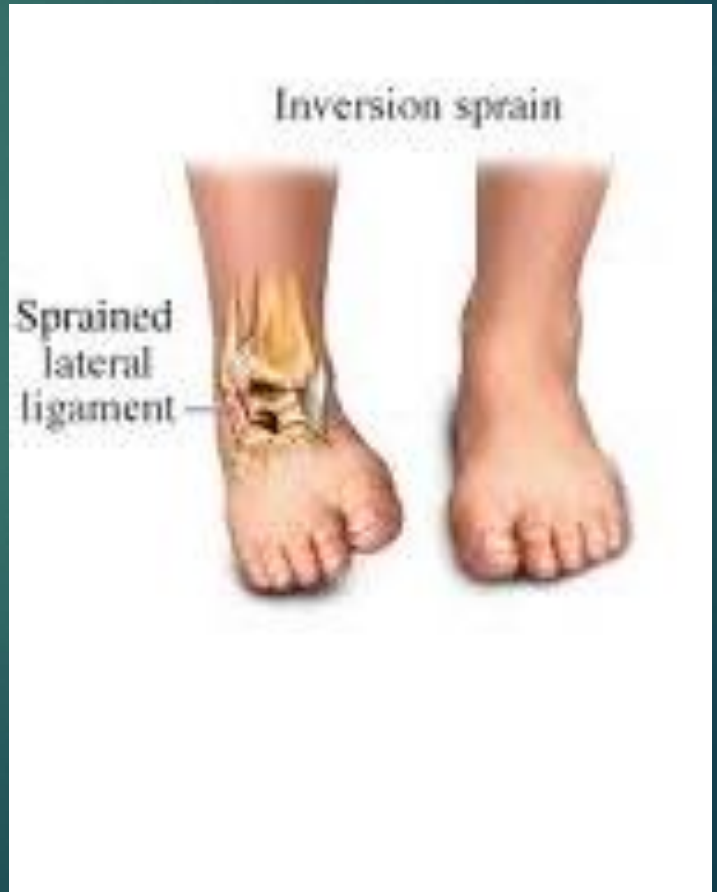
Sprains

The injury produces:

- Capsule and ligament lesions (sprain-specific)
- Tegumentary and subcutaneous lesions (edema, hematoma)
- Musculo-tendinous lesions (fascicular strain or tearing)
- Synovial membrane lesions (haemartosis)
- Osteo-periostal lesions


les lésions traumatiques d'une articulation
articulation normale
de la cheville
entorse
ligament déchiré
luxation
articulation déboitée
fracture luxation
ligament arraché
fracture tibia-péroné
2 os cassés

1. **Forced inversion** (adduction-supination)-most frequent, stretches or tears talocalcaneal ligaments, then talo-fibular and fibulocalcanean ligaments



2. **Forced eversion** (abduction-pronation)

talotibial capsule and ligaments

Classification

- 3 Degrees based on severity of injuries

1st degree – stretching of periarticular ligaments and the fibrous layer of the articular capsule

2nd degree – partial tearing of periarticular ligaments and the fibrous layer of the articular capsule

3rd degree – complete tearing of capsule and ligament structures

- usually associated with oste-periostal tearing of insertions

Sprains of the ankle

Diagnosis

Pain, swelling, bruising of the region

- Sprain by inversion:
  - Mostly on anterior external face
  - Pain before and below tip of external malleolus
- Sprain by eversion:
  - Pain underneath and behind internal malleolus

Severe sprains – haemarthrosis occurs

Imaging investigations

2-position X-ray exam - completes clinical exam, reveals presence of osseous lesions

MRI exam

Differential diagnosis:

Ankle contusion
Juxtaarticular fractures
Chronic ailments

Ankle sprains

TREATMENT

Emergency:

Combat the pain, immobilize the joint

Light sprain (1st degree)- capsulo-ligamentar distention

- Physical rest
- Immobilization in elastic bandage 7-10 days
- Local icing
- Elevation of the limb
- Anti-algic, antiinflamatory medication
- Physical therapy

Ankle sprains

TREATMENT

Medium and severe sprains (torn or pulled)

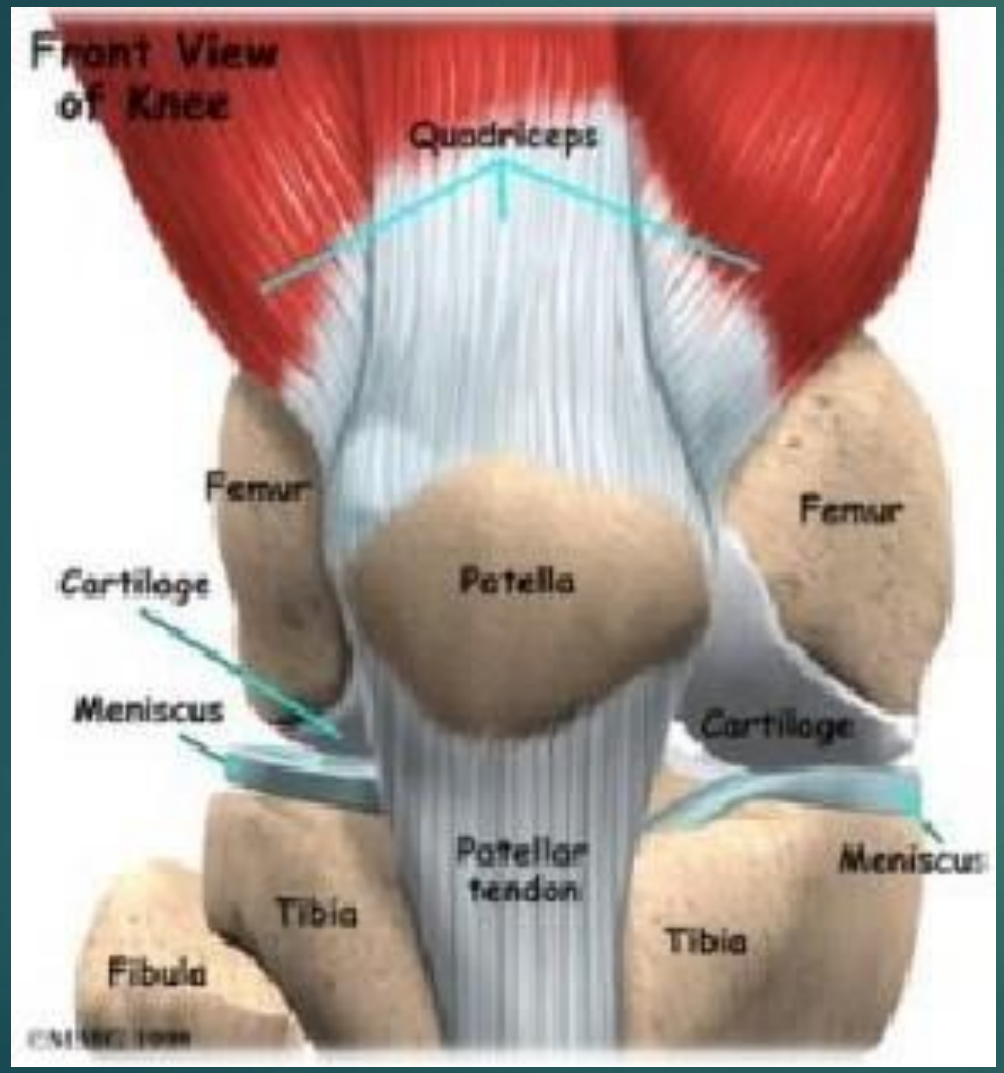
- Physical rest
- Immobilization in plaster cast - 4 weeks. Physical therapy and functional rehabilitation
- Young people and athletes – capsulo-ligamentar suture, eventually augmented via ligamentoplasty with peroneus brevis tendon
- After the procedure, immobilization in cast followed by physical therapy

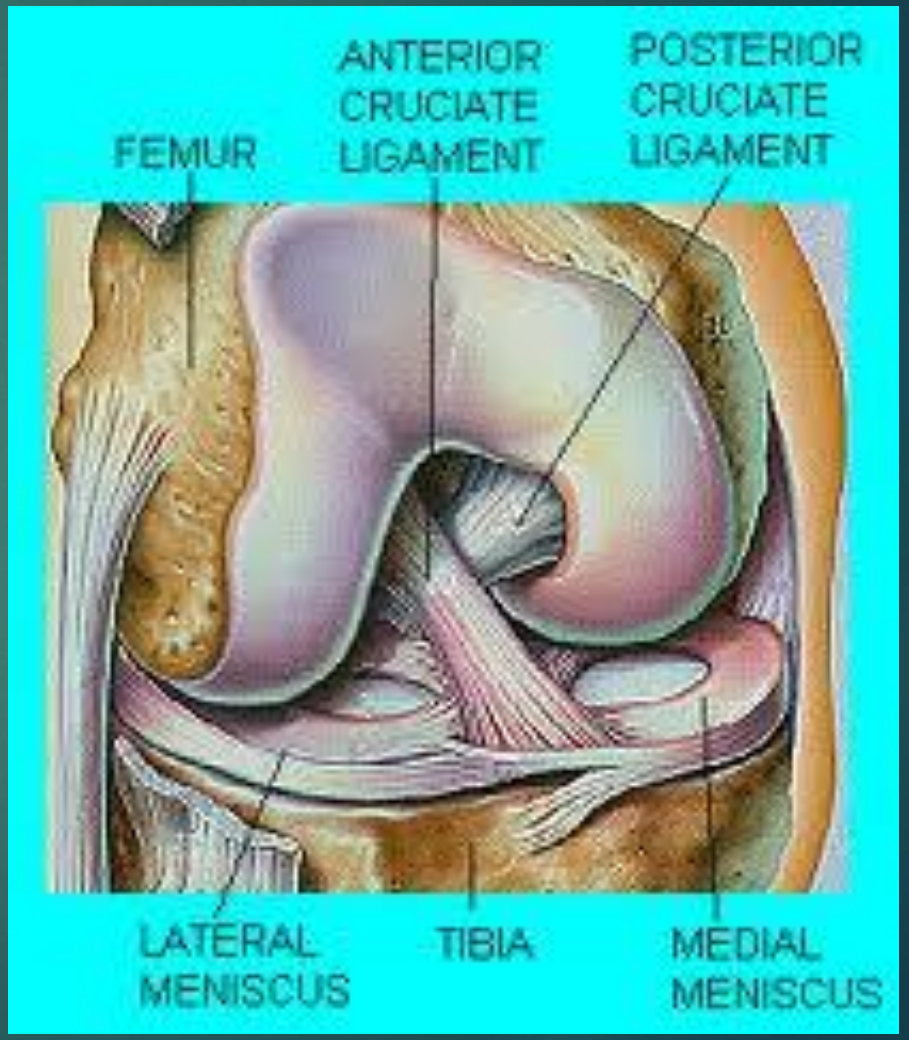
Residual ligament laxity and ankle instability – surgical treatment followed by physiokinetic therapy

Knee sprains

Sprains of the knee consist of an ensemble of capsulo-ligamentary lesions, associated or not with lesions of the meniscus

Frequently encountered in sports injuries


Front View of Knee
Quadriceps
Femur
Femur
Cartilage
Patella
Meniscus
Cartilage
Patellar tendon
Meniscus
Tibia
Tibia
Fibula


FEMUR
ANTERIOR CRUCIATE LIGAMENT
POSTERIOR CRUCIATE LIGAMENT
LATERAL MENISCUS
TIBIA
MEDIAL MENISCUS

Knee sprains

Means of occurence

- Frequently indirect
- *Less frequently direct*

- Road accidents – pedestrians – lateral impact, with extended knee (orthostatism)
- Sports injuries (rugby)

Knee sprains

Pathological anatomy

- From mere strains or partial tearing, to complex capsuloligamentar tears
- Medial capsuloligamentar lesions - frequent
- Lateral capsuloligamentar lesions – must check the external popliteal nerve (common fibular nerve), lateral collateral ligament, Maissiat's band

Knee sprains

Classification

Gorun – stable sprains *(benign)*

- unstable sprains *(severe)*

Genety –benign sprains (stage I and II)

- severe sprains (stage III)

-both analyze the stability of the knee

Knee sprains

Benign sprains (stage I):

-Stretched ligaments

-more frequently the medial collateral ligament

-more rarely the lateral collateral ligament and posterior segment of the capsule

Clinical:

Spontaneous pain after effort, in a fixed point upon palpation

Pain can be worsened by certain movements (20-30 degree flexion, abduction)

Inspection: visually unmodified knee, in most cases without effusion

Normal gait, knee is stable

Rx: - no osteoarticular lesions

Treatment: joint rest 5-7 days, local physical agents, antiphlogistics. Cast is not necessary

Knee sprains

Benign sprains (stage II)

- Partial ligament rupture

Clinical:

Immediate pain, exacerbated by movement and walking

Lateral laxity exam causes pain

Inspection: swollen knee, sometimes limited bruising and effusion.

Treatment: -majority of benign sprains – orthopedic treatment (short leg cast 20-30 days)

- While wearing cast, isometric contractions, physiokinetic therapy, general antiinflamatory treatment, muscle relaxants
- Functional rehabilitation after removal of cast

Knee sprains

severe, instabile

-important lesions of capsulae menisci and ligaments

Usually requires surgical treatment

Knee stability is given by :

- Cruciate ligaments-central
- lateral:
  - Ligaments- varus and valgus,
  - capsula+ligaments – rotational stability

Knee sprains

Clinical exam:

Anamnesis

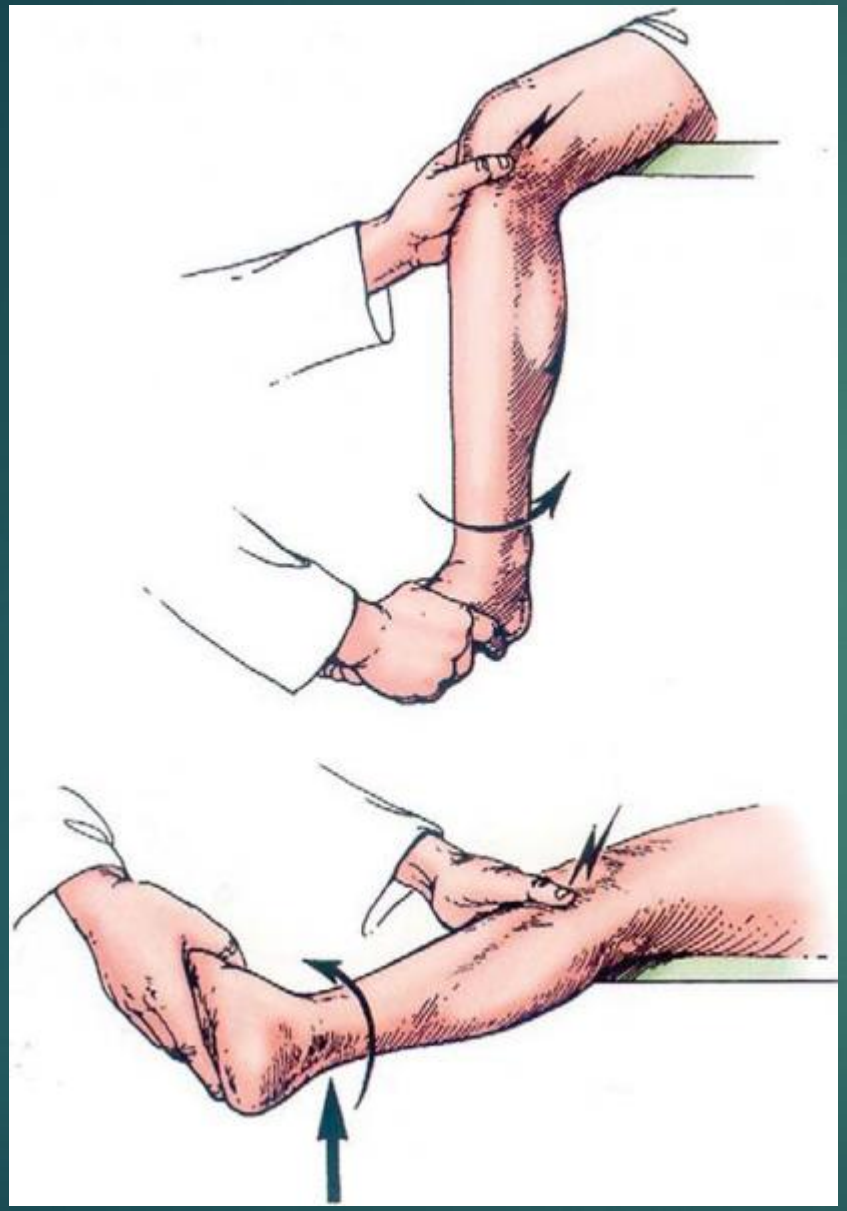
- Type of accident

- Ailments related to laxity: pain, functional impotence, instability, hydrarthrosis

1. Pain – main symptom, incapacitating at the time of the accident, exacerbated by movement
2. Functional disability - important
3. Bruising, sanguine suffusions, hemarthrosis are frequent

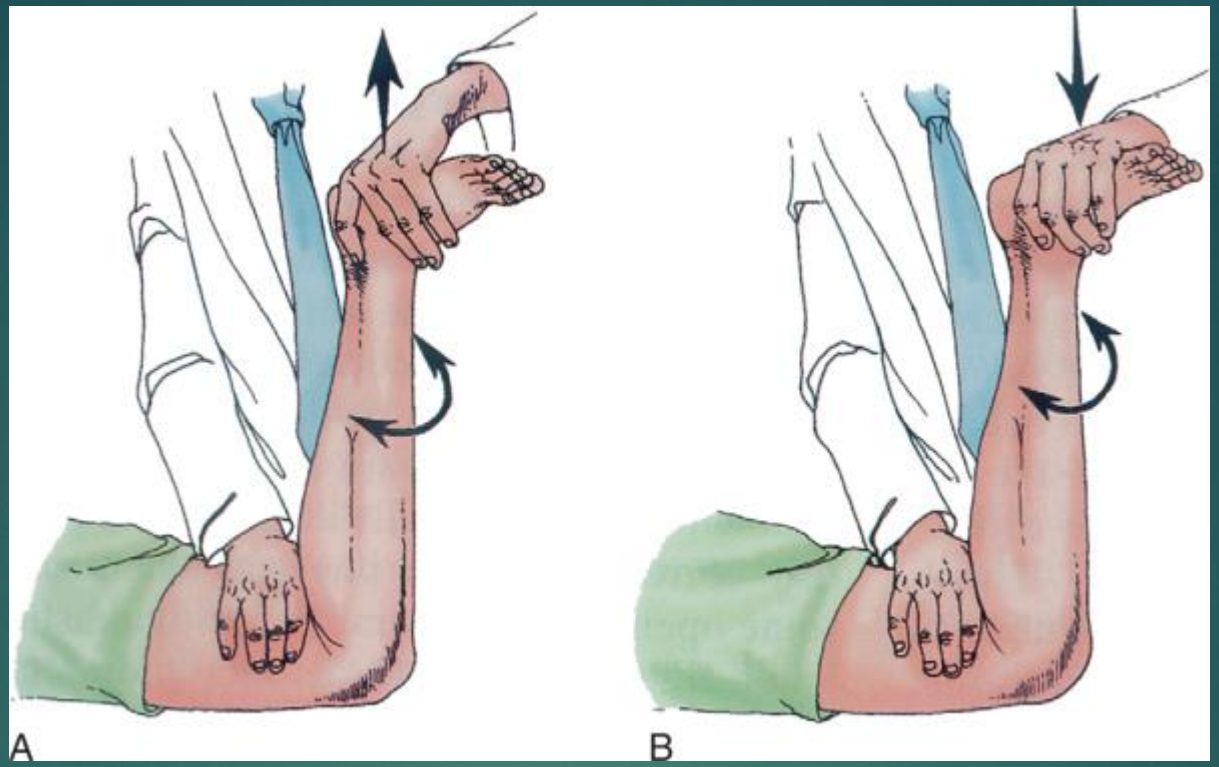
   Ecchymoses - in the vicinity of the ligamental tear

   Haemarthrosis – characteristic for the tearing of the cruciate ligaments



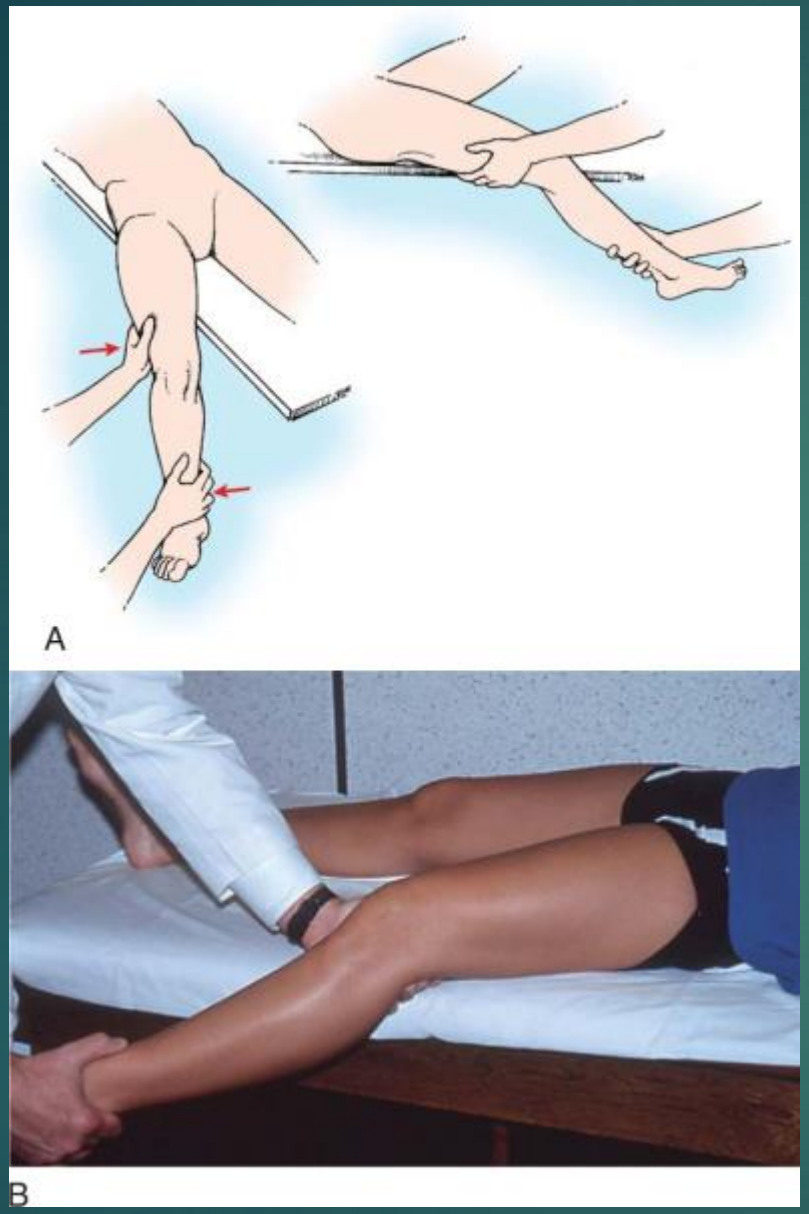
McMurray Test

forced flexion and rotation of the knee – audible click accompanied by pain at the mid-articular line = meniscus injury



Appley – knee is flexed at 90 degrees, thigh fixed on the table. The foot is pulled and the calf rotated. (A)

With the limb in the same position, the foot is pressed, rotated, and lightly flexed and extended. Clicking and pain at the mid-articular line may appear. (B)



Comparative clinical exam of the knees

Medial and lateral laxity in extension

Examining the anterior cruciate ligament
Moving the tibia forward – anterior drawer test

Examining the posterior cruciate ligament
Moving tibia backward – posterior drawer test

Radiological exam:

Rx standard face and side – articular surfaces and tibial spines

Rx in forced valgus or varus

Axial x-rays at 30-60° si 90° flexion

Arthroscopy

- Morphological aspect and lesions of the cruciate ligaments and menisci

CAT and MRI

Recent injuries of the cruciate ligaments

Knee sprains

Isolated lesions of anterior cruciate ligament

- Torsion associated with flexion

More frequently – the high portion of ACL

- Frequently associated with capsule tearing and effraction of the synovial

Clinically resembles a "basket handle" meniscus tear

O'Donoghue's unfortunate triad:

1. Cruciate ligament injury (anterior or posterior)
2. Collateral ligament injury (tibial or fibullar)
3. Injury to condyle on the same side as injured ligament

Knee sprains

- Isolated lesions of the anterior cruciate ligament

The unfortunate pentad (Trillat):

- Lesion of the two cruciate ligaments
- Lesion of lateral ligament
- Lesion of capsule
- Lesion of condyle on the same side as lateral ligament
- May add meniscal lesions or "displacements", paralysis of external popliteal nerve, rupture of the biceps femoris or popliteus, rupture of Maissiat's band in lateral (external) pentads, or dis-insertion of the pes anserinus in medial (internal) pentads.
- Radiological exam – associated bone lesions:

- Fractured tibial spines
- Bone avulsion at the medial femoral condyle, Gerdy's tubercle, fibular head

Knee sprains

Differential diagnosis

1. Juxta-articular bone fractures (lower extremity of femur, and upper of tibia)
2. Patellar luxation
3. Femur-patellar arthrosis
4. Vilo-nodular synovitis
5. Osteochondritis dissecans

Knee sprains

Treatment (arthroscopic)

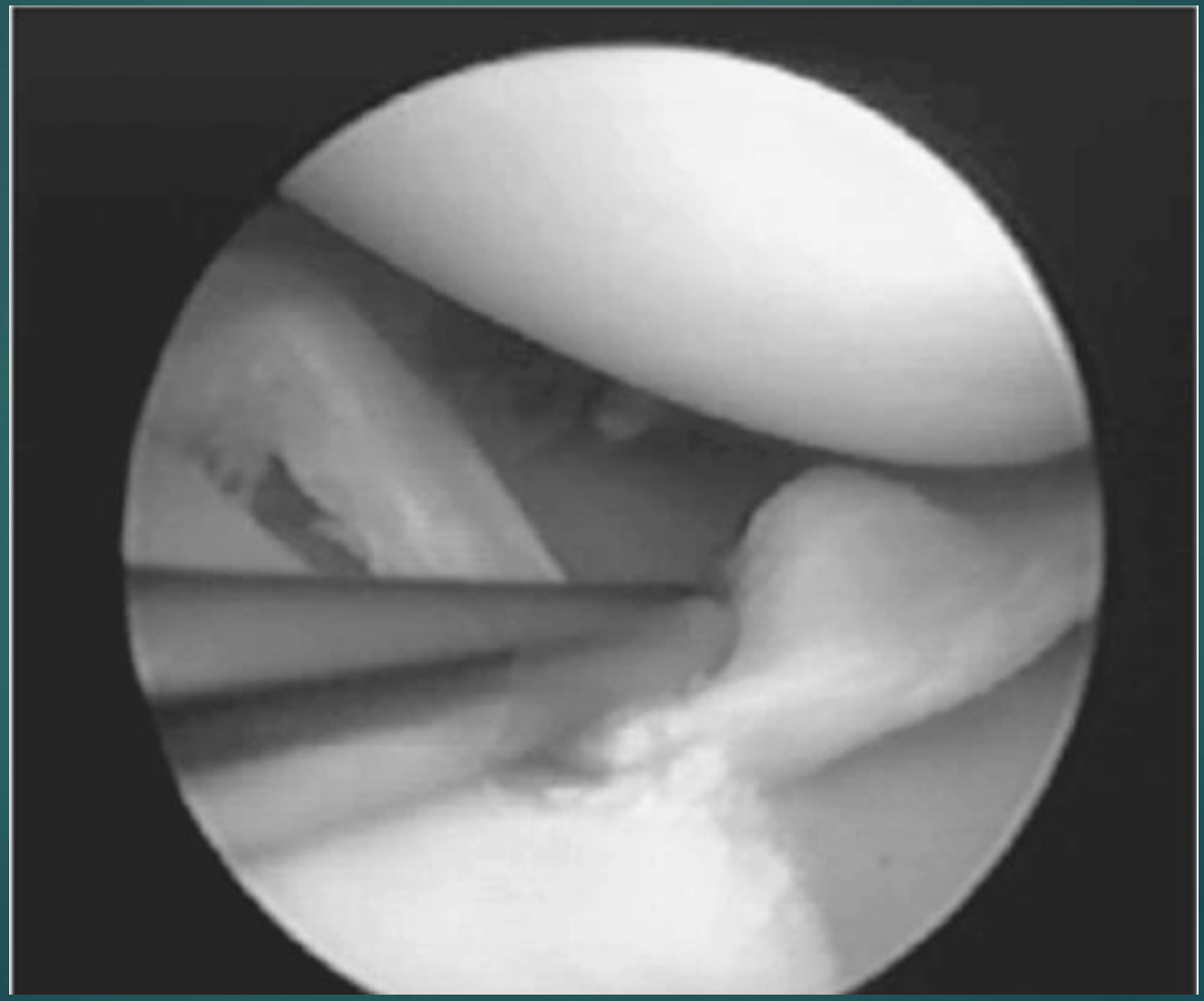
Treatment of recent injuries – treating each lesion one at a time

- meniscectomy if injury to the meniscus
- Repair of the condyle's cortex –
  - direct suture if in the medial region
  - transosseous suture with non- absorbable wire if inferior dis-insertion
- Reconstructing the cruciate ligaments (with allograft, autograft or synthetic ligament)
- Reconstruction of collateral ligaments
- Reconstruction of capsule – by layers

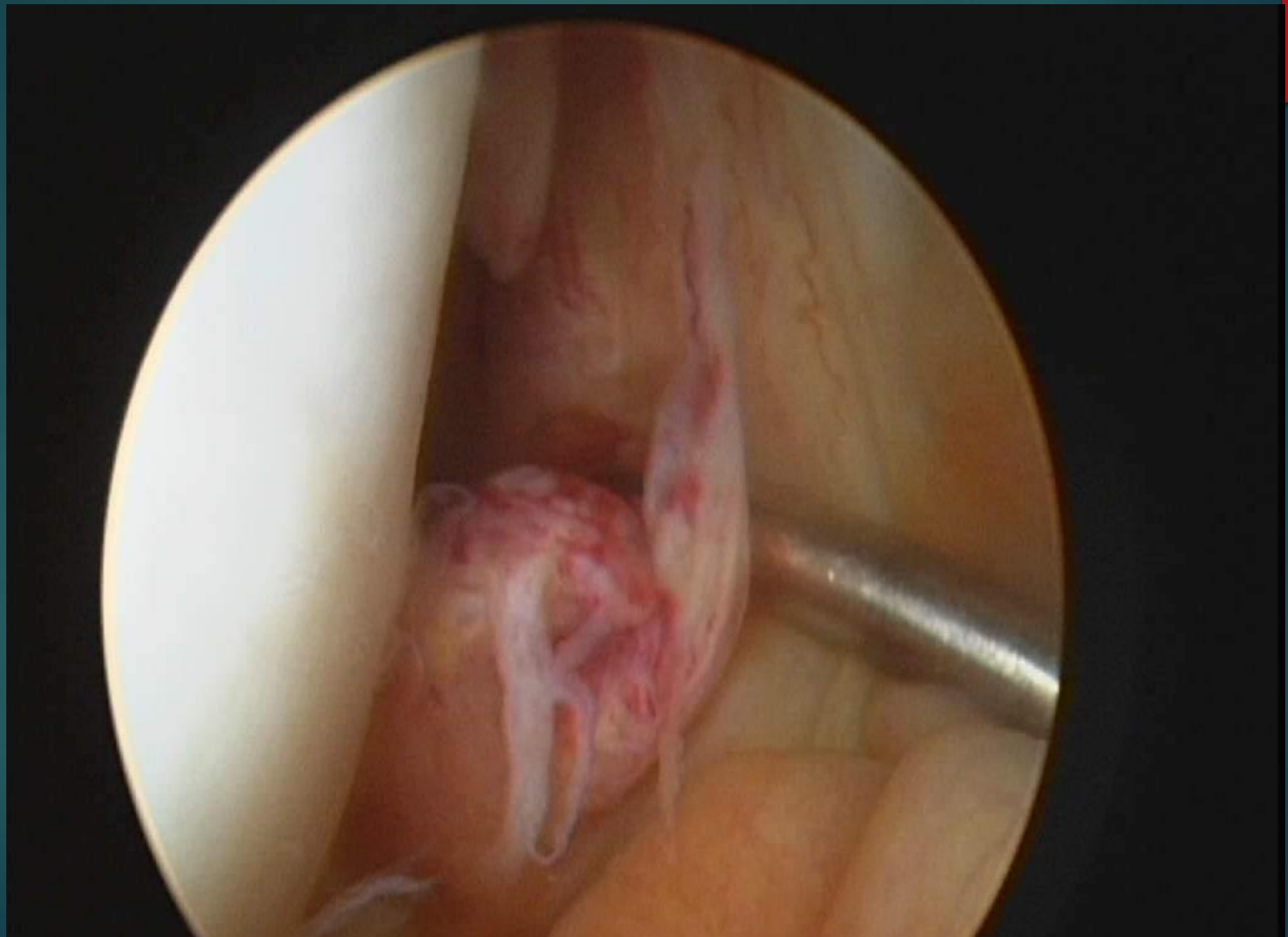
Post-op – Immobilization via cruro-podal leg cast with the knee flexed at 20-30° for 15-20 days

- then 15-20 days inguino-malleolar cast
- prophylaxy of trombo-embolic complications
- functional recovery therapy

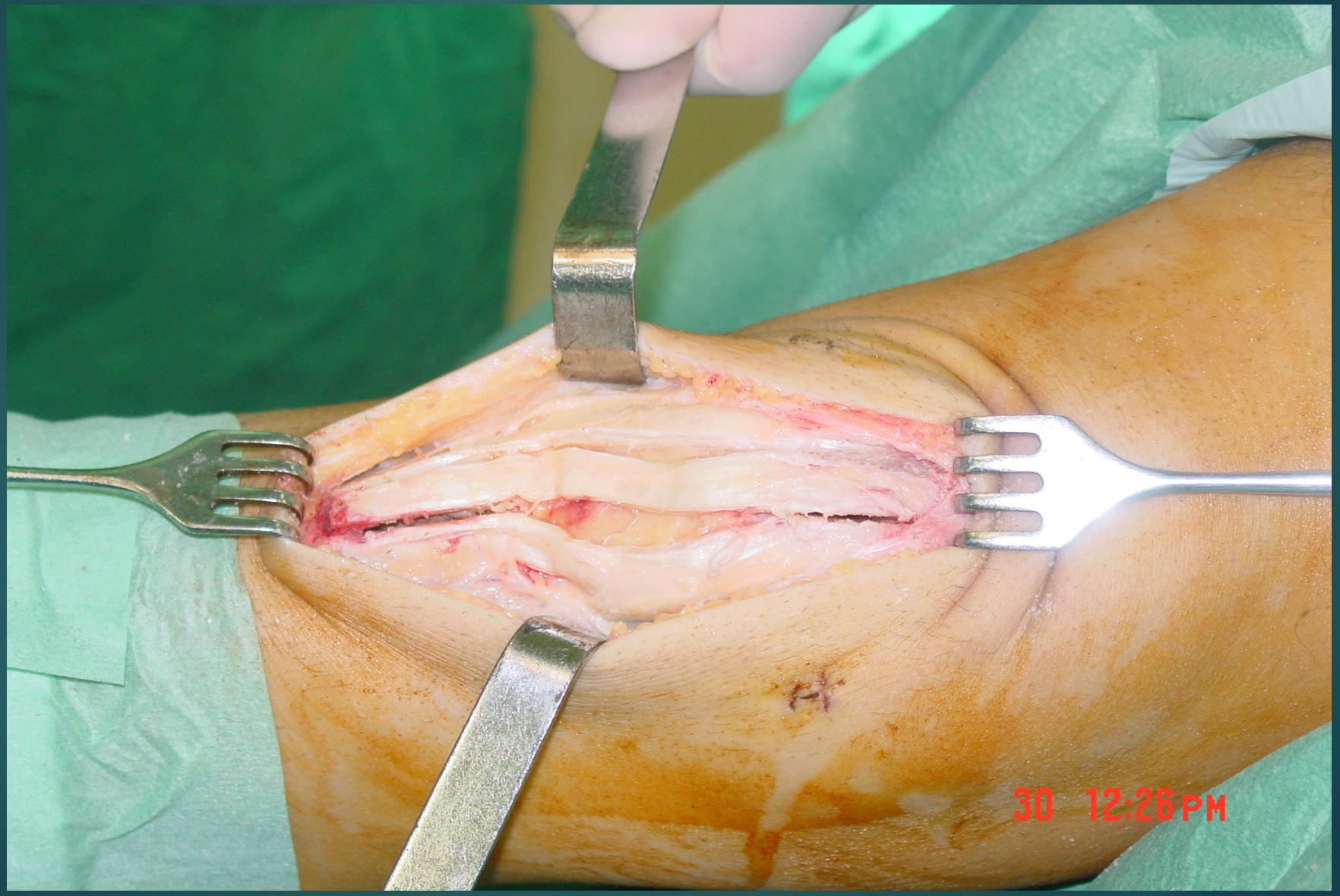
“Basket handle” meniscus lesion - arthroscopic image

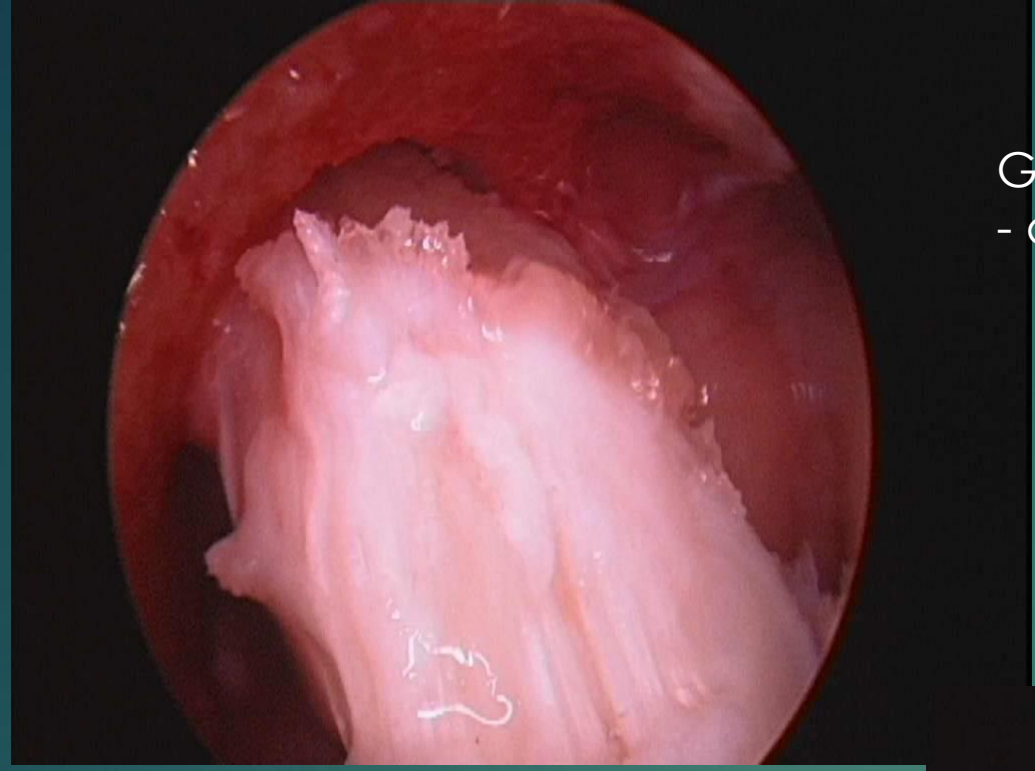


ACL tear- arthroscopic image

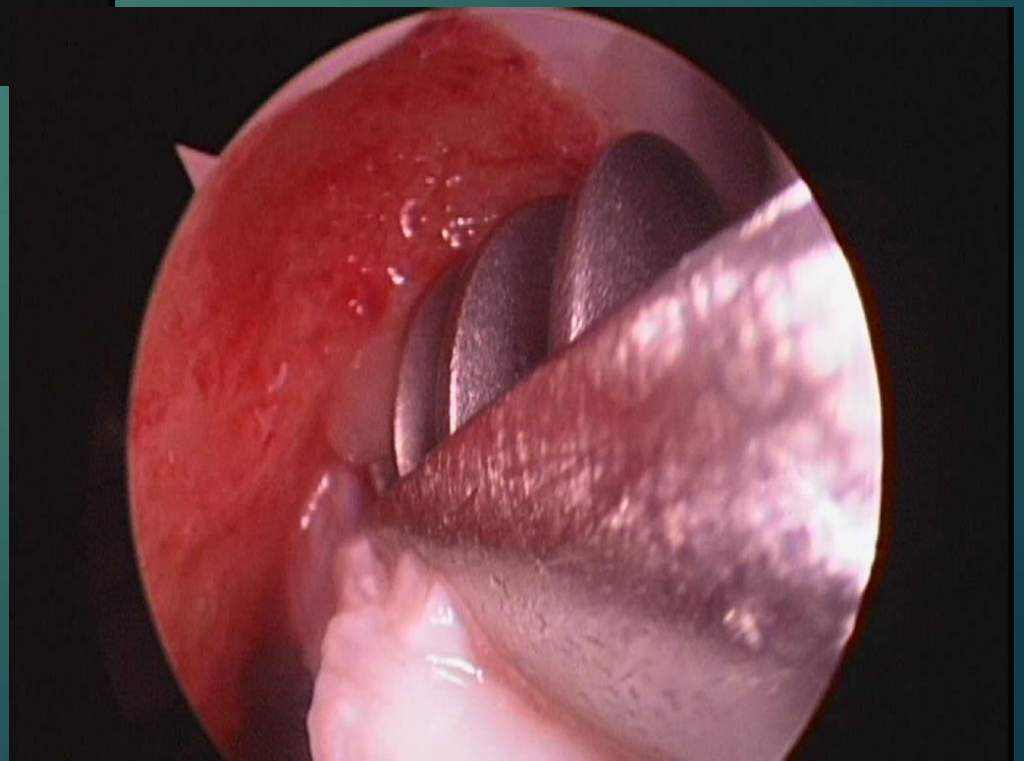


Harvesting graft for ACL reconstruction





Graft fixation for ACL reconstruction
- arthroscopic image



ACL reconstruction with LARS artificial ligament