Orthopaedics for general medicine

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Definition

- **Orthopaedic surgery** or **orthopaedics**, is the branch of surgery concerned with conditions involving the musculoskeletal system. Orthopaedic surgeons use both surgical and nonsurgical means to treat musculoskeletal trauma, spine diseases, sports injuries, degenerative diseases, infections, tumors, and congenital disorders.

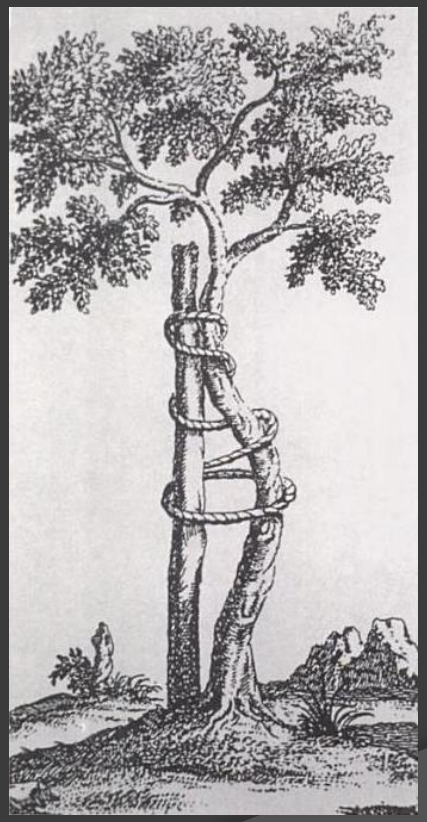
History

- Nicolas Andry coined the word in French as *orthopédie*, derived from the Greek words ὀρθός *orthos* ("correct", "straight") and παιδίον *paidion* ("child"), when he published *Orthopedie* (translated as *Orthopædia: Or the Art of Correcting and Preventing Deformities in Children*[1]) in 1741.

- He advocated the use of exercise, manipulation and splinting to treat deformities in children
- the discipline was initially developed with attention to children, the correction of spinal and bone deformities in all stages of life

  eventually became the cornerstone orthopedic practice.
- Orthopaedic belonged to surgery

the international symbol for orthopaedics



Czech school

- 1. Orthopaedical clinic Ke Karlovu v Praze 1927
- 1. Orthopaedical clinic in Brno 1933
- Prof.Zahradníček /Praha/- modern surgery of DHD
- Prof.Frejka /Brno/ - Prejka pillow splint in DHD
- Prof.Pavlík /Olomouc/ - Pavlík harnesses
- In 1971 /prof. Pavlanský / was orthopaedics excluded from general surgery as a seperate discipline

Education system

- According to the new guidelines
- Specialization in orthopaedics and traumatology of the locomotive apparatus
- 6 years of residency training
- 24 month orthopaedic stem
- 48 month specialized training

Specializace pro lékaře - základní obory, vzdělávací programy z roku 2015 podle vyhlášky č. 185/2009 Sb., ve znění pozdějších předpisů.

orthopaedic sub-specialties

- General orthopaedic
- Hand surgery
- Shoulder and elbow surgery
- Pediatric orthopaedic
- Foot and ankle surgery
- Spine surgery
- Musculoskeletal oncology
- Surgical sports medicine
- Orthopaedic trauma

Problematics

- **Soft tissue disorders**

  diseases of musels, tendons and connective tissues

  /tendinopathy, enthesopathy, bursopathy/

- **Degenerative diseases**

  - arthropathy: crystal, reactive, enteropathic, diabetical, neurological, heamophylic

  -**osteoarthritis** a type of joint disease that results from breakdown of joint cartilage and underlying bone - primary

  - secondary /post trauma, imflammation, systematic diseases,AVN

- **Congenital and acquired abnormalities of the spine and limbs**

  Skoliosis, DDH, pes equinovarus,

- **Injuries** soft tissue , bones
- **Tumors** soft tissue, cartilage, bones, vessel
- **Systematic** and local immflamation

Orthopaedics examination

Orthopaedic Assessment

Podiatric Orthopaedics 258

Clinical Methods

- Patient assessment
  - History / Subjective examination
  - Physical examination
  - Diagnostic imaging
  - Special investigations

Orthopaedic Assessment

- History
  - Determine nature of complaint
  - Symptoms include pain, stiffness / loss of movement, swelling, instability, loss of power, disturbances of sensation
  - Acute or chronic condition
  - Aggravating & easing activities
  - age, occupation, general health, social circumstances, hobbies/sports, attitude

Pain Assessment

- VAS
- Body Chart

Inspection

Orthopaedic Assessment

- **Physical examination**
  - Inspection
  - Palpation
  - Range of Movement (ROM)
  - Ligament Stress Testing
  - Muscle Power / Strength
  - Proprioception
  - Neurological Testing
  - Functional Tests
  - Assessment of sources of referred pain

Clinical Examination

- Inspection
  - Expose part fully
  - Compare with opposite limb
  1. BONES for alignment & posture, deformity, leg length discrepancy
  2. JOINTS for swelling / effusion
  3. MUSCLES for wasting
  4. SKIN for scars, changes of colour or texture

Angular Alignment

- VARUS – distal component moves towards midline
- VALGUS - distal component moves away from midline

Measurement

- **Limb length**
  - Anterior superior iliac spine to medial malleolus
- **Limb girth**
  - Swelling
  - Muscle wasting

S- swelling
E- erythema
A- atrophy
D- deformities
S- scars

Palpation

Clinical Examination

- Palpation
  1. Skin - temperature
  2. Soft tissues – swelling or joint effusion, muscle wasting or spasm
  3. Bones
  4. Location of tenderness

Swelling

- Comes on soon after injury = blood
- Comes on after 8 to 24 hours = synovial
- Boggy, spongy feeling = synovial
- Hard = bone
- Tough, dry = callus
- Thick, slow moving = pitting oedema

Clinical Examination

- Range of Movement (ROM)
  1. ACTIVE (Physiological)
  2. PASSIVE (Physiological & Accessory)

Movement may be classified broadly:
Hypomobility ↔ Normal ↔ Hypermobility

Active ROM

- Physiological movements
  - E.g. flexion, extension. abduction, adduction, internal and external rotation
  - Ankle dorsiflexion, plantarflexion
  - Inversion & eversion

T - tenderness
E - effusion
S - swelling
T - temperature
C - crepitus
A - atrophy

ROM

Active ROM

- Compare with opposite limb
- Measured from 0 deg – anatomical position
- Active – measured first before passive.
- The degree to which a joint can be moved by muscle contraction
- Active movement limited by – joint pain; joint stiffness; pain from nearby # site & soft tissues; weakness from associated muscles; swelling; apprehension
- Note: quality of movement, crepitus, painful range, looseness or excessive range

Passive ROM

- Physiological movements:
  flexion, extension, abduction, adduction, internal & external rotation
- Normal "End feel" of joint movement may be:
  "hard" (bone-to-bone),
  "springy" (capsule/ligaments)

Passive ROM

- Accessory Movements
  - translatory gliding (anterior/posterior, medial/lateral),
  - traction/distraction (caudad/cephalad)
- Roll and Glide Principle

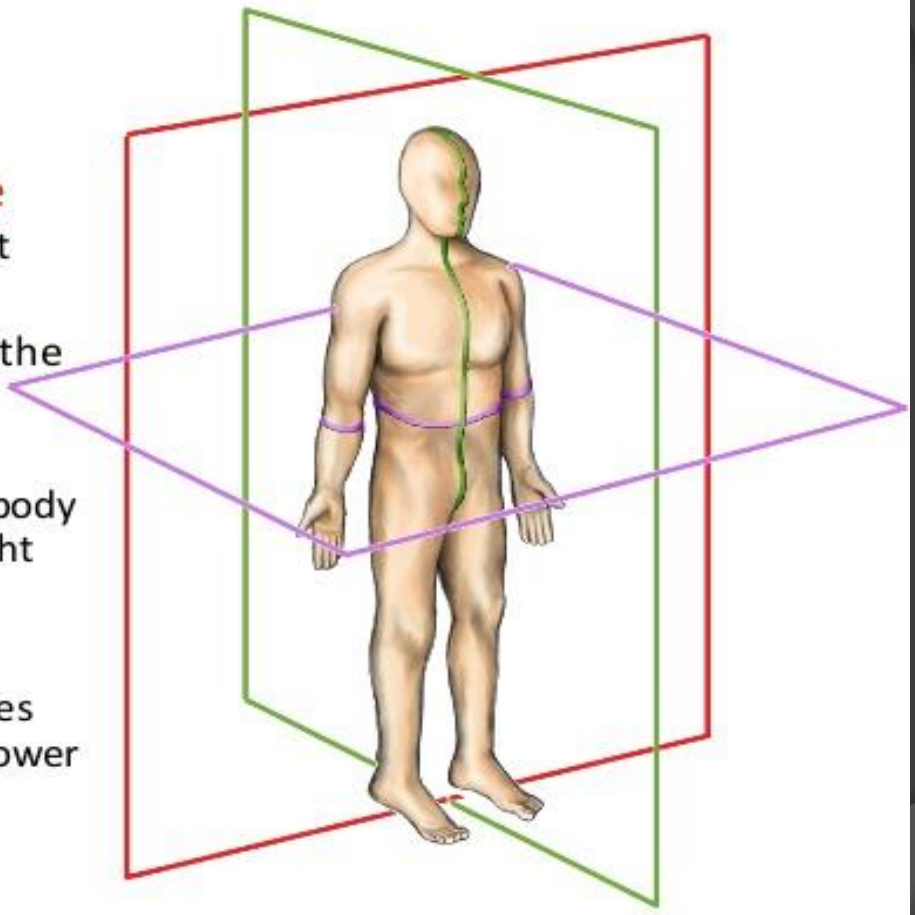
Muscle Length / Flexibility

- Place muscle on stretch
- Maximal distance between origin & Insertion

Anatomical Planes

- Anatomical position
  - Anatomical planes

- Coronal (Frontal) Plane divides the body into front and back sections
- Sagittal Plane divides the body into left and right sections
  - Median - divides the body into equal left and right parts
- Axial (Horizontal or Transverse) Plane - divides the body into upper and lower segments



Diagnostic imaging

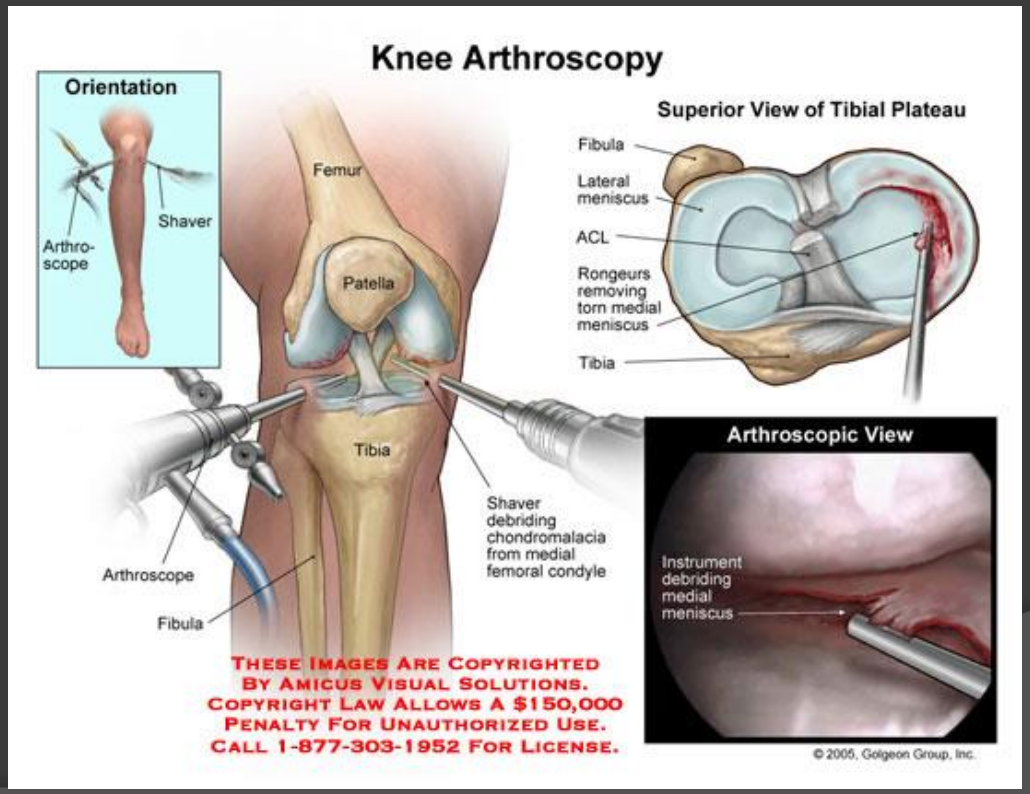
- X-Ray
- CT - ia fractures, spine patology, TU,
- US - soft tissue disorders
- MRI - complex patology of soft tissue and bones , joint, spine, TU
- Angiography - vascular abnormalities, trauma, TU,
- Scinti - detection of the bone infection, TU,

Laboratory diagnostik and special investigations

- Blood count
- CRP
- FW
- PCR
- biopsy
- punction
- arthroscopy

Arthroscopy

- **Arthroscopy** is a minimally invasive surgical procedure on a joint in which an examination and treatment of damage is performed using an **arthroscope**, an endoscope that is inserted into the joint through a small incision.



Therapy

- **Conservative**

Exercise: Regular, aerobic exercise, and stretching and strengthening

Physical therapy :heat therapy, elektrotherapy, US, magnet, balneotherapy

Medication:

pain relievers (in pill form or topical cream) and anti-inflammatory medications

injections of the steroids

joint nutrition pills, injection i.a.form

Splinting, casting, brace

Therapy

- **Surgical**

Trauma

Soft tissue – suture

Bone - osteosynthesis external fixation
internal fixation

Chronic disorders

revisions

osteotomy

arthroplasty- synovektomy, cheilektomy,

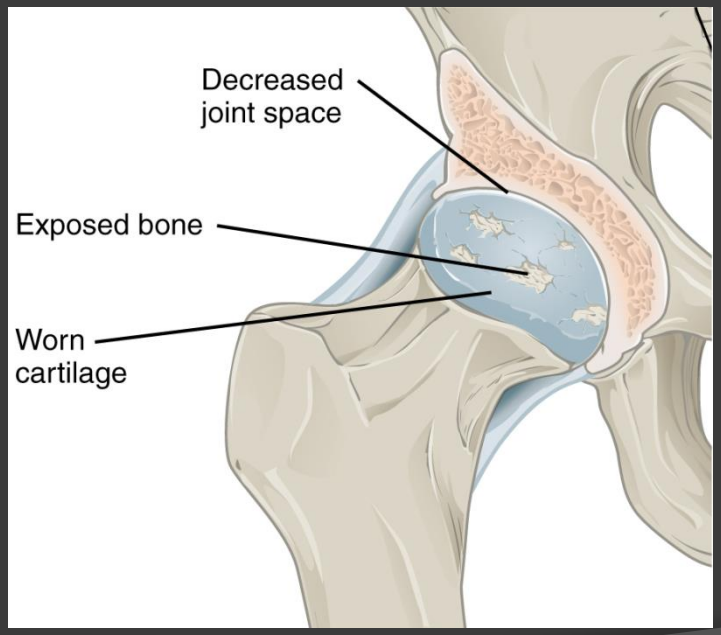
joint replacement

joint fusion

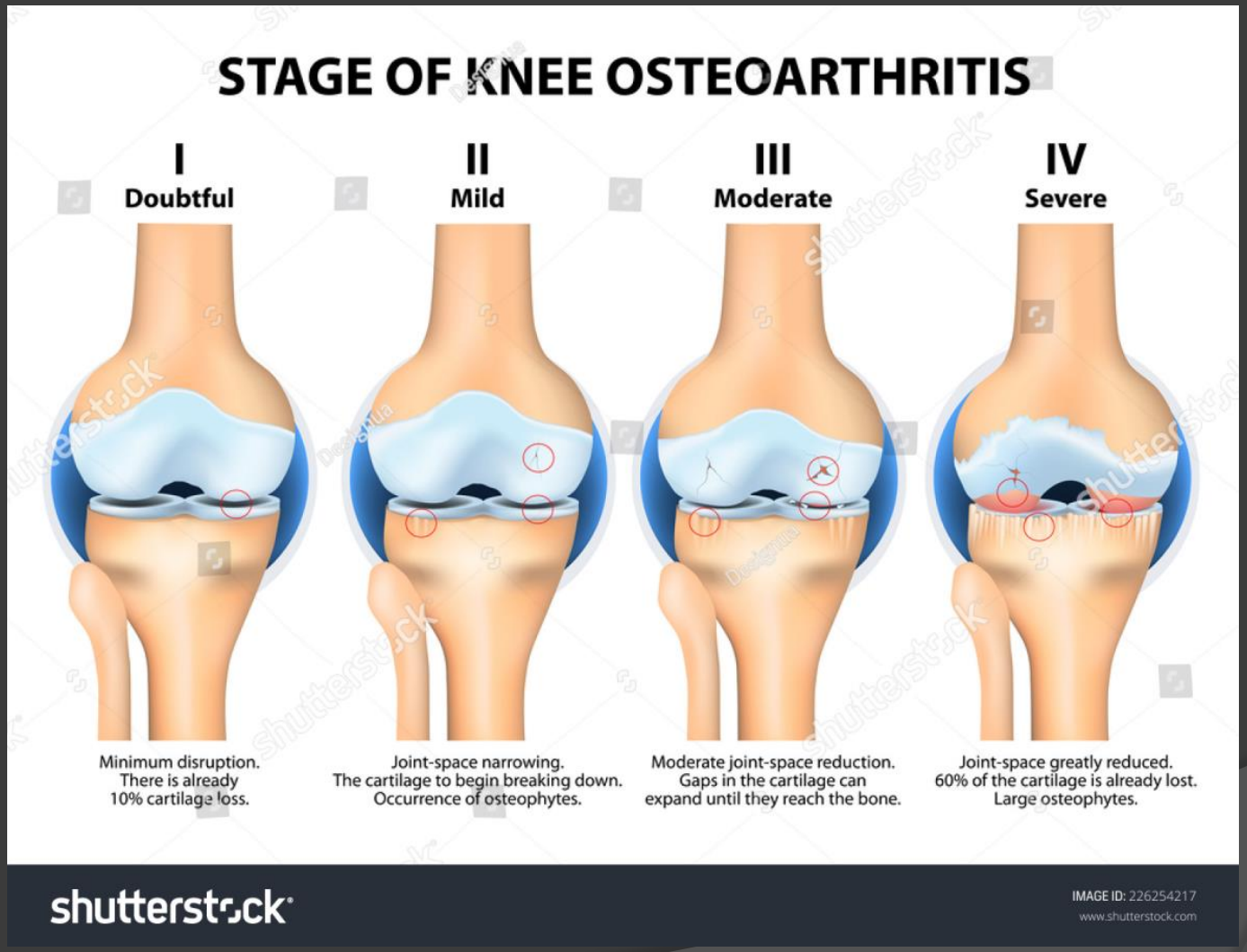
amputation

Osteoarthritis

- Degenerative disease
- a type of progressive joint disease that results from breakdown of joint cartilage and underlying bone



4.Stages of OA



Etiology

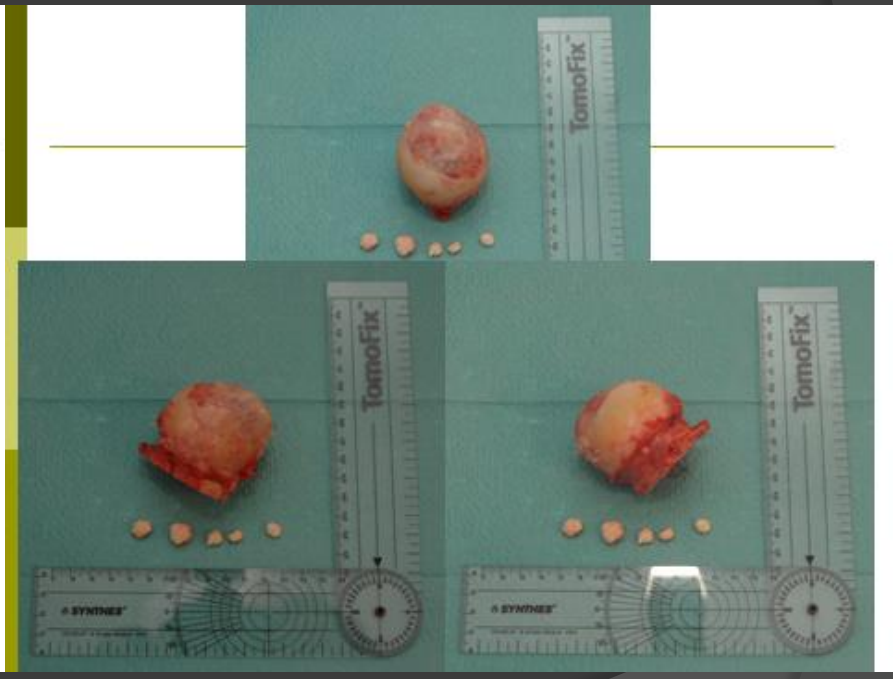
- primary osteoarthritis age, genetics

- secondary osteoarthritis
- Post-traumatic arthritis
- Inflammatory arthritis rheumatoid diseases
  postinfections diseases
- AVN - avascular necrobiosis
- congenital and developmental abnormalities
- alcohol, drugs

signs

pain
stifness
swellness
deformities
loss of movement instability
crunching sound when you move your joints


TomoFix
SYNTHES

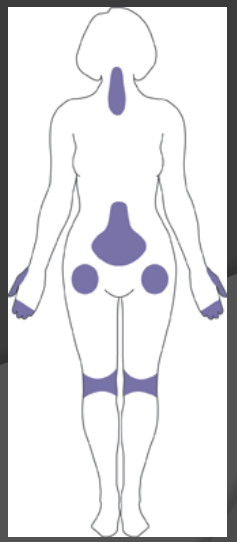

TomoFix
TomoFix
TomoFix
SYNTHES
SYNTHES

X-ray

Joint replacement arthroplasty

- Replacement Arthroplasty is an orthopedic surgery where the articular surface of a musculoskeletal joint is replaced by a prosthetic implant. It is an elective procedure that is done to relieve pain and restore function to the joint after damage by arthritis (rheumasurgery) or some other type of trauma.

- Joint replacements are available for other joints on a limited basis, most notably the knee, hip, shoulder, elbow, wrist, ankle, spine, and finger joints.



HIP replacement arthroplasty

- The modern total hip replacement was pioneered by Sir John Charnley, expert in tribology at Wrightington Hospital, England in the 1960s.[8] He found that joint surfaces could be replaced by implants cemented to the bone. His design consisted of a stainless steel one-piece femoral stem and head and a polyethylene, acetabular component, both of which were fixed to the bone using PMMA (acrylic) bone cement.
- For over two decades, the Charnley Low Friction Arthroplasty and its derivative designs were the most-used systems in the world.
- This formed the basis for all modern hip implants.

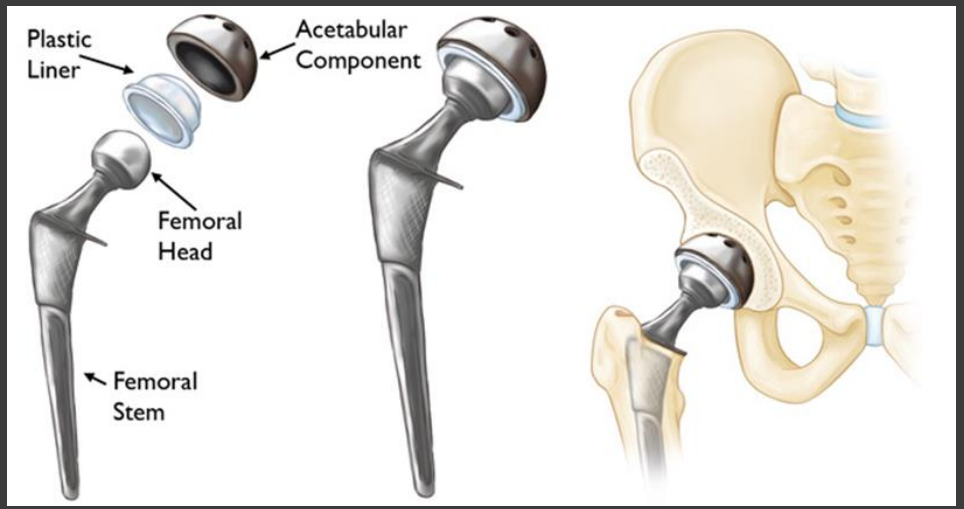
Type of implants

- Type of implantation - total edoprostesis
  hemi -cervikokapital

- Type of fixation - cemenent
  - noncemented
  - hybrid

alloplasty


Endoprotéza Poldi


Plastic Liner
Acetabular Component
Femoral Head
Femoral Stem

surface

- keramik
- metal
- UHMWPE

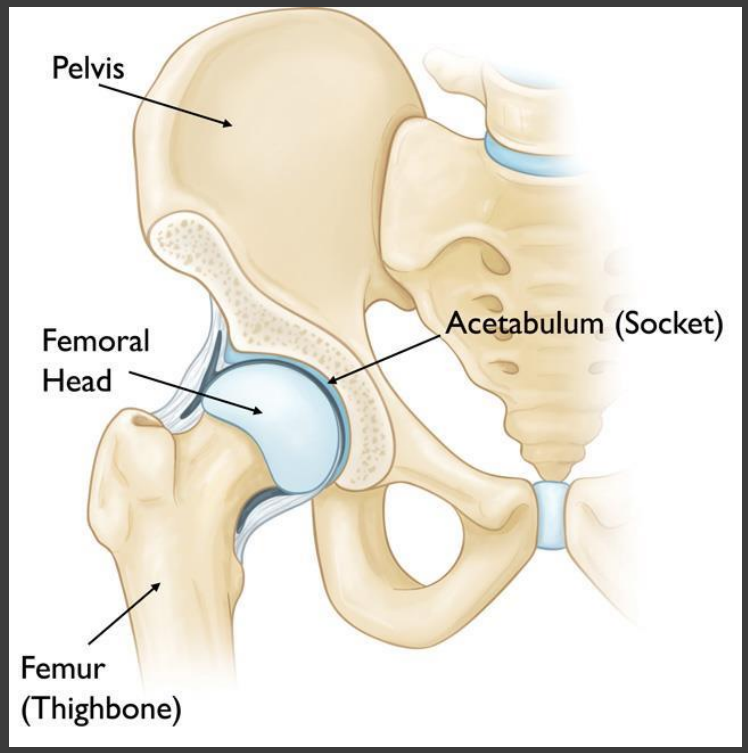

Pyrocarbon replacement of the
Meta carpal joint


F

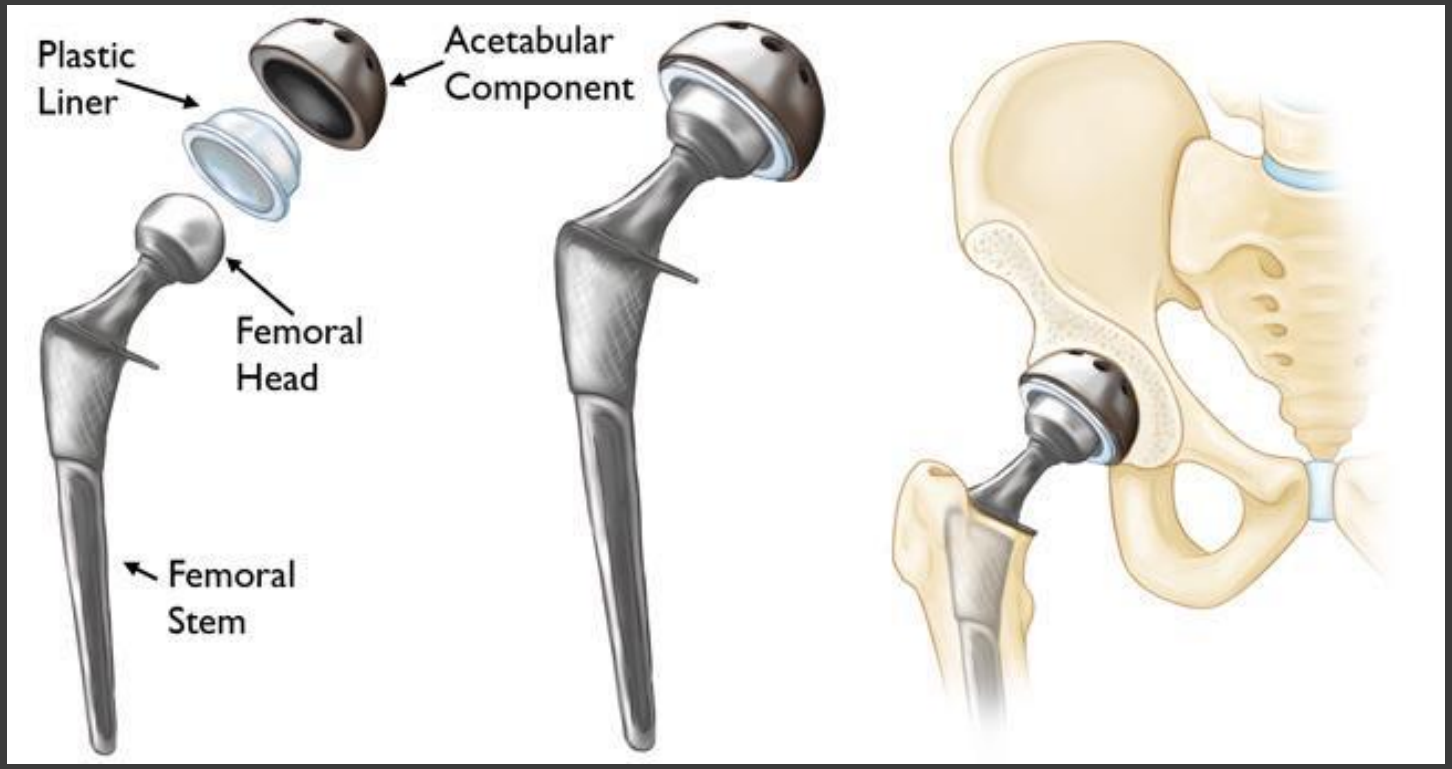
Total hip replacement

Anatomy

ball-and-socket joint



Description



Candidates

There are no absolute age or weight restrictions for total hip replacements.

Most patients who undergo total hip replacement are age 50 to 80

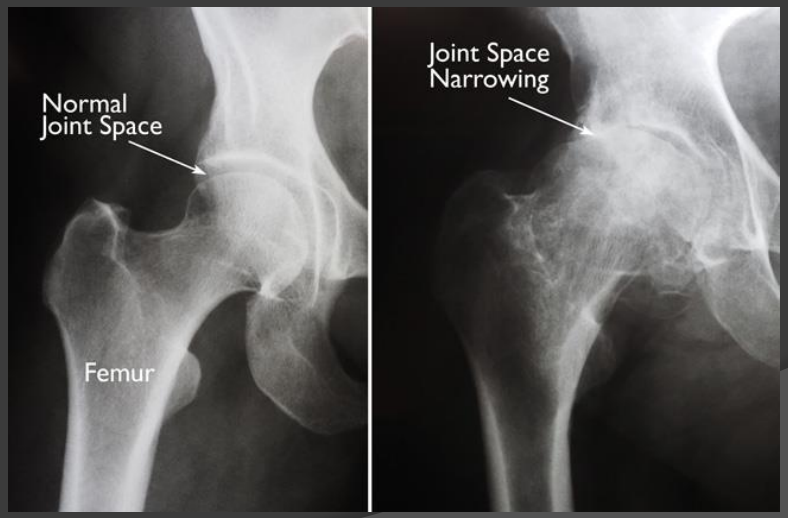
Total hip replacements have been performed successfully at all ages, from the young teenager with juvenile arthritis to the elderly patient with degenerative arthritis.

When Surgery Is Recommended

- Hip pain that limits everyday activities
- Hip pain that continues while resting, either day or night
- Stiffness in a hip that limits the ability to move or lift the leg
- Inadequate pain relief from anti-inflammatory drugs, physical therapy, or walking supports

The Orthopaedic Evaluation

- Medical history: general health, surgery
- Physical examination: hip mobility, strength and alignment
- X-rays, MRI, US



Preparing for Surgery

- Primary care doctor
- Complete medical history – correction of the medication
- laboratory tests
- EKG
- Chest - Xray
- Urology
- Dental evaluation
- Skin preparation
- *Social and home Planning*

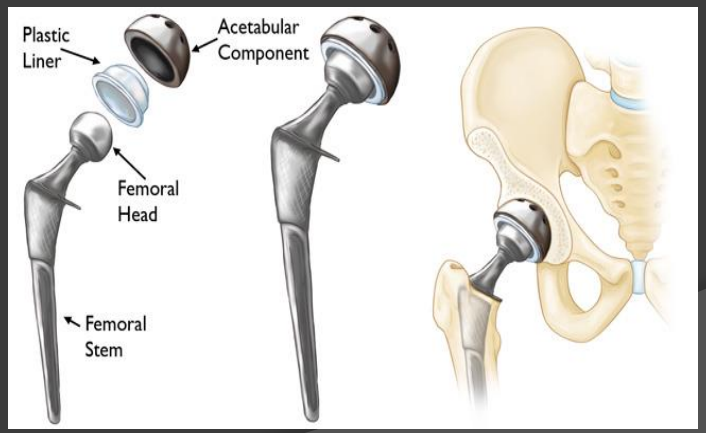
Surgery

- *Anesthesia*
- *Medicaments LMWH, ATB, haemostatic drugs, painkillers*

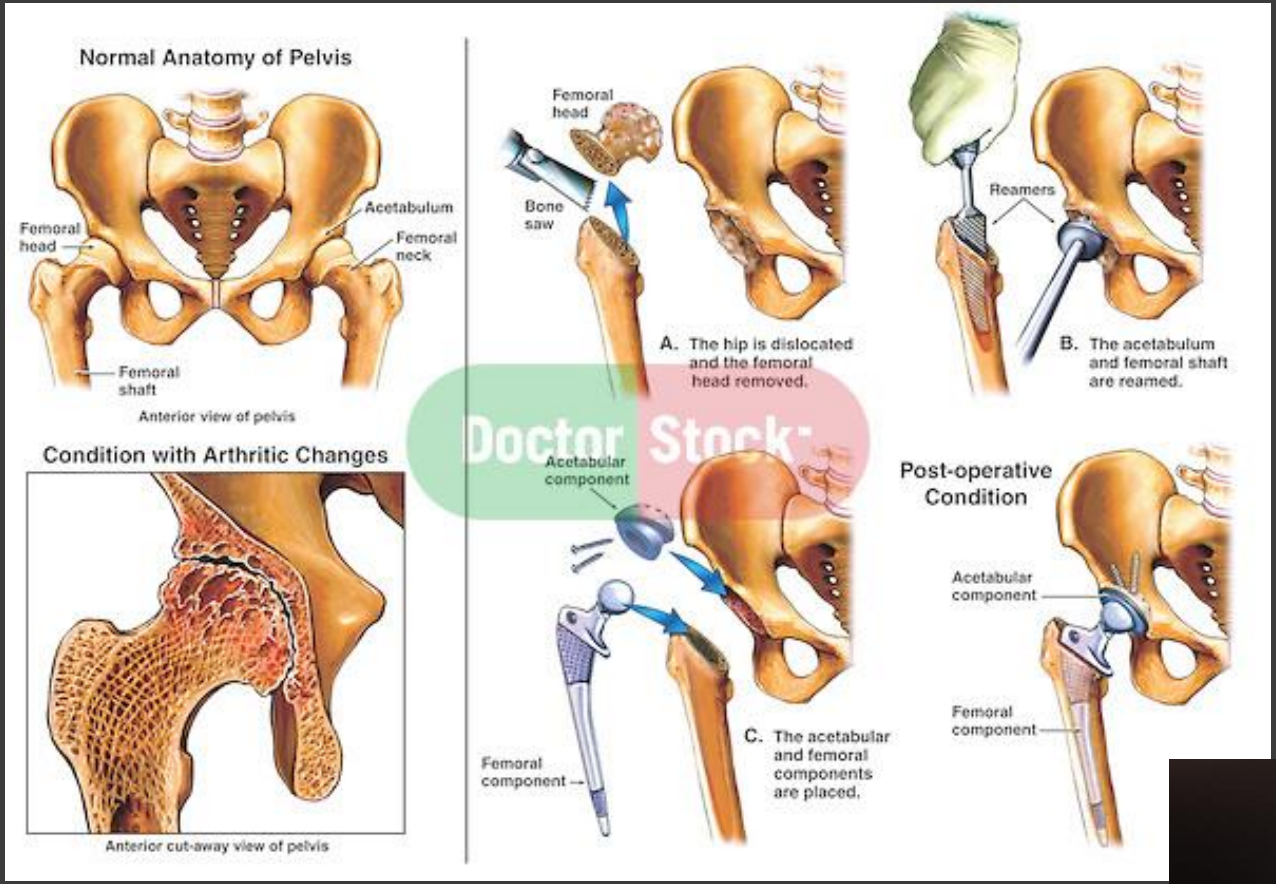
Type of implantation - total edoprostesis
hemi - cervikokapital

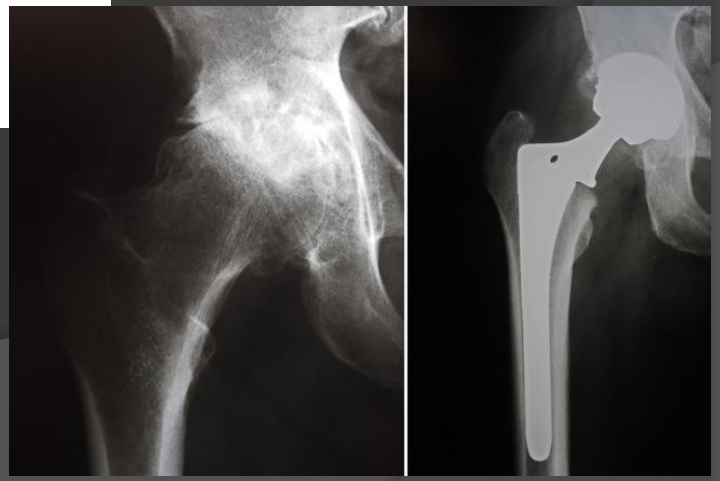
Type of fixation - cemenent
- noncemented
- hybrid

Materials Ti, Co, Cr,Ni, PE, keramik
Surface : Metal-PE, keramik-PE, keramik-keramik,



Procedure


Normal Anatomy of Pelvis
Femoral head
Acetabulum
Femoral neck
Femoral shaft
Anterior view of pelvis
Condition with Arthritic Changes
Anterior cut-away view of pelvis
Femoral head
Bone saw
A. The hip is dislocated and the femoral head removed.
Reamers
B. The acetabulum and femoral shaft are reamed.
Acetabular component
Femoral component
C. The acetabular and femoral components are placed.
Post-operative Condition
Acetabular component
Femoral component

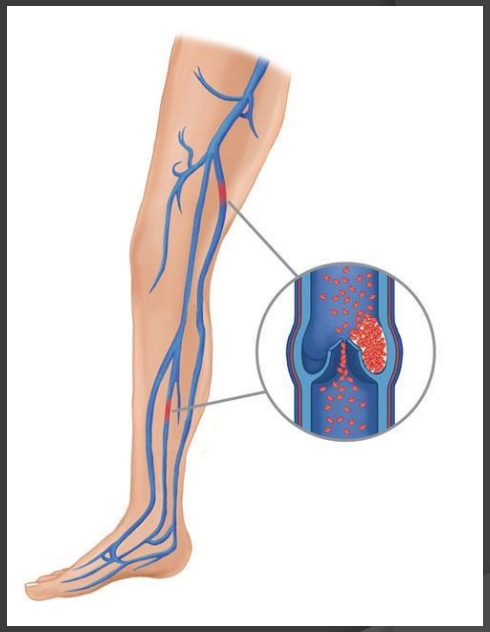


Follow up

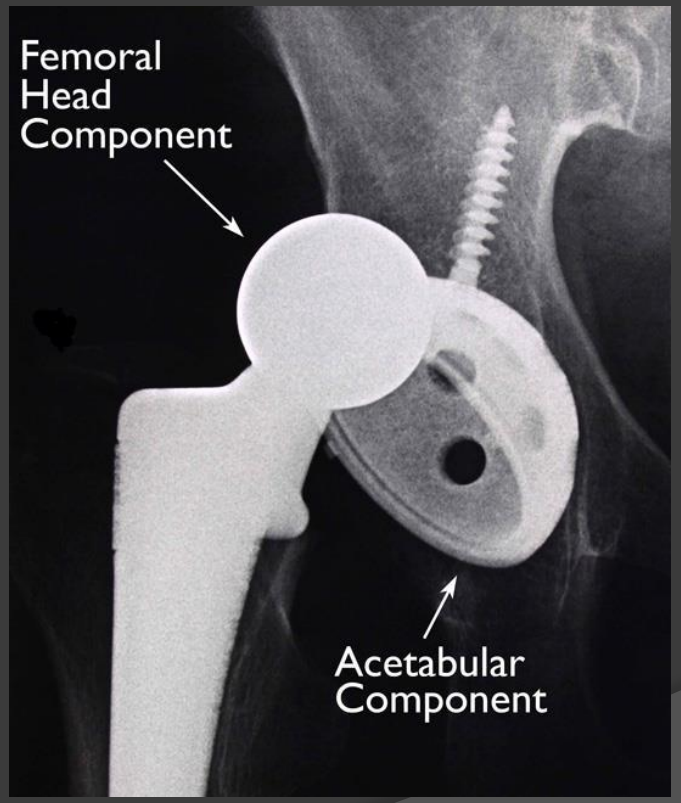
- Early RHB and mobilisation
- Walking with crutches
- sitting, standing and climbing stairs
- exercises to restore movement and strengthen your hip

Possible Complications of Surgery

- Nerve and blood vessel injury, bleeding, fracture
- heart attack or stroke
- *Infection*
- *Blood Clots*
- *Dislocation*
- *Periprosthetic fracture*
- *Loosening and Implant Wear*
- ***Leg-length Inequality***

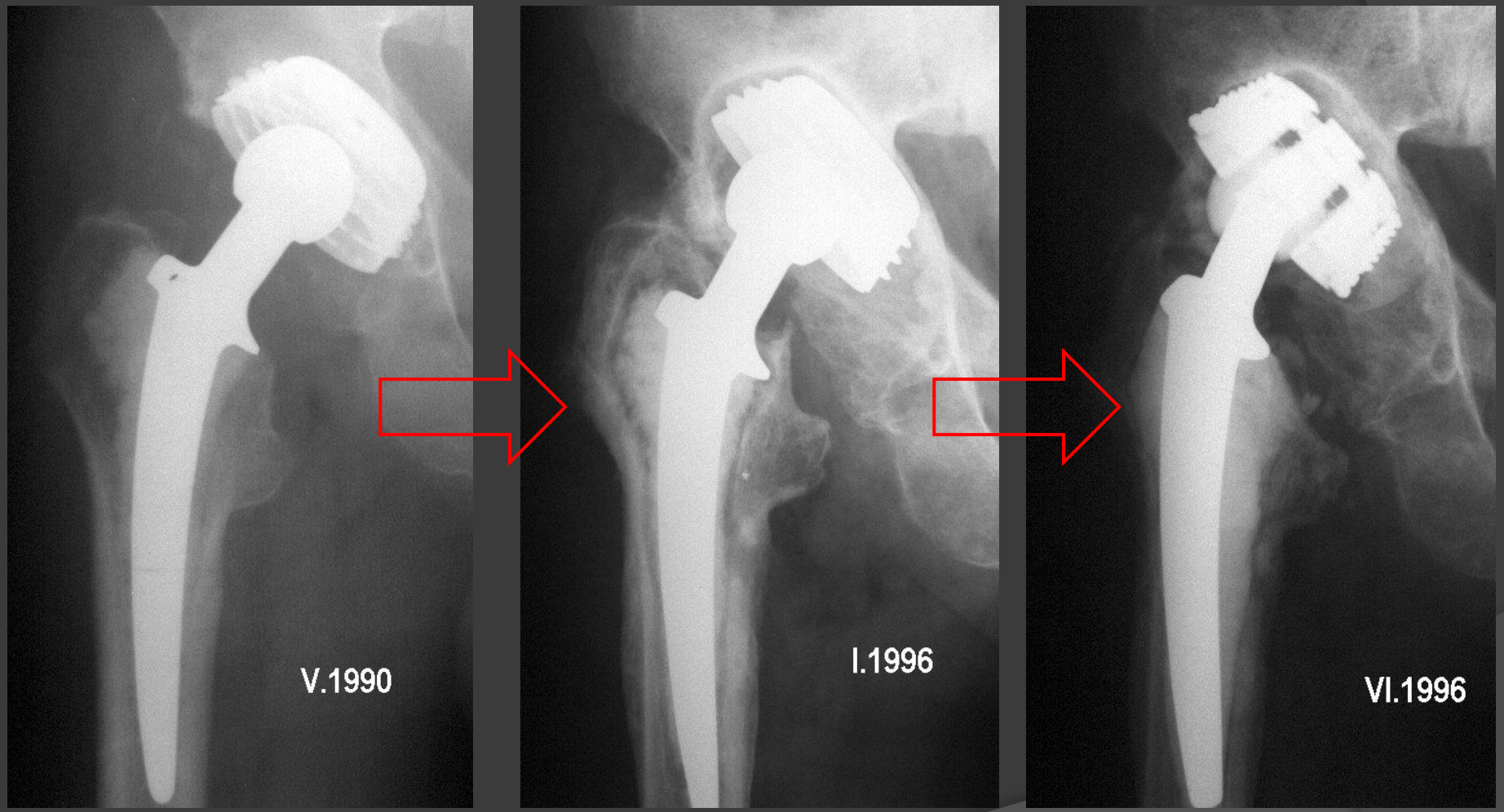


Complications

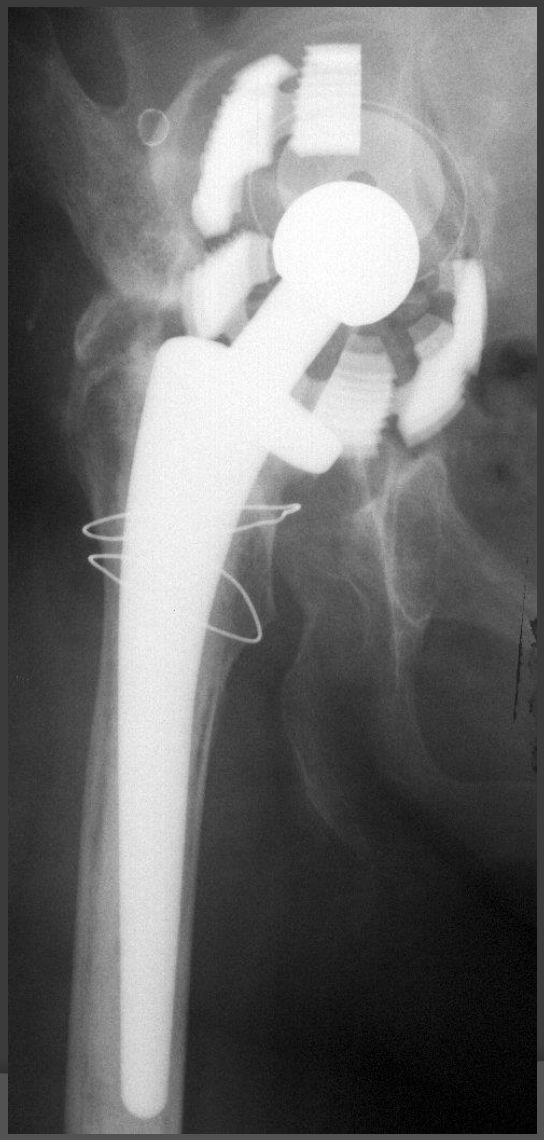


Aseptic loosening – wear

Septic loosening



Failure of the implant



Protecting Your Hip Replacement

- maintain proper strength and mobility of your new hip
- avoid falls and injuries
- antibiotics prophylaxis
- See your orthopaedic surgeon periodically for routine follow-up examinations and x-rays

Realistic Expectations

With appropriate activity modification, hip replacements can last for many years

- recommended physical activity unlimited walking, swimming, golf, driving, hiking, biking, dancing, and other low-impact sports.
- avoid! high-impact activities such as running, jogging, jumping, or other high-impact sports

Preparation

Recovery unit

RHB unit

Common Orthopaedic Disorders

Back pain

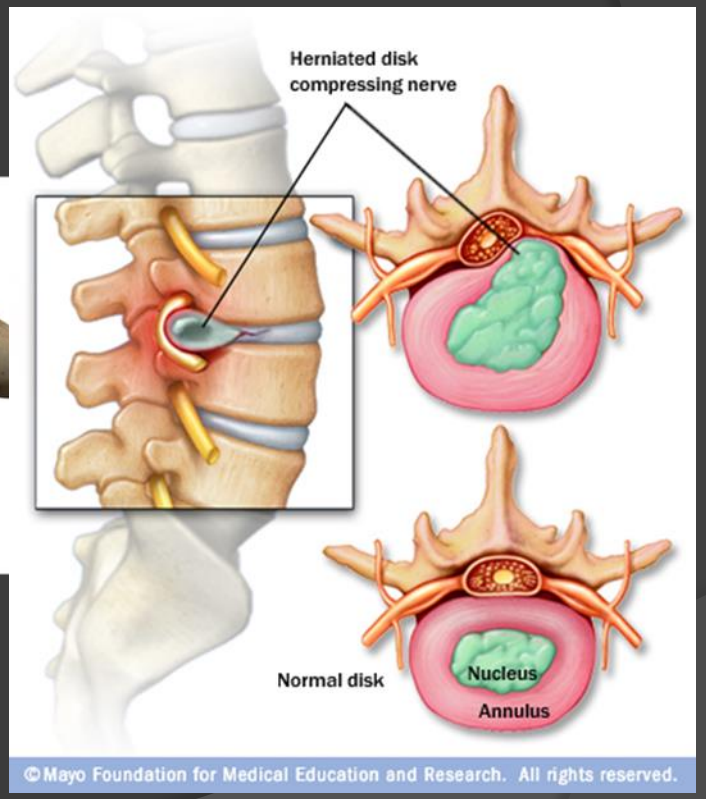
Low back pain
Scoliosis
Cervicobrachial syndrome
Kyphosis
Fractures

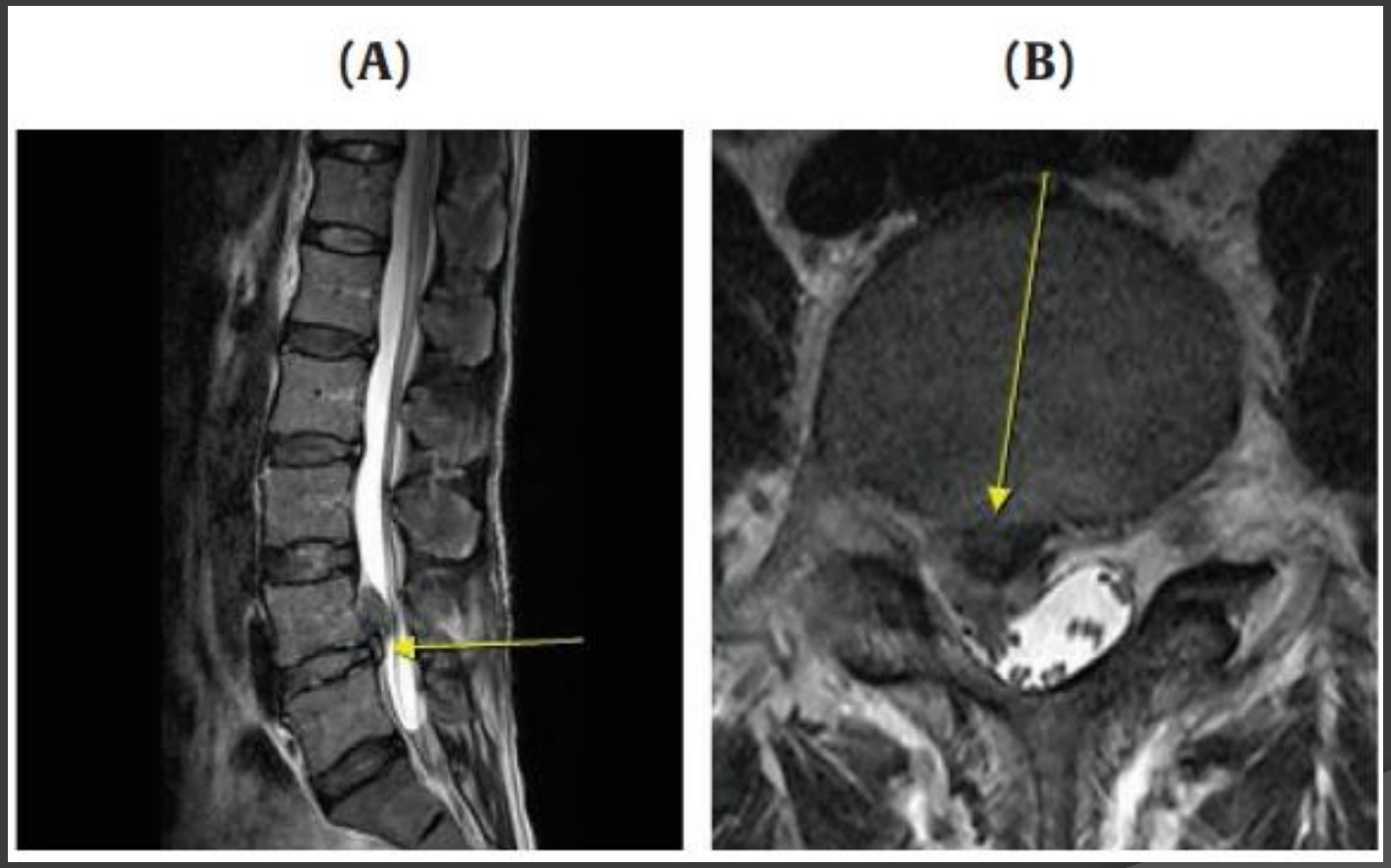
Low back pain

pain in the lower back can restrict mobility
and interfere with normal functioning

causes: repetitive overuse
injuries soft tissue, bones
degenerative diseases (slipped) disk ,
spondylarthrosis, spondylosis
compression fract.
infection
tumor

Degenerative changes

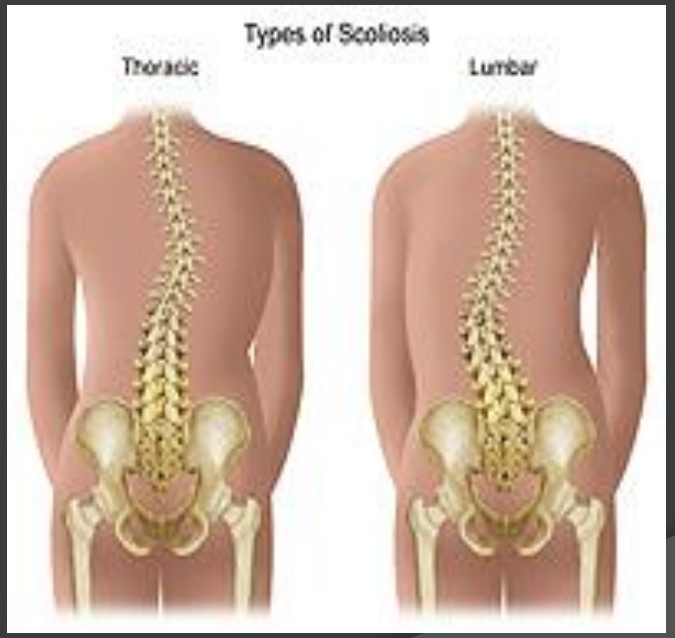



(A)
(B)

Scoliosis

Abnormal shape of the spine in frontal and trasversal plane

Causes : idiopatic developmental
congenital
degenerative



Therapy

Conservative

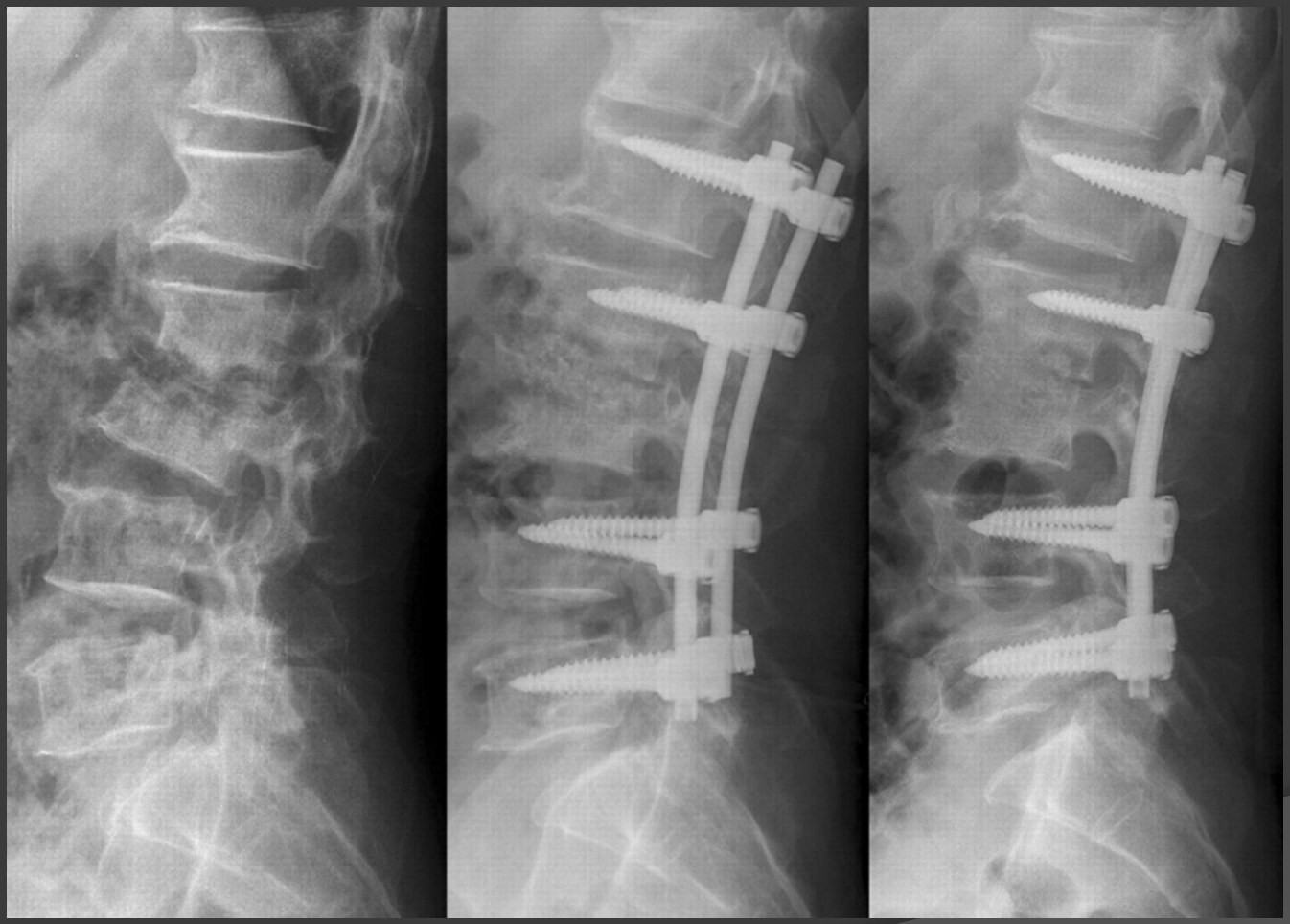
Surgical

lumbar fusion

dekompression

diskektomy

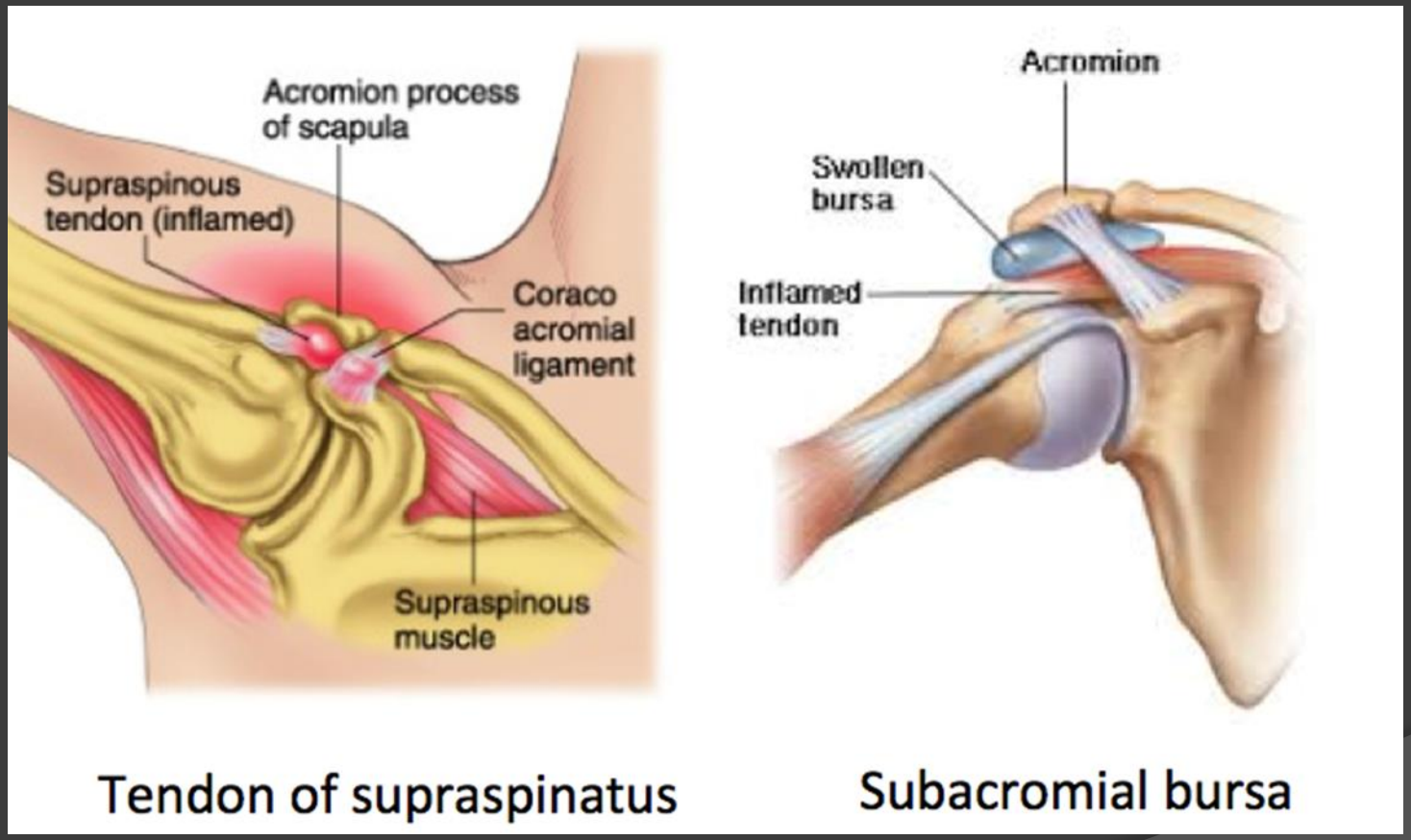
Lumbar fusion

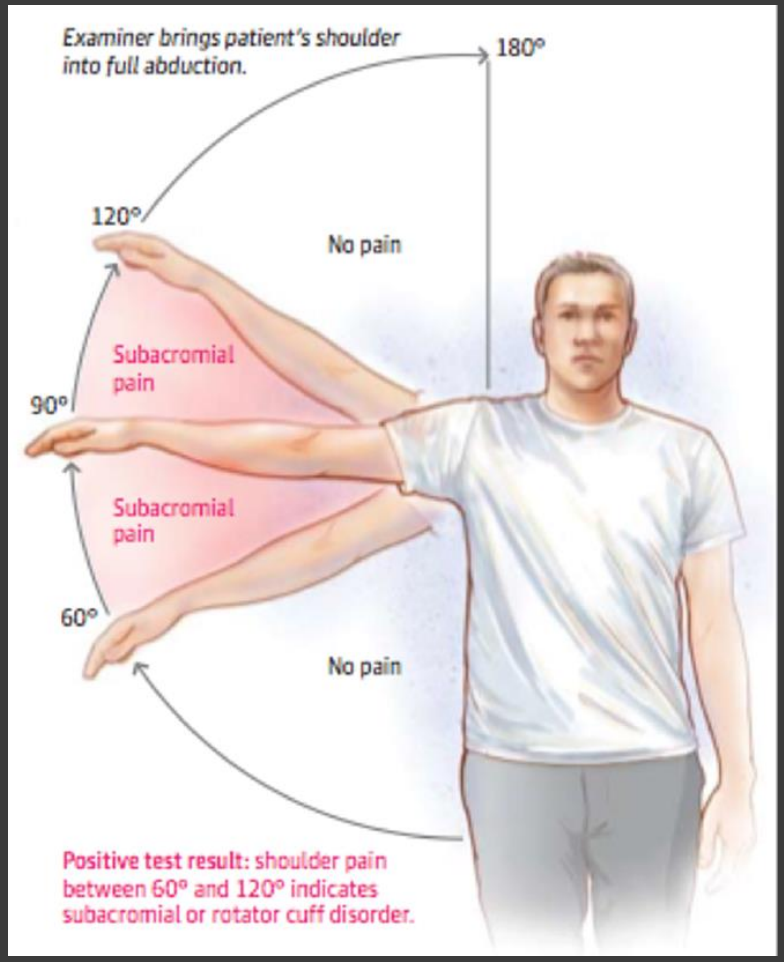


Shoulder

Injury: contusion, distesion, luxation , fracture
Soft tissue disorders
-impingement syndrom,
rotator cuff sy.
- SA bursopathy
- frosen shoulder

osteoarthritis - omarthrosis


Acromion process of scapula
Supraspinous tendon (inflamed)
Coraco acromial ligament
Supraspinous muscle
Tendon of supraspinatus
Acromion
Swollen bursa
Inflamed tendon
Subacromial bursa

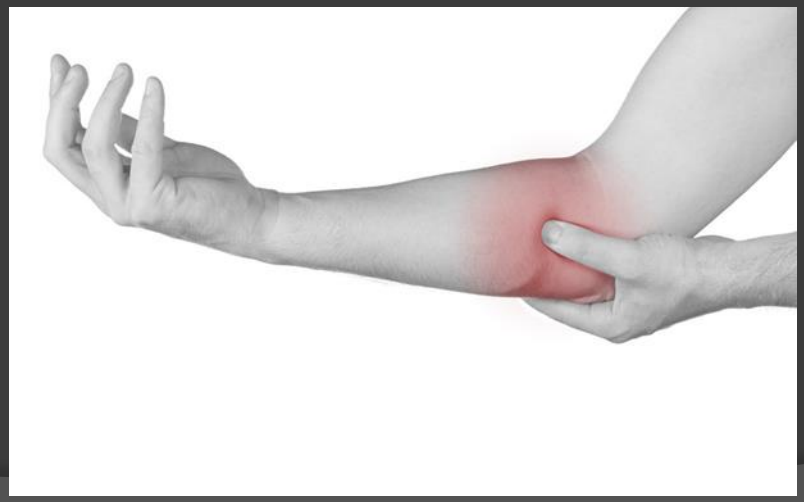

Examiner brings patient's shoulder into full abduction.
180°
120°
No pain
Subacromial pain
90°
Subacromial pain
60°
No pain
Positive test result: shoulder pain between 60° and 120° indicates subacromial or rotator cuff disorder.


R
MKN
Empty glenoid
Anterior, medially and inferiorly positioned humerus

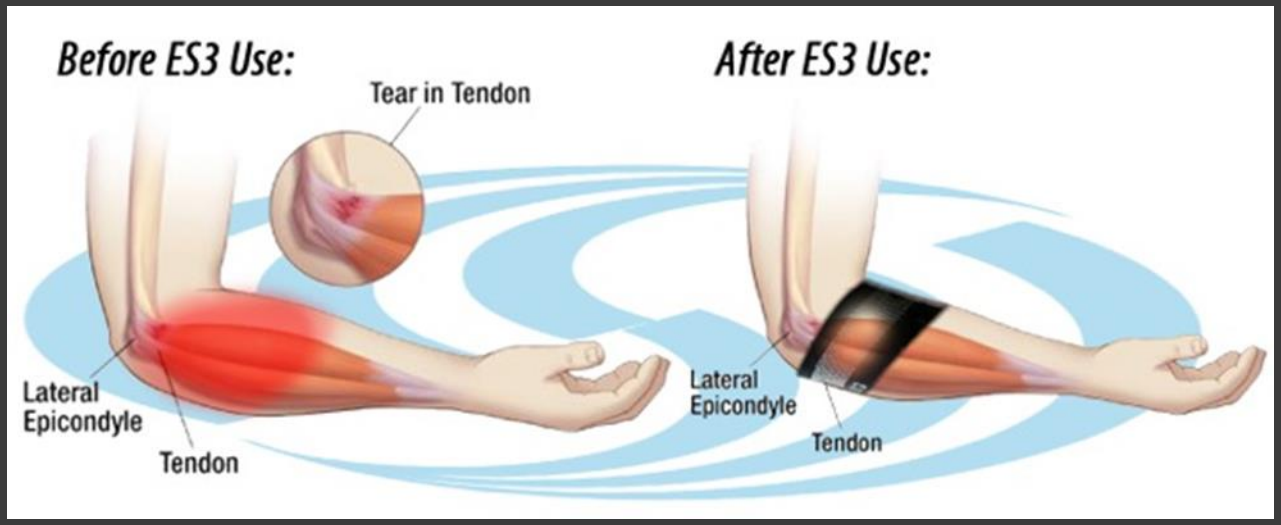
reduction of SJ

Hippocrates Method

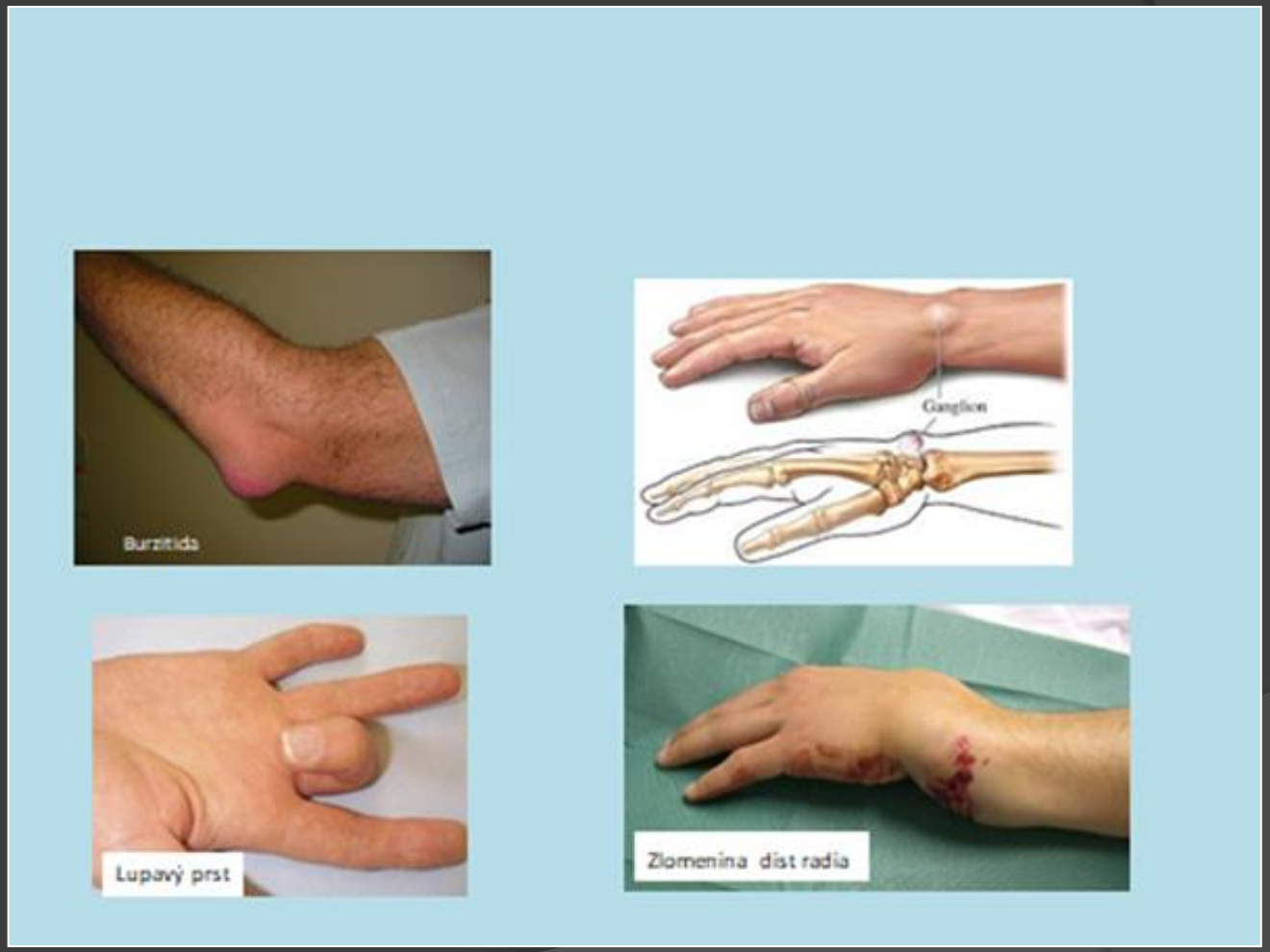
Elbow and hand



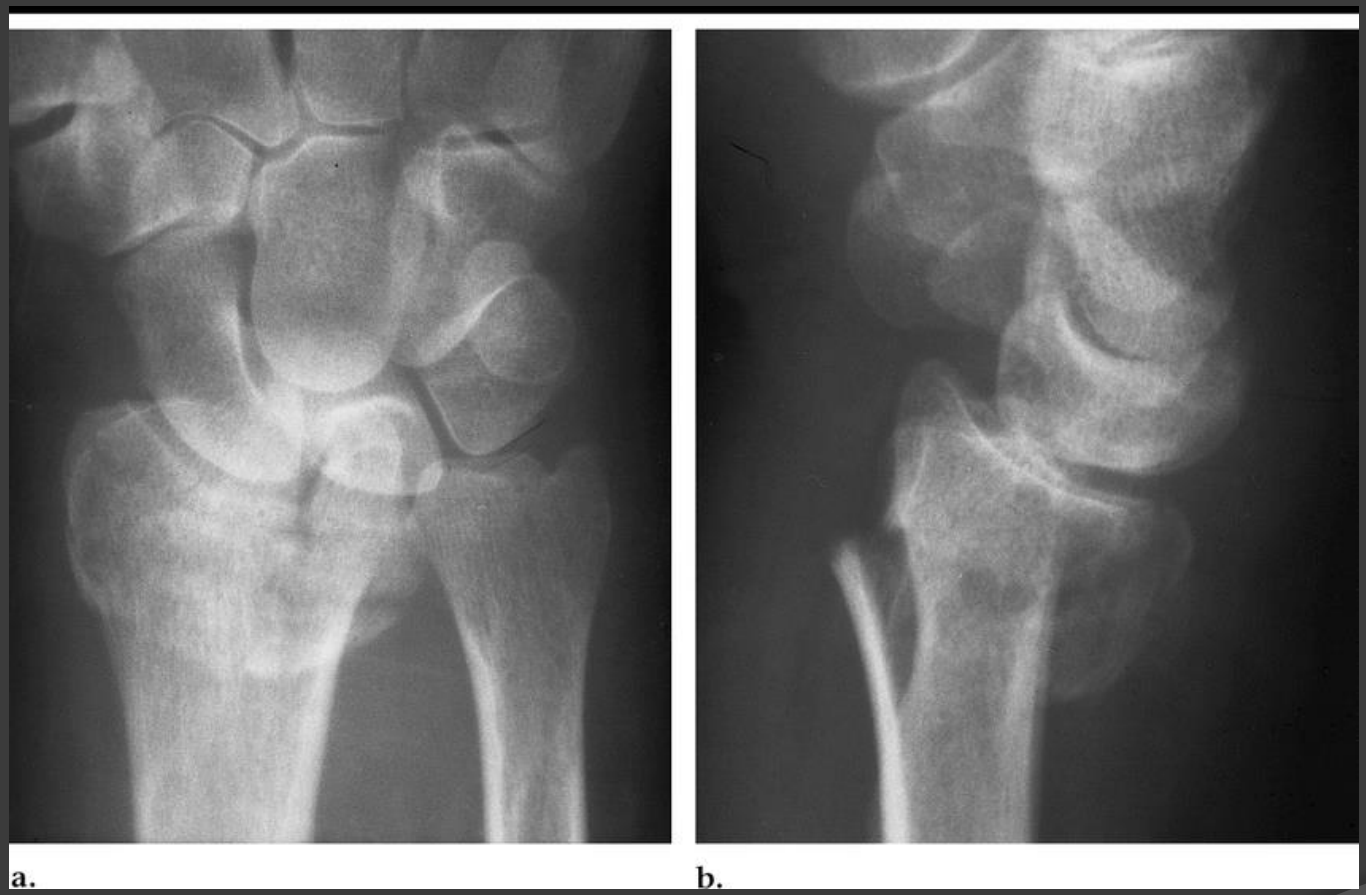
- Tenis elbow
- Golfer elbow
- Soft tissue disorders
- fractures
- Neuropathy
- Systemic disaeses


Before ES3 Use:
Tear in Tendon
Lateral Epicondyle
Tendon
After ES3 Use:
Lateral Epicondyle
Tendon

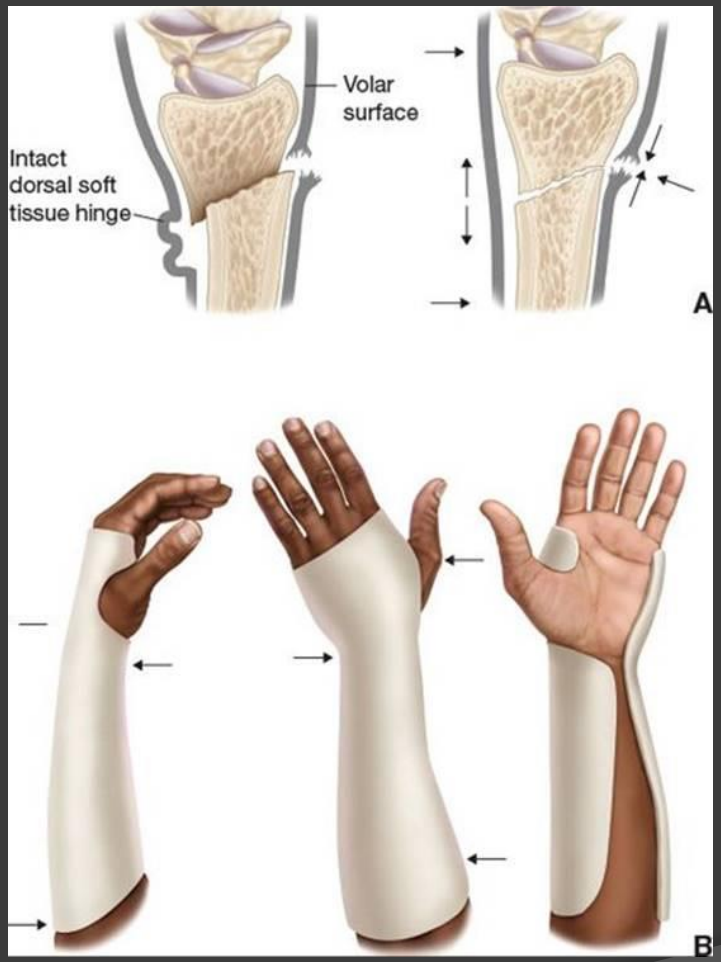
Bursopathy
Triggerfinger
Ganglion
fracture



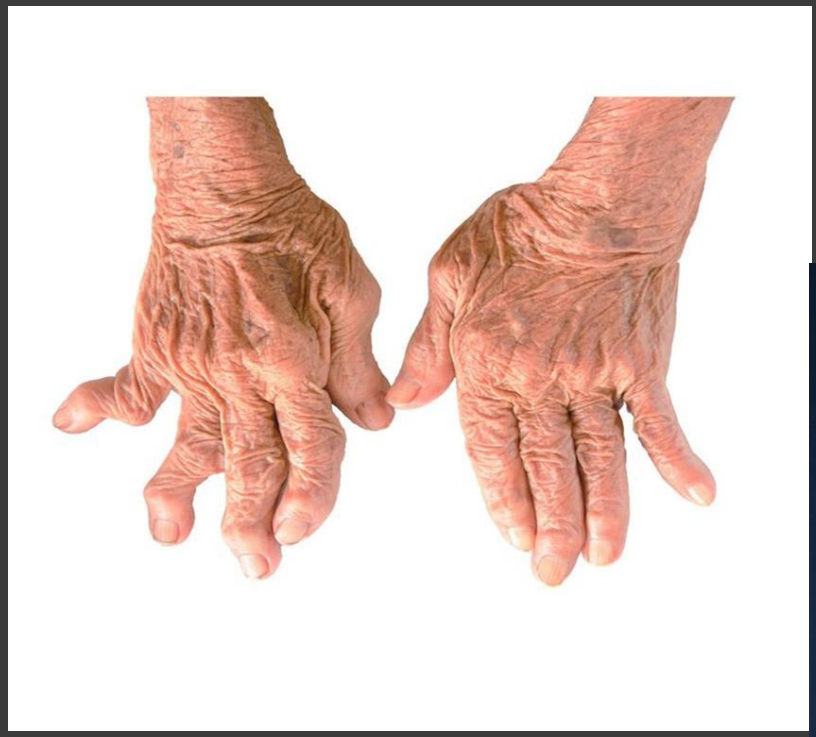
X-ray



Therapy of the fracture

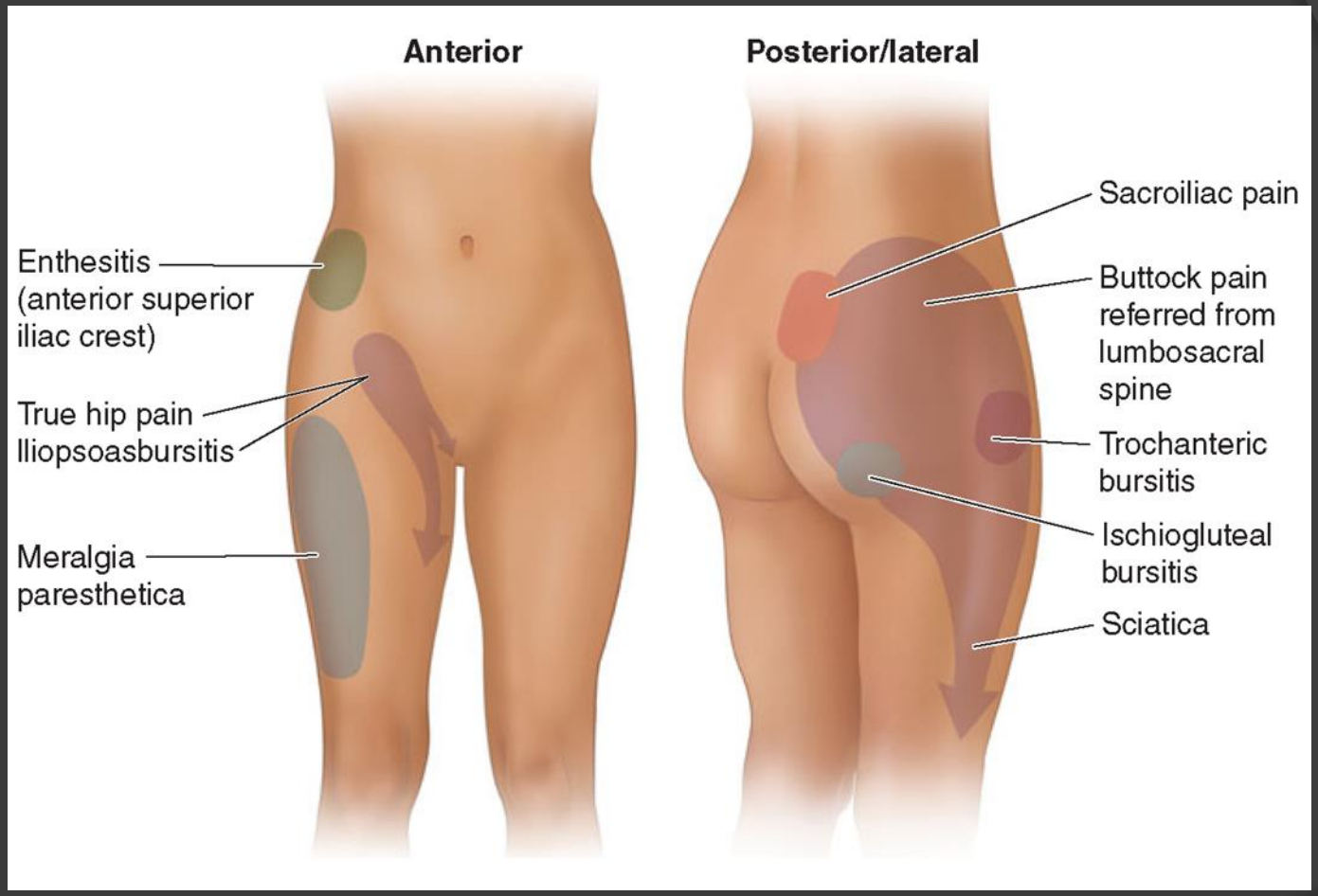


rheumatoid arthritis



HIP

- Soft tissue disorders
  - Enthesopathy, bursopathy
- Coxarthrosis
- Sakroilleitis
- Fracture
- DDH


Anterior
Posterior/lateral
Enthesitis (anterior superior iliac crest)
True hip pain
Iliopsoasbursitis
Meralgia paresthetica
Sacroiliac pain
Buttock pain referred from lumbosacral spine
Trochanteric bursitis
Ischiogluteal bursitis
Sciatica

fracture of the femoral neck

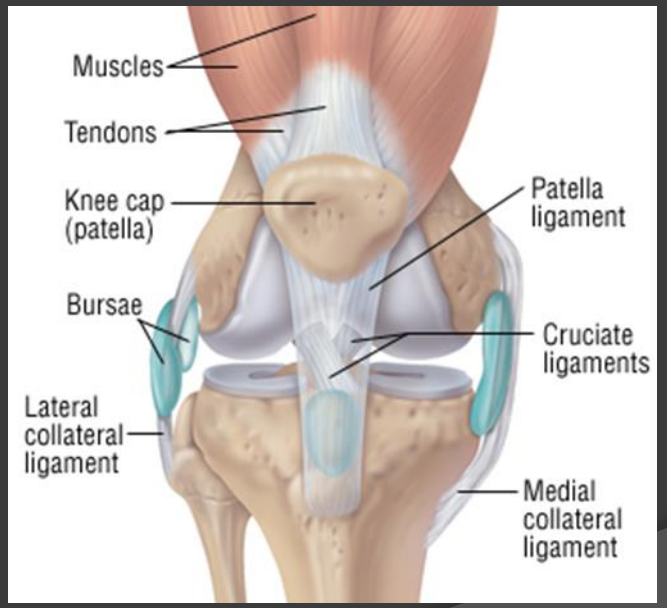
Coxarthrosis

Hip alloplasty

OS of the fem. neck fr.

Knee

- Soft tissue disorders
- Degenerative changes
  gonartrosis
- Injuries



SPECIAL TESTS

PATELLA	• Patellar grinding • Patellar Tracking
ACL	• Anterior drawer test • Lachman test
PCL	• Posterior Drawer Test • Posterior Sag Sign
MCL	• Valgus Stress Test
LCL	• Varus Stress Test
Meniscus	• Apley's Grinding • McMurray's Test

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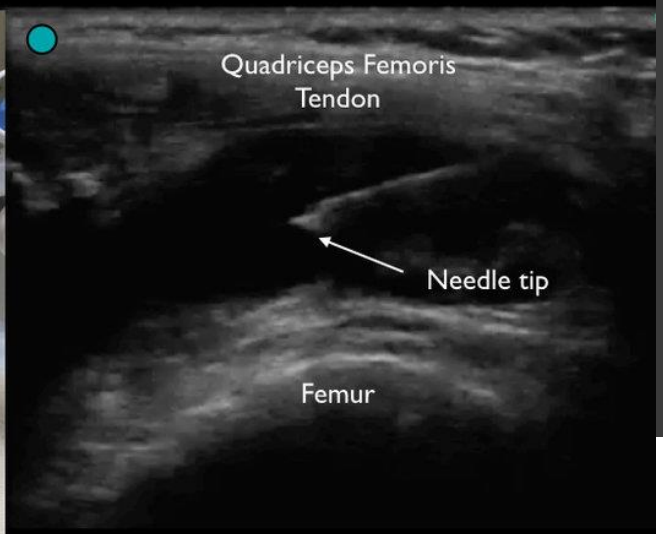
Preapatellar bursitis

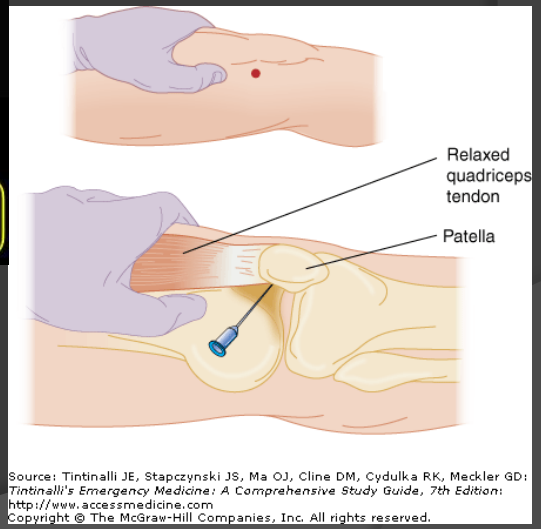
Baker‘s cysts

STEP 4

In-plane approach to the suprapatella fossa
Needle between iliotibial band and vastus lateralus

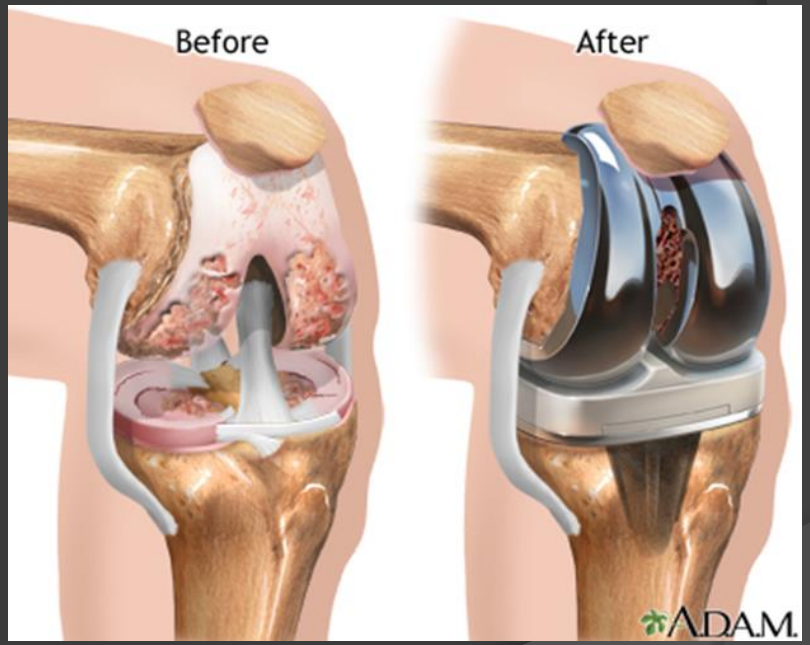


HGHED US



Source: Tintinalli JE, Stapczynski JS, Ma OJ, Cline DM, Cydulka RK, Meckler GD: *Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 7th Edition*: http://www.accessmedicine.com

Gonarthrosis
total knee endoprosthesis



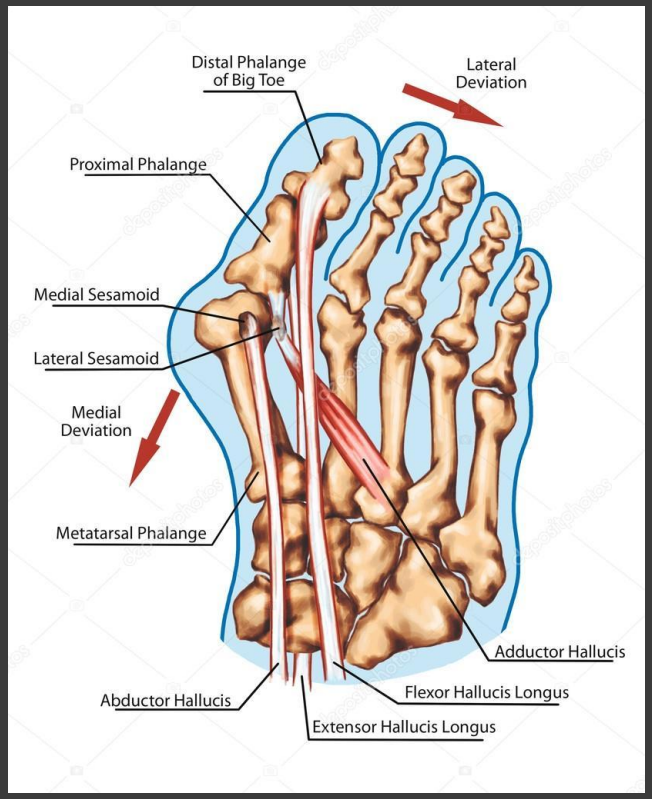
FOOT

Soft tissue disorders
Degenerative changes
Injuries

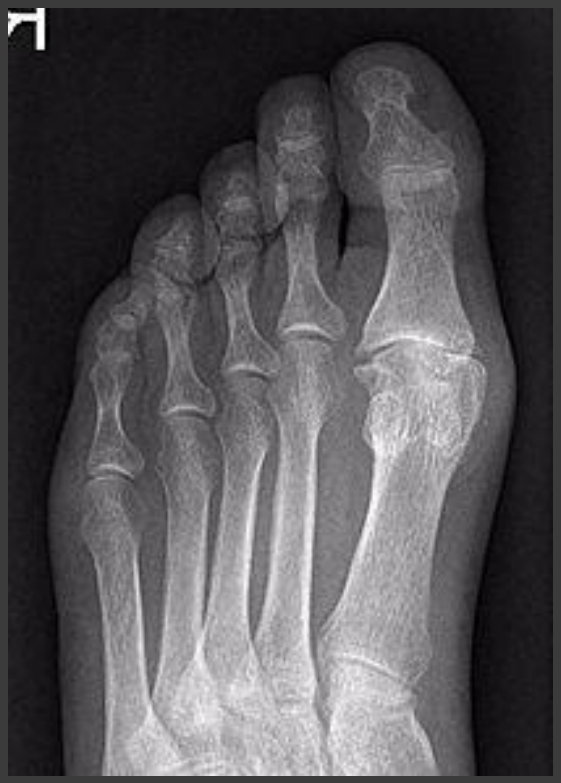
Systemic diseases

Sprained ankle

Hallux valgus -Bunion



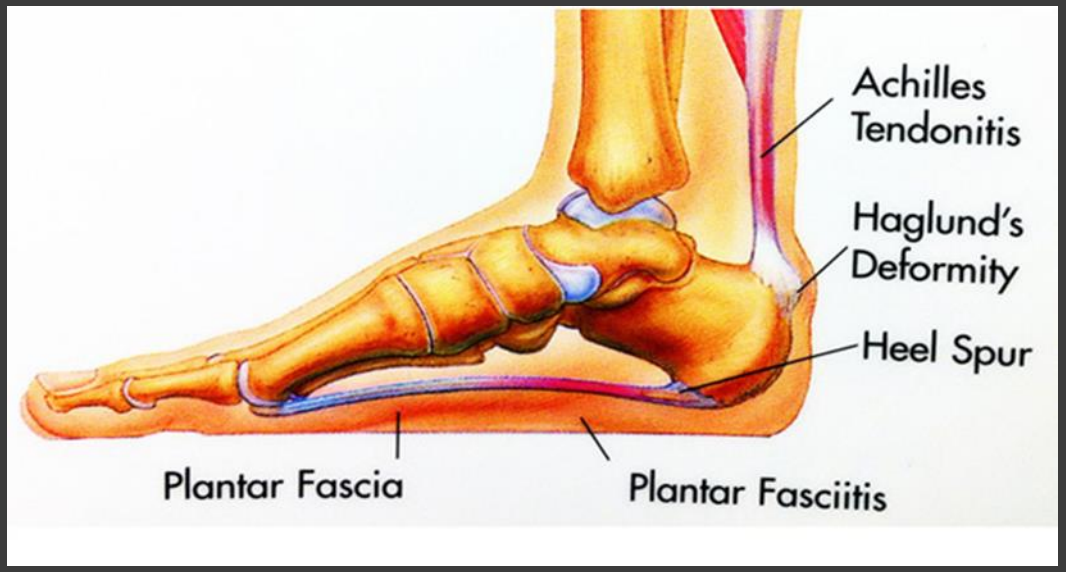
Hallux rigidus



Pes planus –flat foot

Asymetric wear of sole

Soft tissue disorders



Conservative therapy

Ortop. insoles

Surgical therapy

Soft tissue:

Modified Mcbride

Distal MTB osteotomy HVA ≤ 40, IMA < 13:

Chaveron.. biplanar Chevron

Mitchel

Proximal MTB osteotomy: HVA >40°, IMA >13°

Scarf Crescentric

Ludloff Broomstick

Combined MTB osteotomy: severe disease (HVA 41-50°, IMA 16-20°)

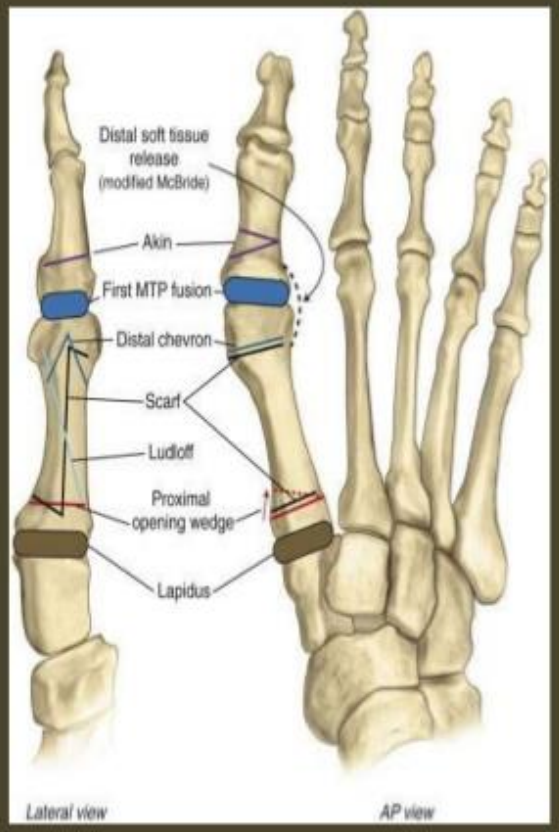
Proximal phalanx osteotomy

Akin

Arthrodesis

1st MTJ

Lapidus-1st metatarsocuneiform

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Orthopaedic team