Musculoskeletal system trauma - Radiology

KC Ljubljana KIR

Musculoskeletal tissues

- BONES
- JOINTS (LIGAMENTS, CARTILAGE)
- MUSCLES AND TENDONS
- (VESSELS, NERVES)

Imaging modalities

- X-ray
- CT scan (computer tomography)
- MRI (magnetic resonance imaging)
- ultrasound (US)
- artrography (MRI, CT, X-ray)

REFERRAL - what to write on the referral paper?

- good communication between referring physician and radiologist to choose the right imaging modality is essential:
- short (essential) clinical presentation
- what is the clinical question?, the goal of imaging?

- inadequatly performed examination – no clinical presentation and question on the referral paper – target tissues?, expected pathology?, what to look for?

X-ray

- +

easily accessible, fast, cheap, high space resolution

- -

radiation, overlapping tissues, lack of soft tissues assessment

- 2 projections
- additional projections
- BONE assessment, much less soft tissues

CT

- +
- relatively easily accessible, fast
- no overlapping structures /tissues
- random plane and 3D view

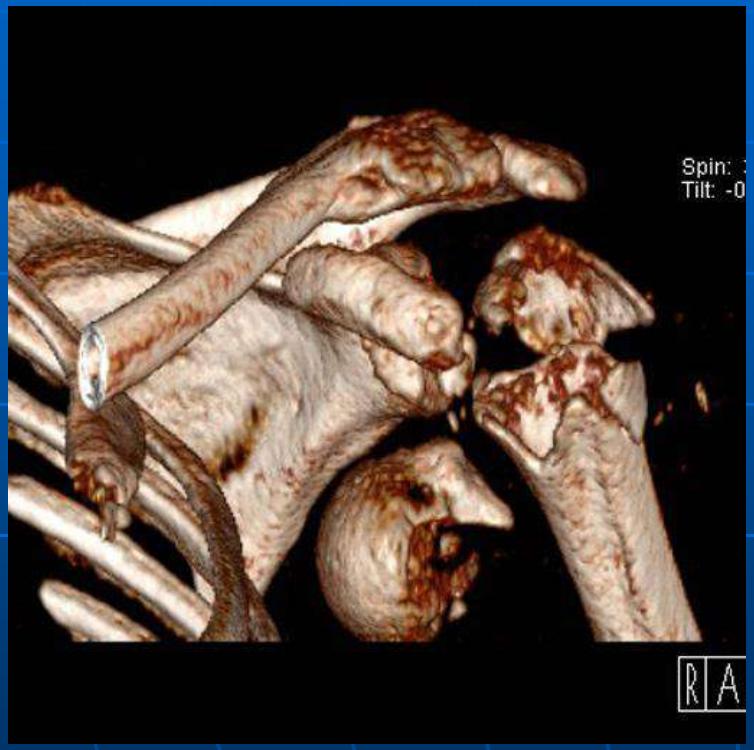
- -
- slightly lower space resolution,
- more radiation

CT

- assessement of BONE
- when X-ray is inconclusive
- complex, intraarticular fractures
- assessement of: bone healing, rotation, angulation, malposition of healed long bone
- +/- soft tissues (larger structures)


L


Spin: -6
Tilt: -4
A


Spin:
Tilt: -0
R A


Spin: 90
Tilt: 0
R

MR

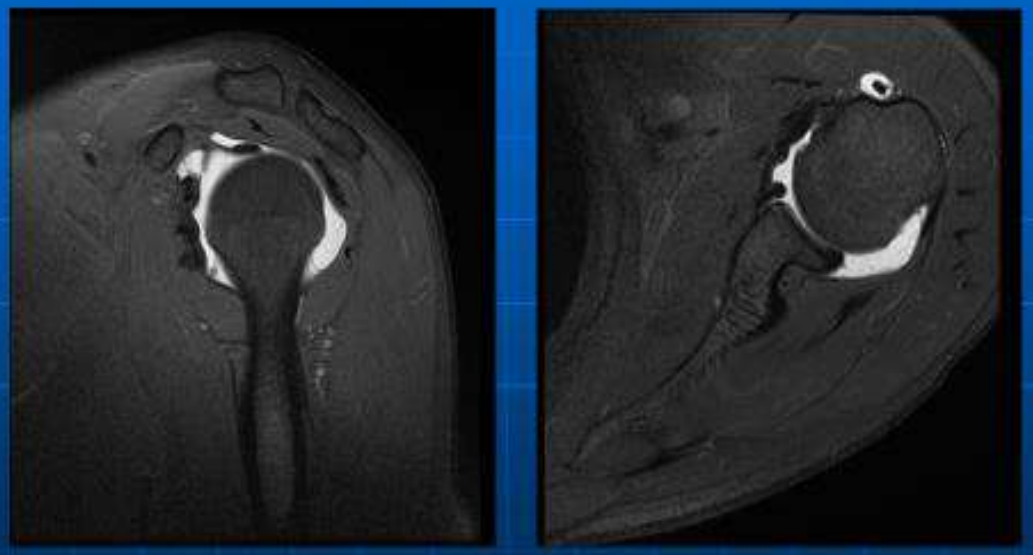
- magnetic field and radiofrequency pulse
- no radiation (dangerous), very good contrast and tissue resolution
- in slices, standard planes, possibility of 3D
- low accessibility (☹), expensive, relative space rasolution
- time-consuming (30 – 60 min)

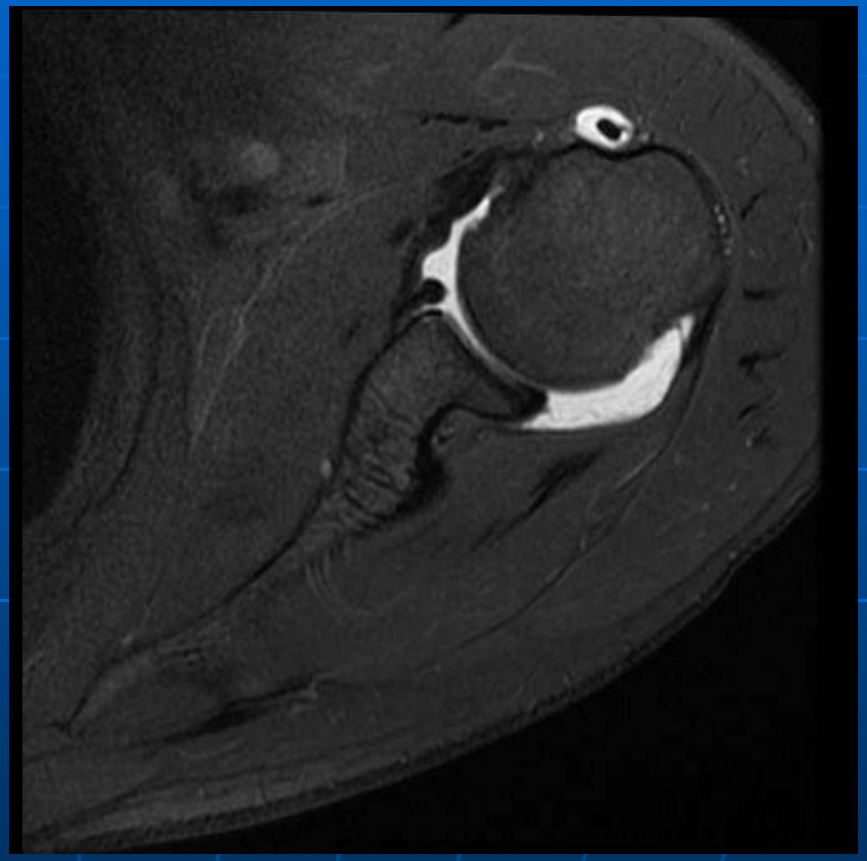
- no metal, which is MRI incompatible (MRI compatibility licence!)
- pacemaker
- claustrophoby, very high body weight, very high body temperature, pregnancy


D

artrography

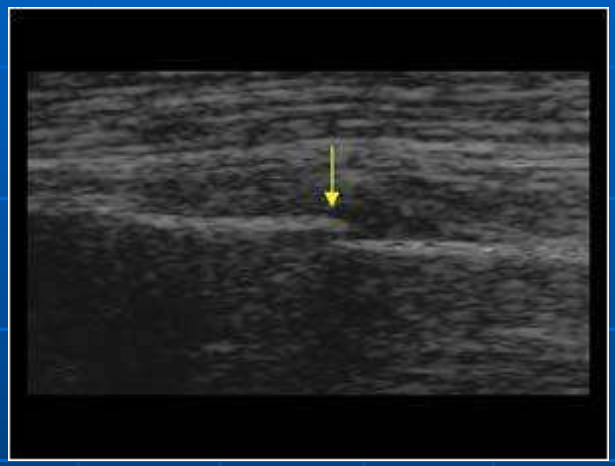
- intraarticular contrast aplication with needle (sterile skin, needle, local anaesthesia)
- CT or MRI (less X-ray)
- distension of the joint and better assessement of intraarticular structures – cartilage, labrum, ligaments, osteochondral lesions

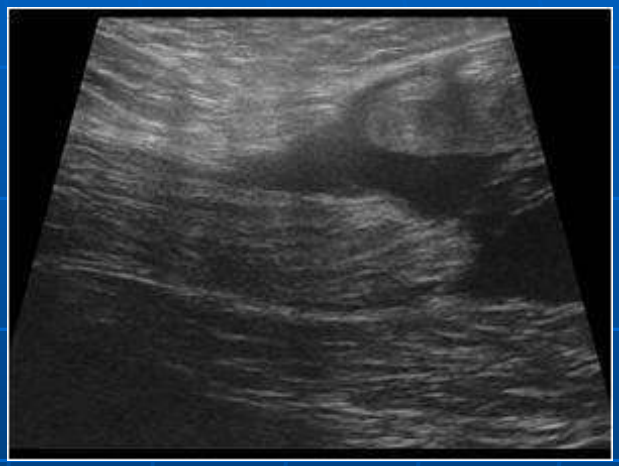




US - ultrasound

- relatively good accessibility, cheap, no radiation
- time consuming, operator dependent
- „does not see through bone and air“
- for superificial tissues





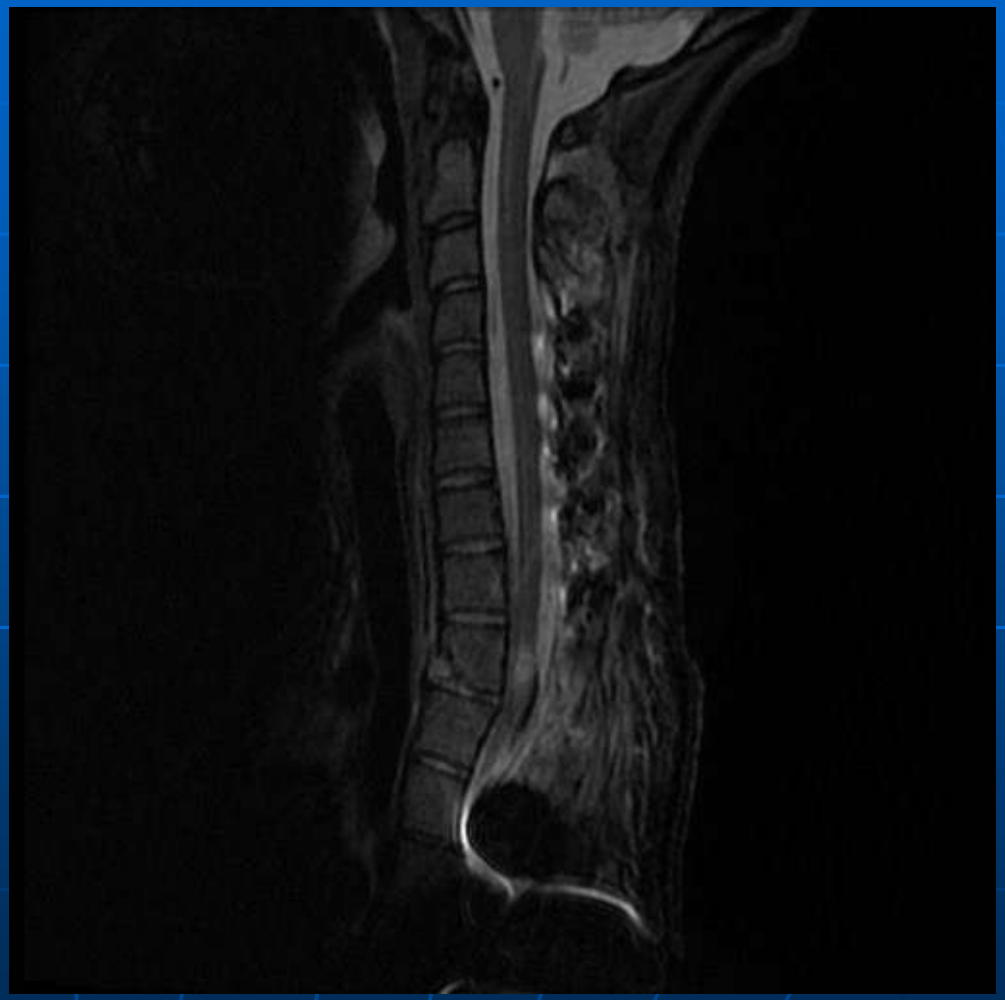
MRI

- the best tissue resolution– the best imaging modality for assessement of SOFT TISSUES (fat, muscles, tendons, ligaments, cartilage, nerves, vessels..)
- BONE – the best qualitative assessement – NORMAL /PATHOLOGY,

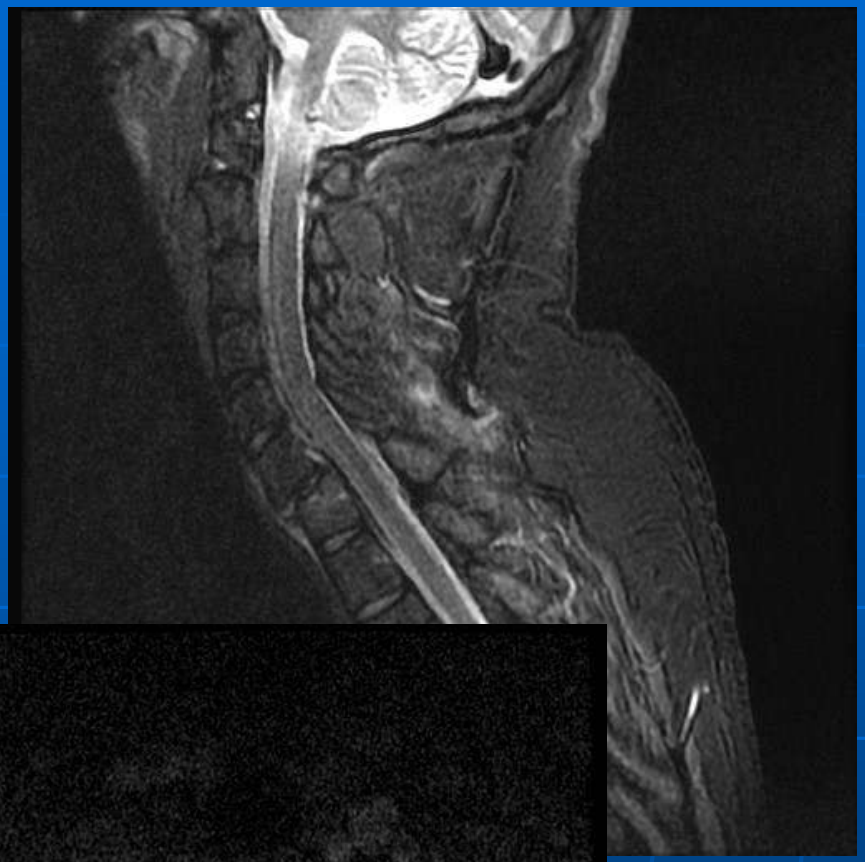
morphology (shape, conture of bone) not so good

- for DEEP TISSUES, inaccessible with US
- extra pathology – degenerative changes, infection, tumors…

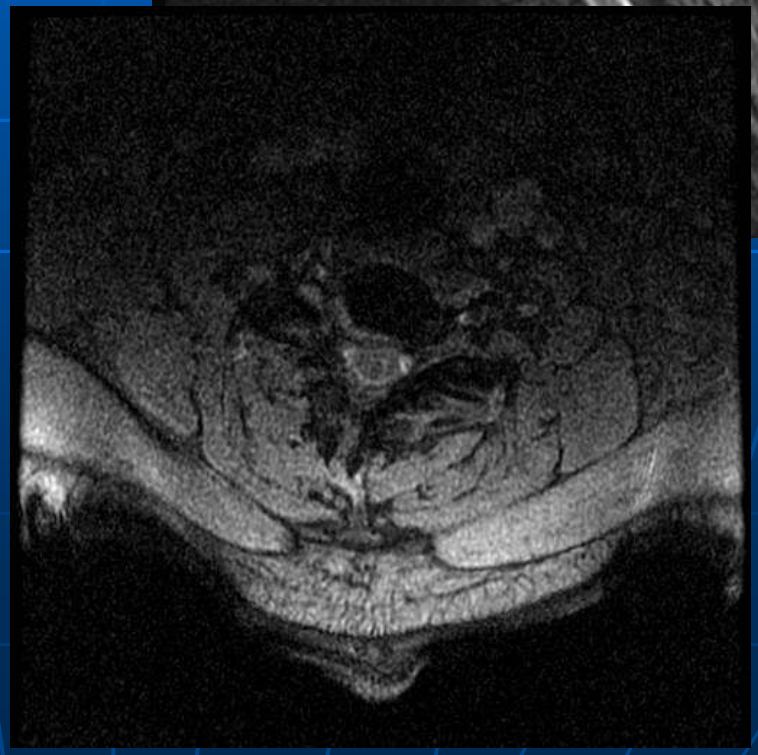
- URGENT MRI examination – injury of the spinal cord?
- DELAYED MRI examinations – injury of ALL other tissues
- - depends on the treatment, surgery, patient condition
- ACUTE INJURIES
  - vertebral fractures,
  - intraarticular assessement before the surgery
- CHRONIC INJURIES



- spine MRI
- narowing of the neural structures?
- spinal cord (spinal canal) and spinal nerves (i.v. foramina)



- fracture?
- intervertebral disc injury?
- injury of the spine ligaments?



- fracture – FRESH or OLD

- fresh fracture – bone oedema lasting up to 6 months

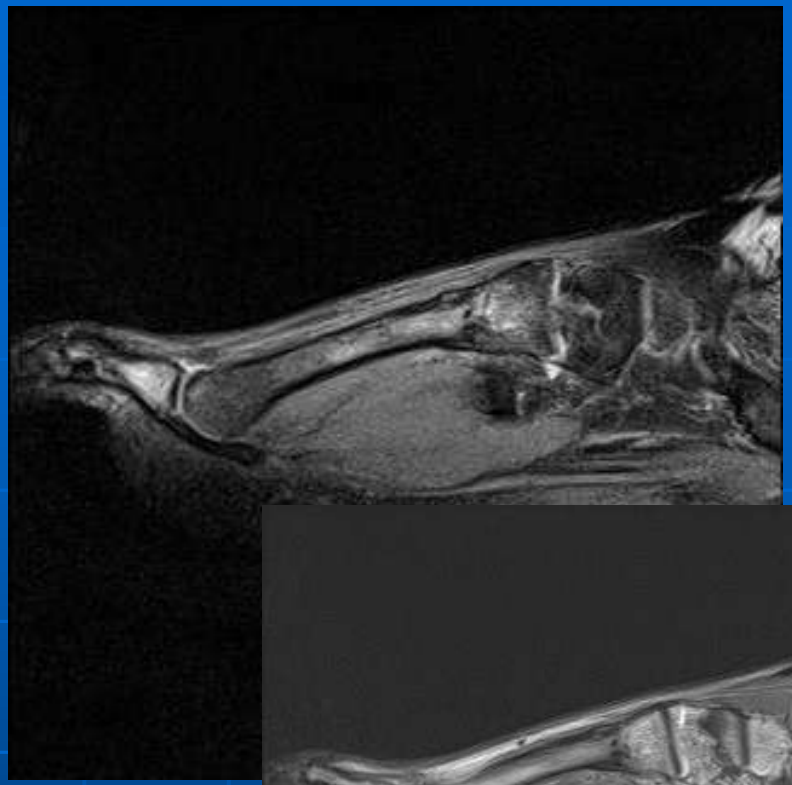
- STRESS fracture?

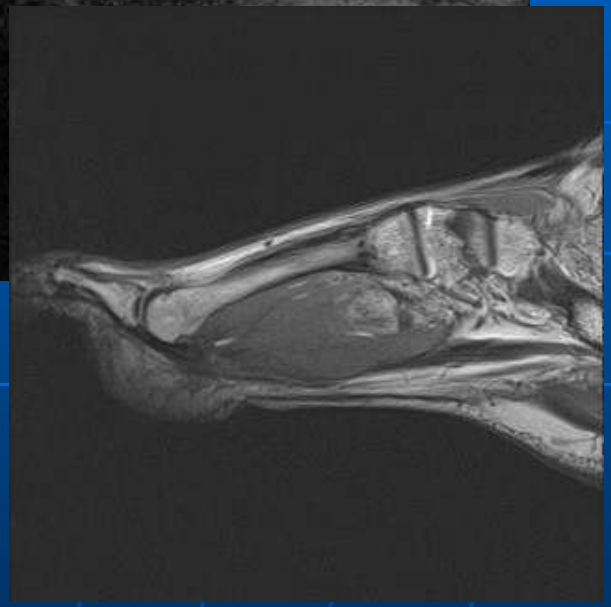
(metatarsal, sacrum, tibia)

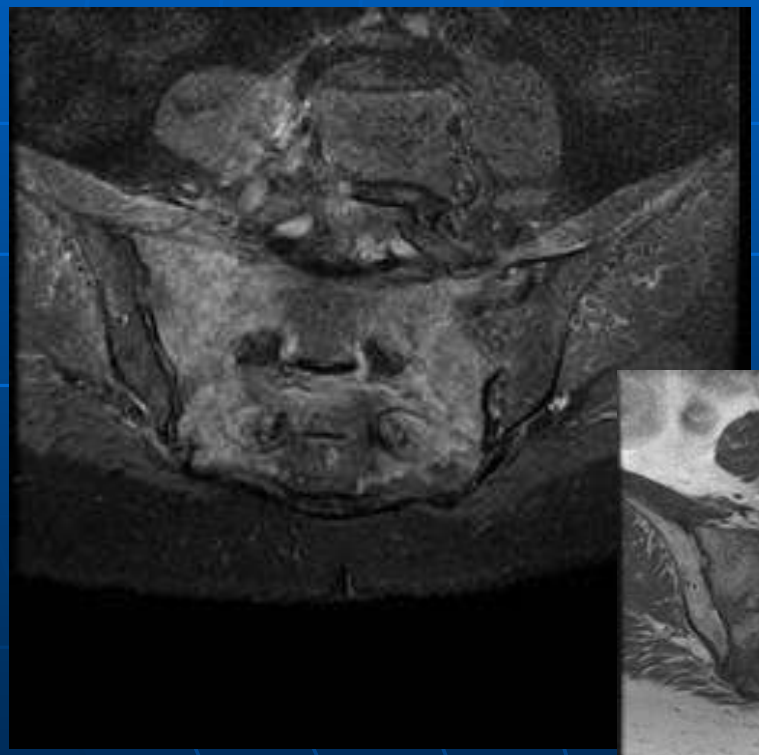
- INSUFFICIENCY fracture?

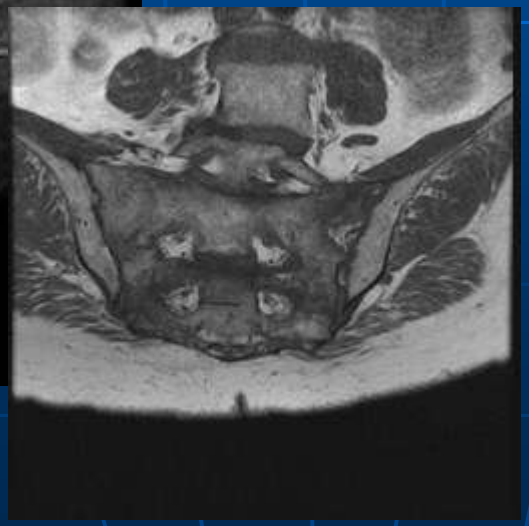
(spine, sacrum)

fracture lines not seen on CT or X-ray





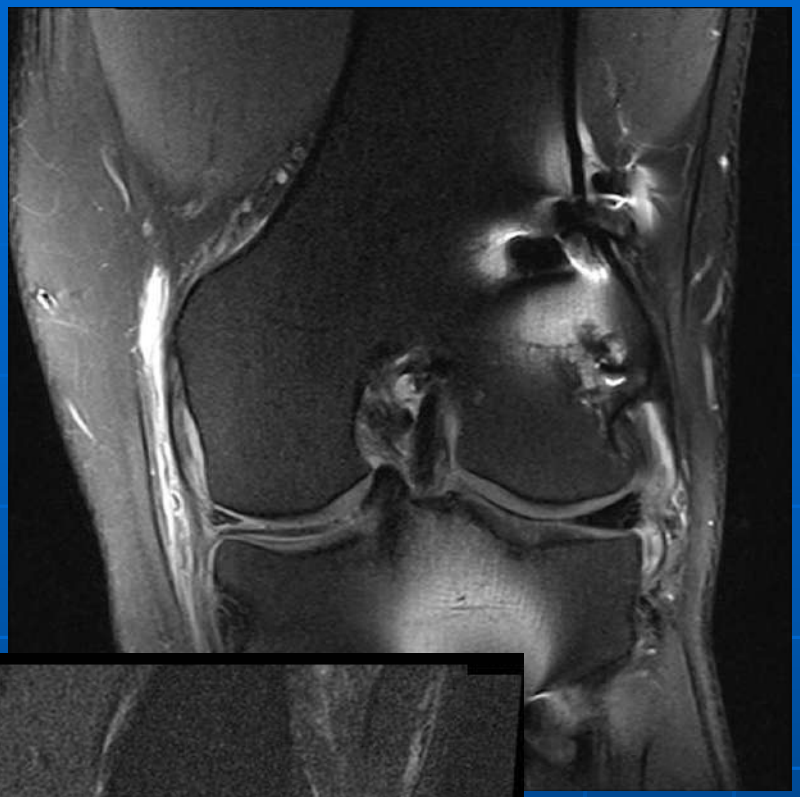




- MENISCI (knee)
- LIGAMENTS

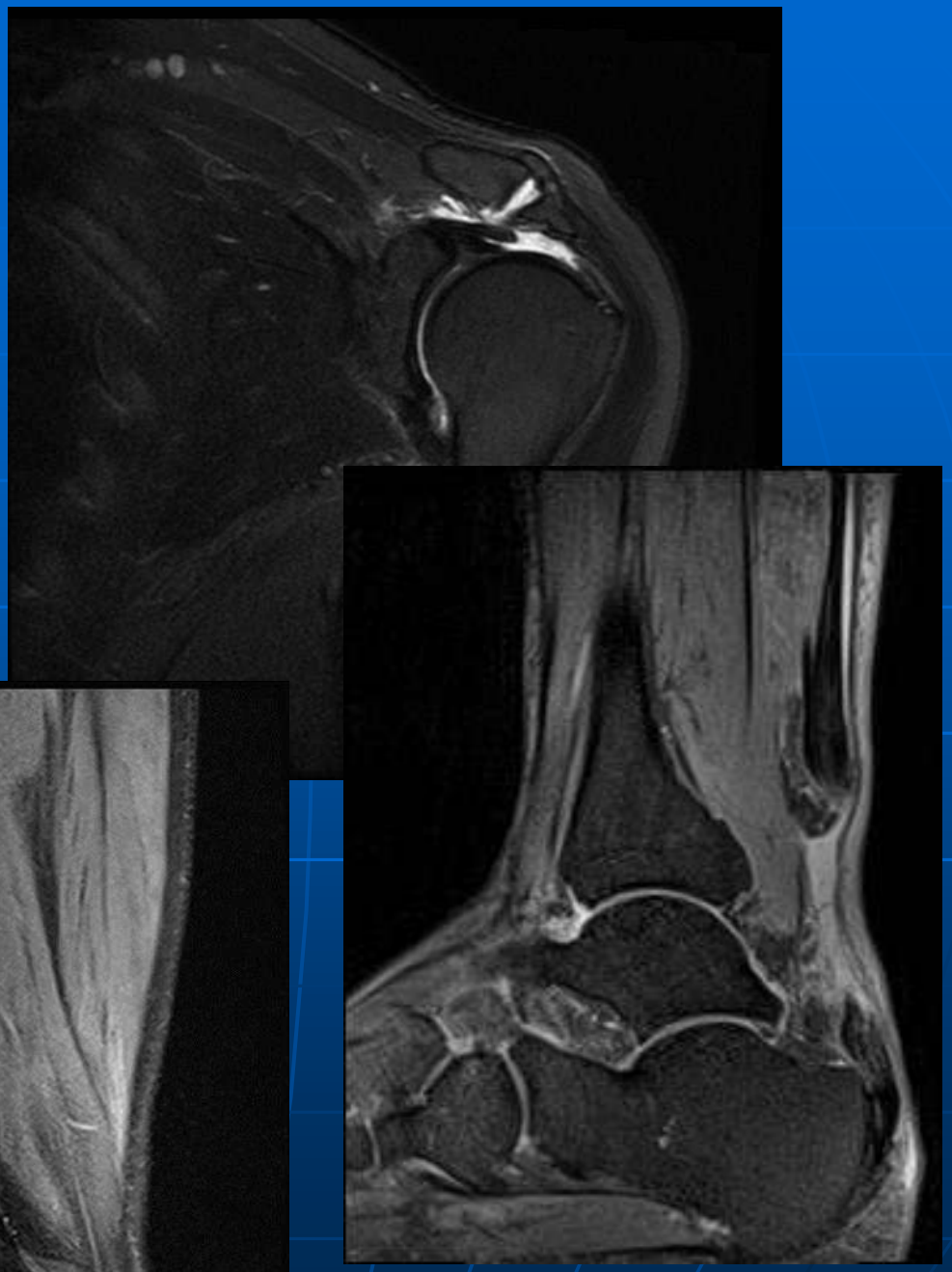
knee: superficial – COLLATERAL lig.

deep - CRUCIATE lig.

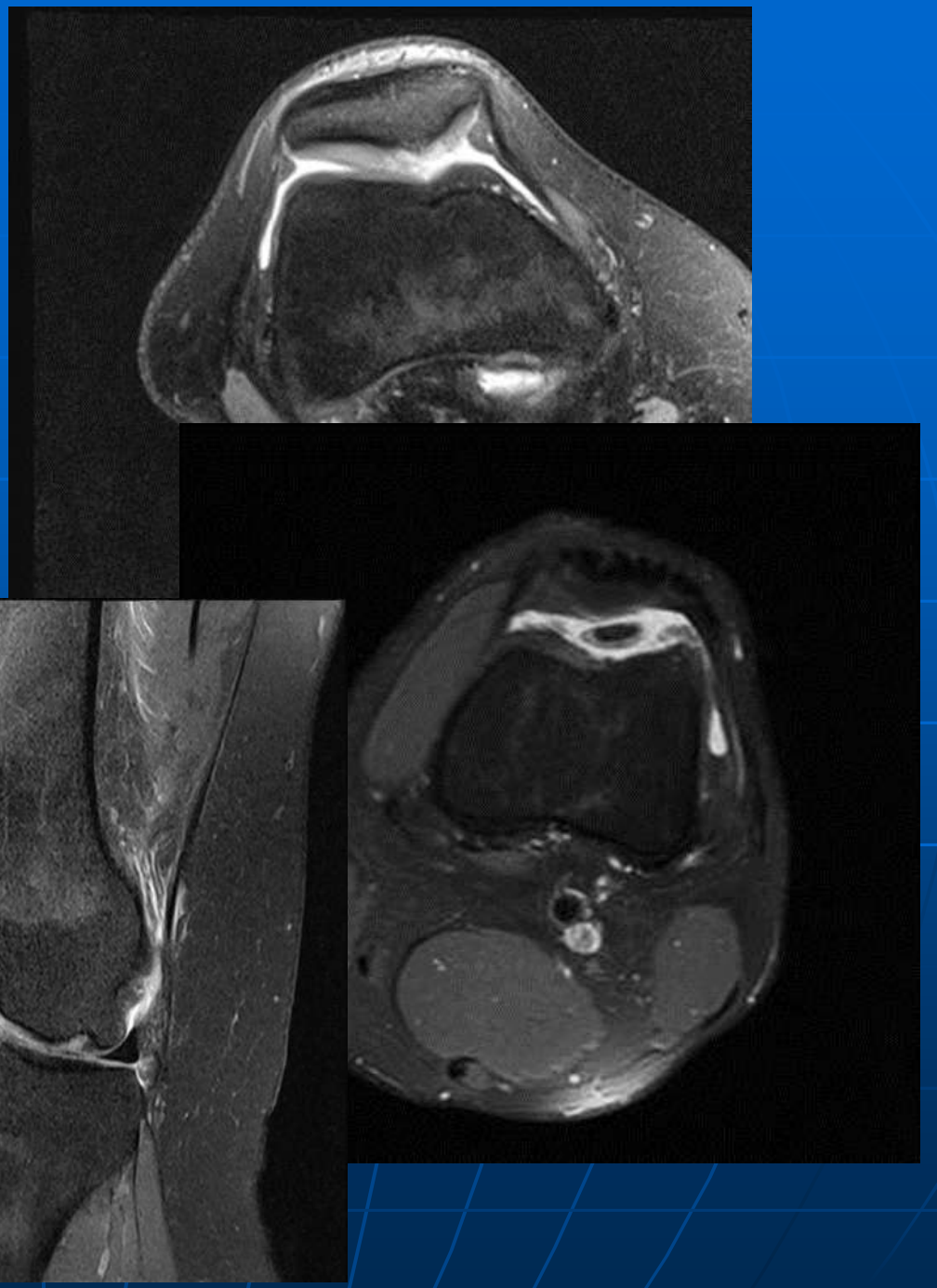


- TENDONS
- shoulder – rotatory cuff tendons
- rupture PARTIAL/ COMPLETE

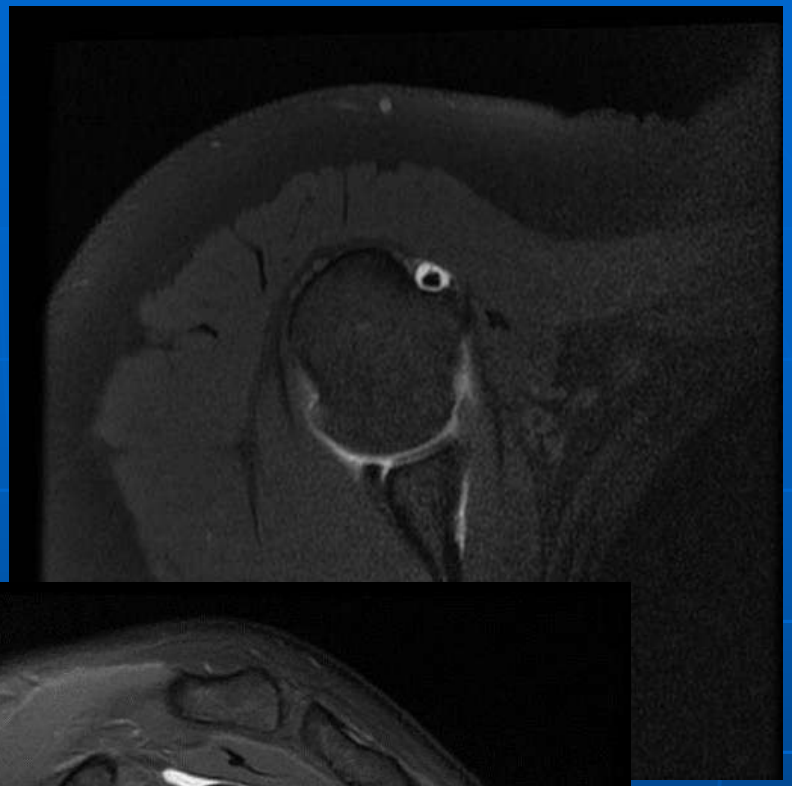
- MUSCLES distension / rupture / haematoma



- CARTILAGE
- CHONDRAL/ OSTEOCHONDRAL lesion
- intraarticular FREE BODY



- MRI ARTROGRAPHY
  (shoulder, hip, wrist)
- better assessement of CARTILAGE, LABRUM, LIGAMENT, TENDON
  injuries
- assessement of CHRONIC injuries
- before/(after) the surgery



- PATHOLOGIC fracture TUMOR, POST CONTRAST imaging

- AVASCULAR BONE NECROSIS- viability of bone

  (navicular bone, hip)