College of Health and Medical Technologies
Department of Radiology Technologies
Computed Tomography

CT scan of Musculoskeletal System

4 th stage

LECTUER 13

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MSc Radiographic Imaging

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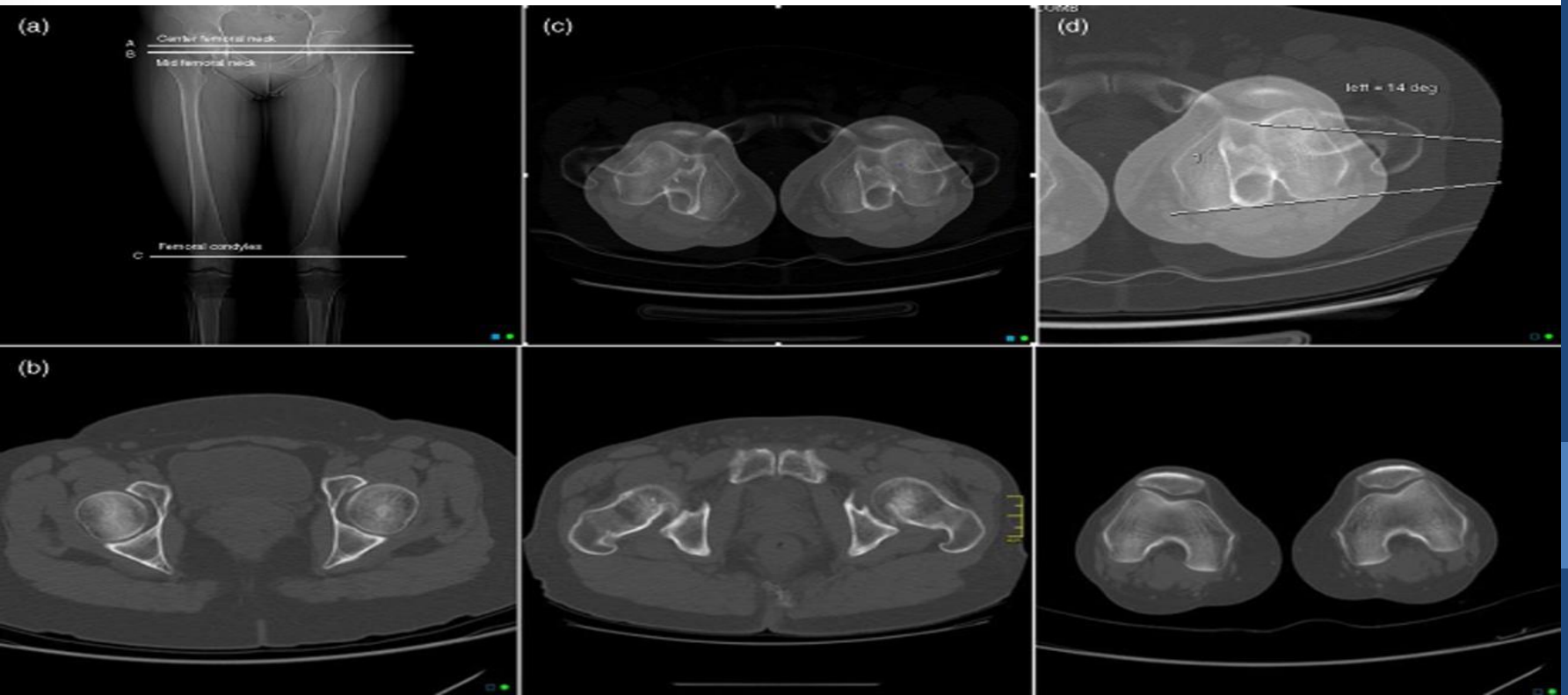
CT hip (protocol)

The CT hip protocol serves as an examination for the evaluation of the hip joint. It is often performed as a non- contrast study. However, it can be combined with a CT arthrogram for the evaluation of chondral and/or labral tears or a femoral neck version scan.



Indications

1.occult proximal femoral or acetabular fractures preoperative planning

2-osteoarthritis of the hip

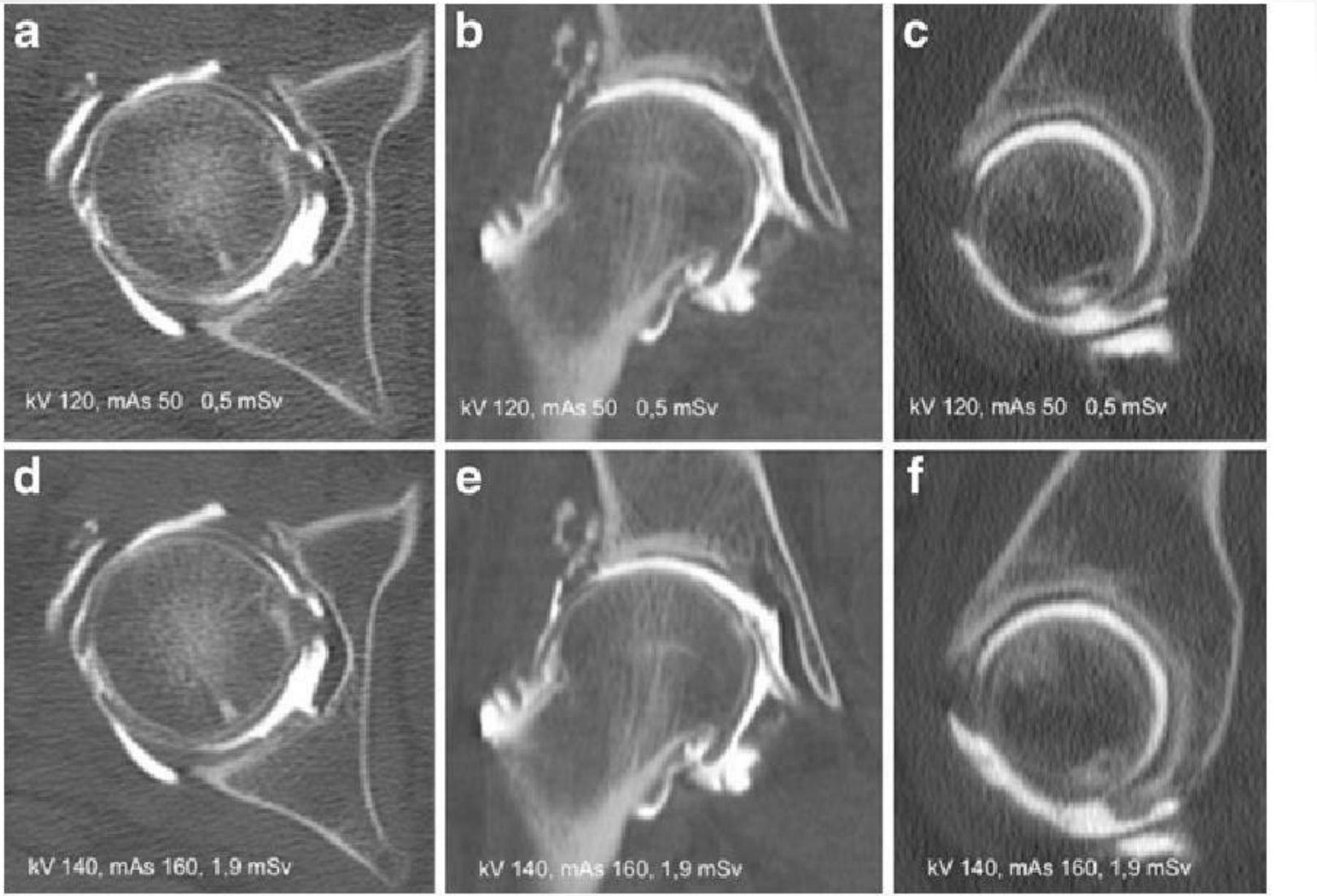
3-acetabular dysplasia

4.complications of hip protheses

5.inflammatory or septic arthritis

6.bone and soft tissue tumors

7.image guidance cartilage injury or labral tears (CT arthrogram) in cases where MRI is contraindicated



...n a patient with a body mass index of 28 kg/m^2 ... cartilage-subchondral bone plate interfaces is ...

Technique

patient position

supine position

tube voltage

≤120 kVp

tube current

as suggested by the automated current adjustment mode

scout

iliac crest to the proximal half of the femur

scan extent

might vary depending on the indication e.g. preoperative planning or implants

should include the anterior inferior iliac spine and 3-5 cm below the lesser trochanter

scan direction

craniocaudal

scan geometry

field of view (FOV): 120-250 mm

slice thickness: ≤1.25 mm, interval: ≤0.625 mm

reconstruction algorithm: bone, soft tissue

multiplanar reconstructions

axial images: strictly axial to the body axis

coronal images: strictly coronal to the body axis

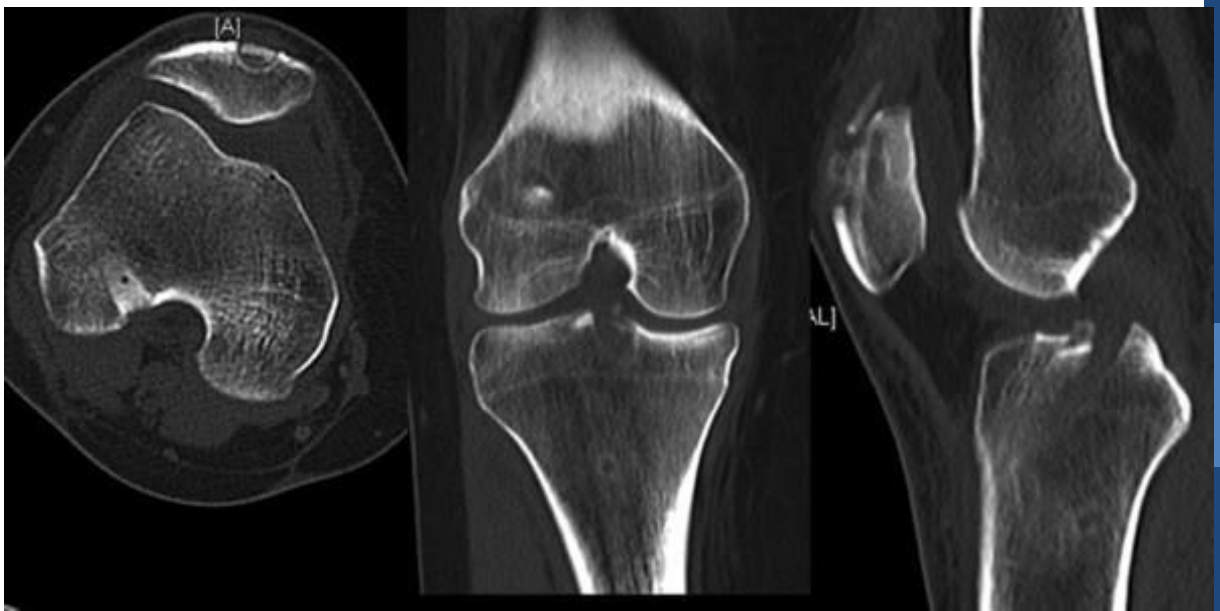
sagittal images: strictly sagittal to the body axis

axial oblique: parallel to the femoral neck axis

slice thickness: ≤2 mm, overlap 50%

CT knee (protocol)

The CT knee protocol serves as an examination for the bony assessment of the knee the femoral condyles or the tibial plateau and the proximal tibiofibular joint. It is often performed as a non-contrast study. It can also be combined with a CT arthrogram in cases of suspected internal derangement where an MRI is contraindicated.



Indications

1.distal femoral fractures proximal tibial fractures preoperative planning

2-osteoarthritis

3-trochlear dysplasia

4.knee implants and complications

5.inflammatory or septic arthritis

6.bone and soft tissue tumors image guidance

7.CT arthrography

8-contraindication to MRI

-presence of metallic implants

-internal derangement

Technique

patient position

supine position **tube**

voltage

≤120 kVp

tube current

as suggested by the automated current adjustment mode

scout

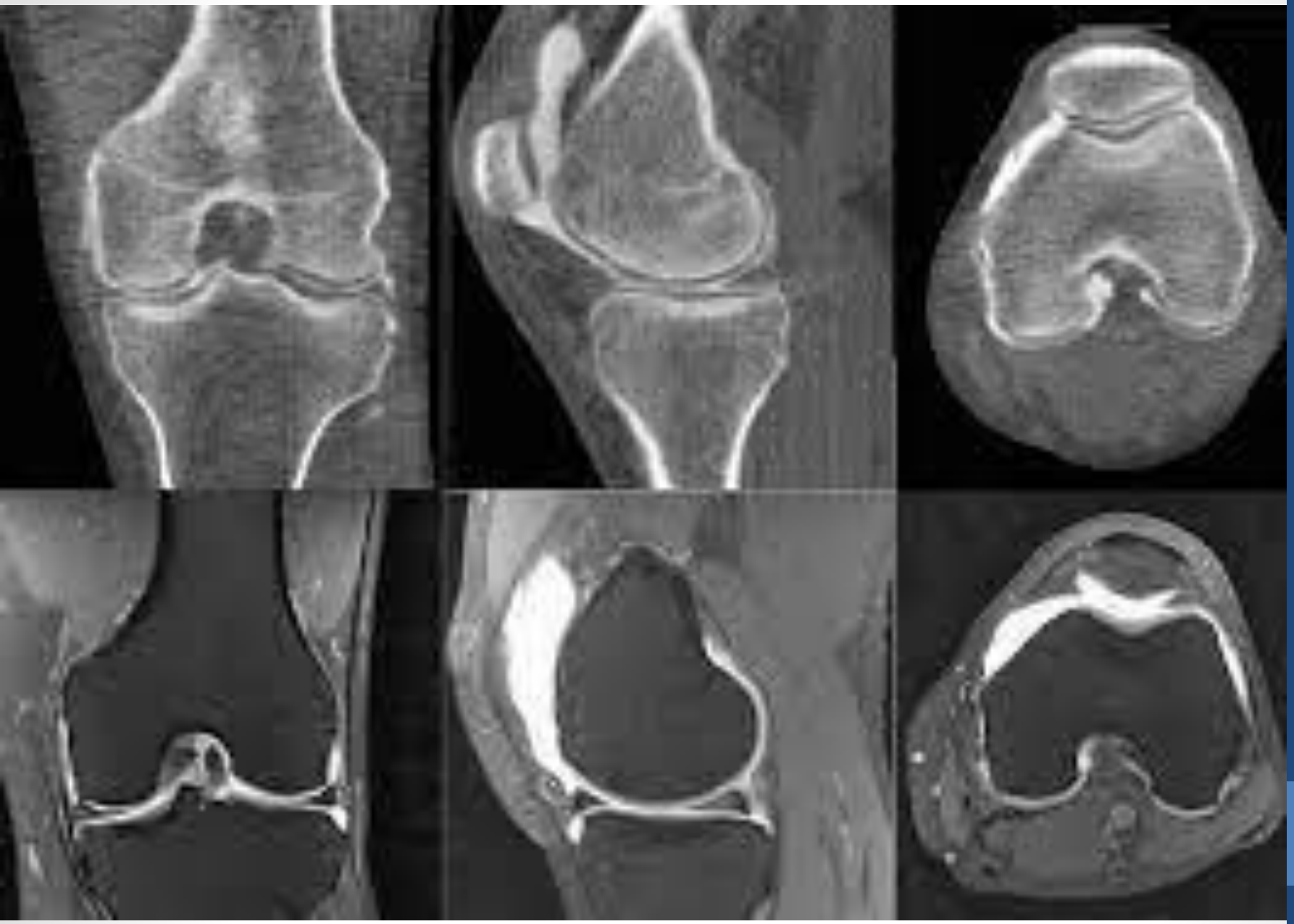
distal third of the femur and proximal half of the tibia

scan extent

the whole patella and the fibular head should be included

scan direction

craniocaudal



scan geometry

field of view (FOV): 120-250 mm (should be adjusted to increase in-plane resolution)

slice thickness: ≤1.25 mm, interval: ≤0.625 mm

reconstruction algorithm: bone, soft tissue

multiplanar reconstructions

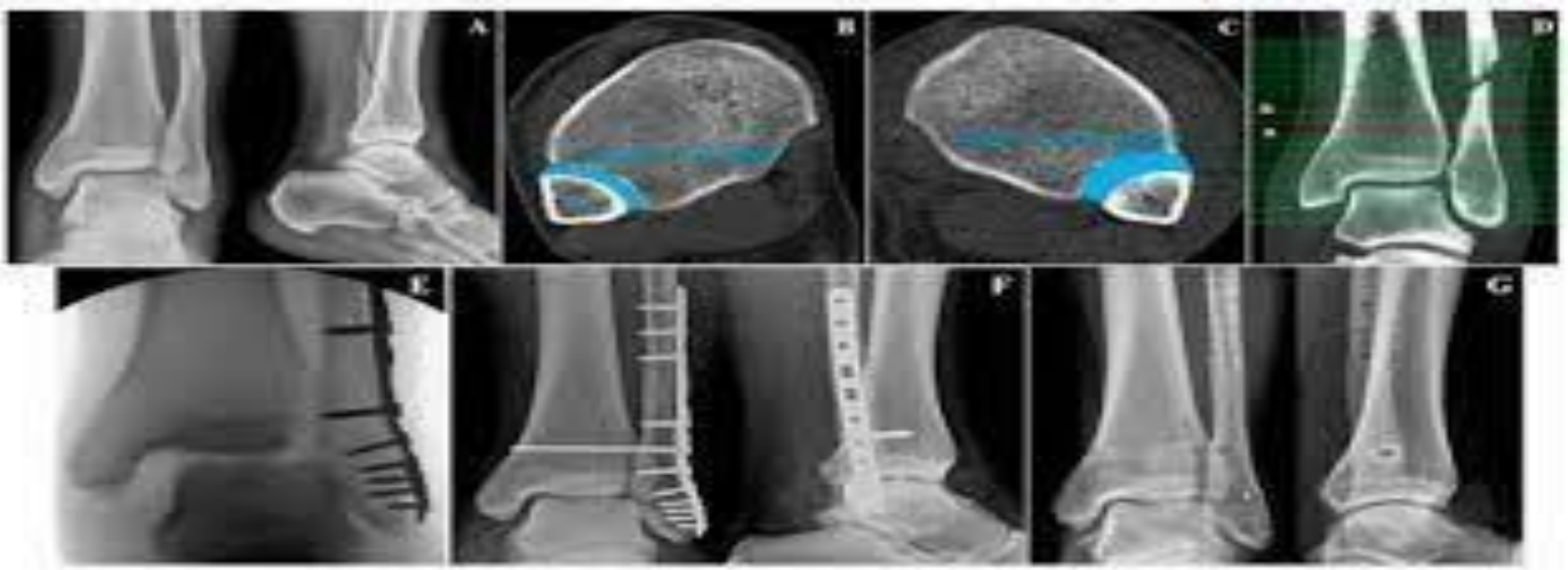
axial images: parallel to the femorotibial joint line

coronal images: parallel to the transepicondylar axis sagittal images: perpendicular to the transepicondylar or parallel to the anteroposterioraxis

slice thickness: ≤2 mm, overlap 50%

CT ankle (protocol)

The CT ankle protocol serves as an examination for the bony assessment of the ankle and foot and is almost always performed as a non-contrast study. It can be also combined with a CT arthrogram for the evaluation of chondral and osteochondral injuries or can encompass the whole foot in certain indications.



Indications

1.distal tibial fractures ,malleolar fractures

2.talar and calcaneal fractures midtarsal injury

3.subtalar dislocation

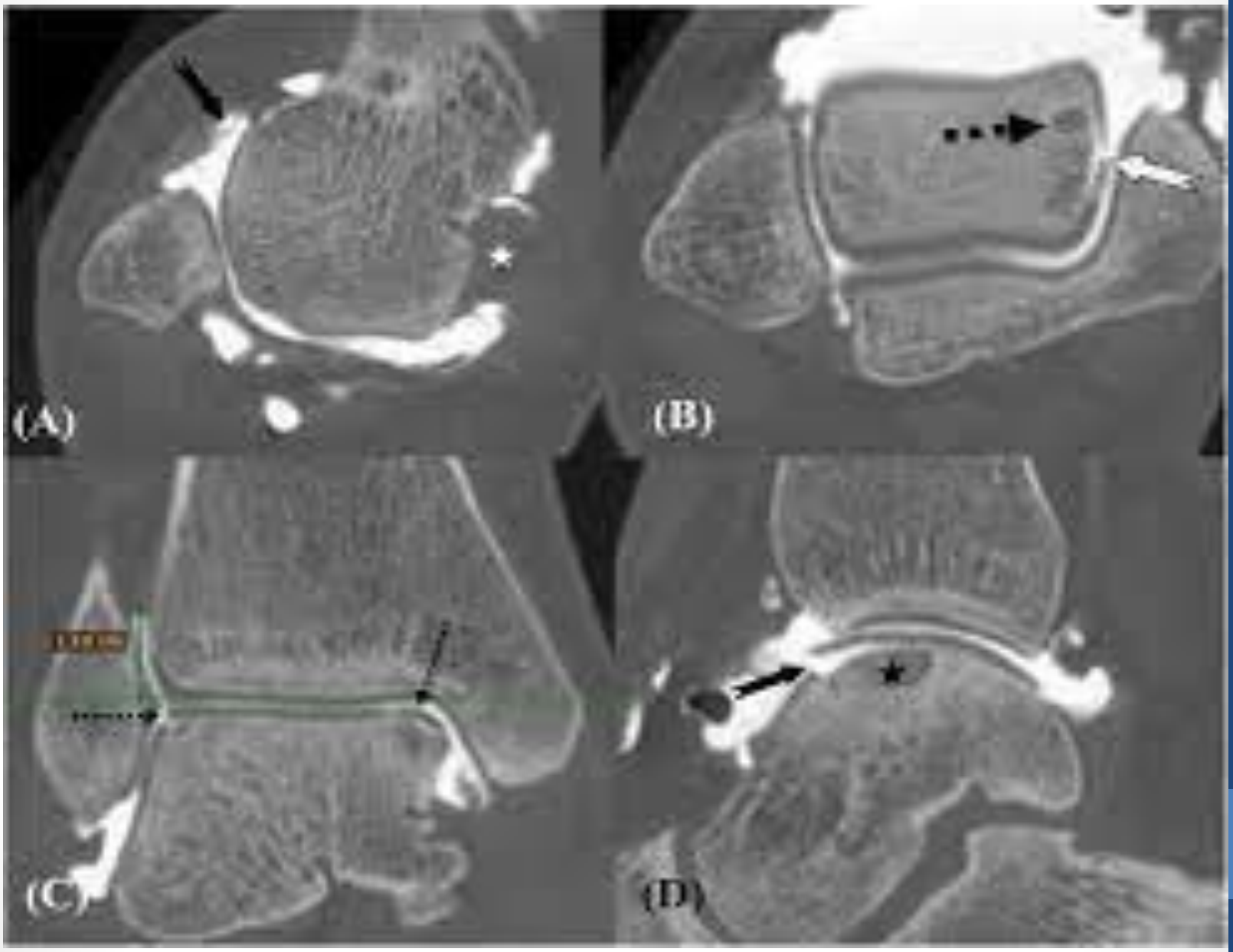
4.osteoarthritis of the ankle

5.inflammatory processes

6.infectious processes postoperative

7.evaluation bone and soft tissue tumors

8.image guidance (e.g. subtalar joint injection) cartilage injury (CT arthrogram)


(A)
(B)
(C)
(D)

Technique

patient position supine

position **scout**

mid/distal third of lower leg to the skin of the heel

tube voltage and **tube current**

≤120 kV and ≤100 mAs

scan extent

variable depends on the proximal extent of the pathology

minimum: ~2 cm above the tibiotalar joint to the bottom of the calcaneus

scan direction

caudocranial **scan**

geometry

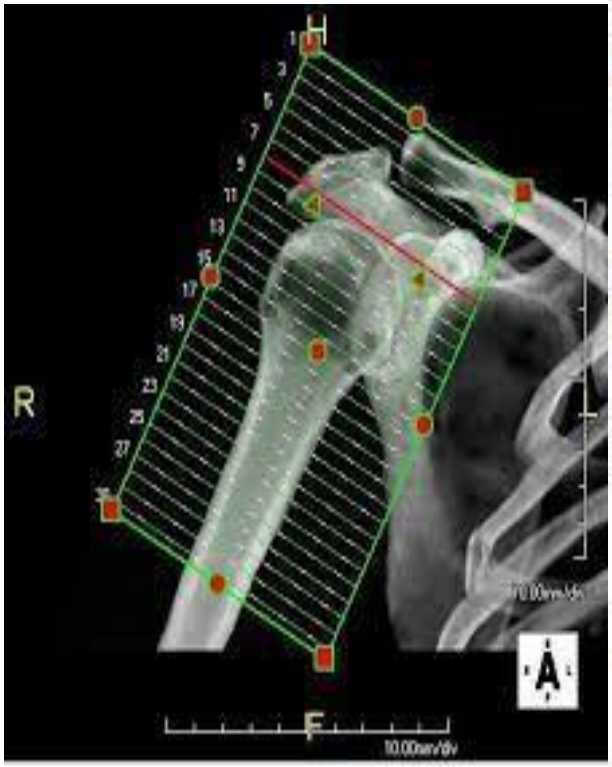
field of view (FOV): 100-160 mm (should be adjusted to increase in-plane resolution)

slice thickness: ≤1.5 mm, overlap ~50%

reconstruction algorithm: bone, soft tissue

CT shoulder (protocol)

The CT shoulder protocol serves as an examination for the assessment of the shoulder joint. It is often performed as a non-contrast study. It can be combined with a CT arthrogram for the evaluation of labral injuries or the rotator cuff if MRI is contraindicated or in a postoperative setting where metallic implants are present.



Indications

1.proximal humeral fractures

2.scapular fractures preoperative planning

3-osteoarthritis of the shoulder

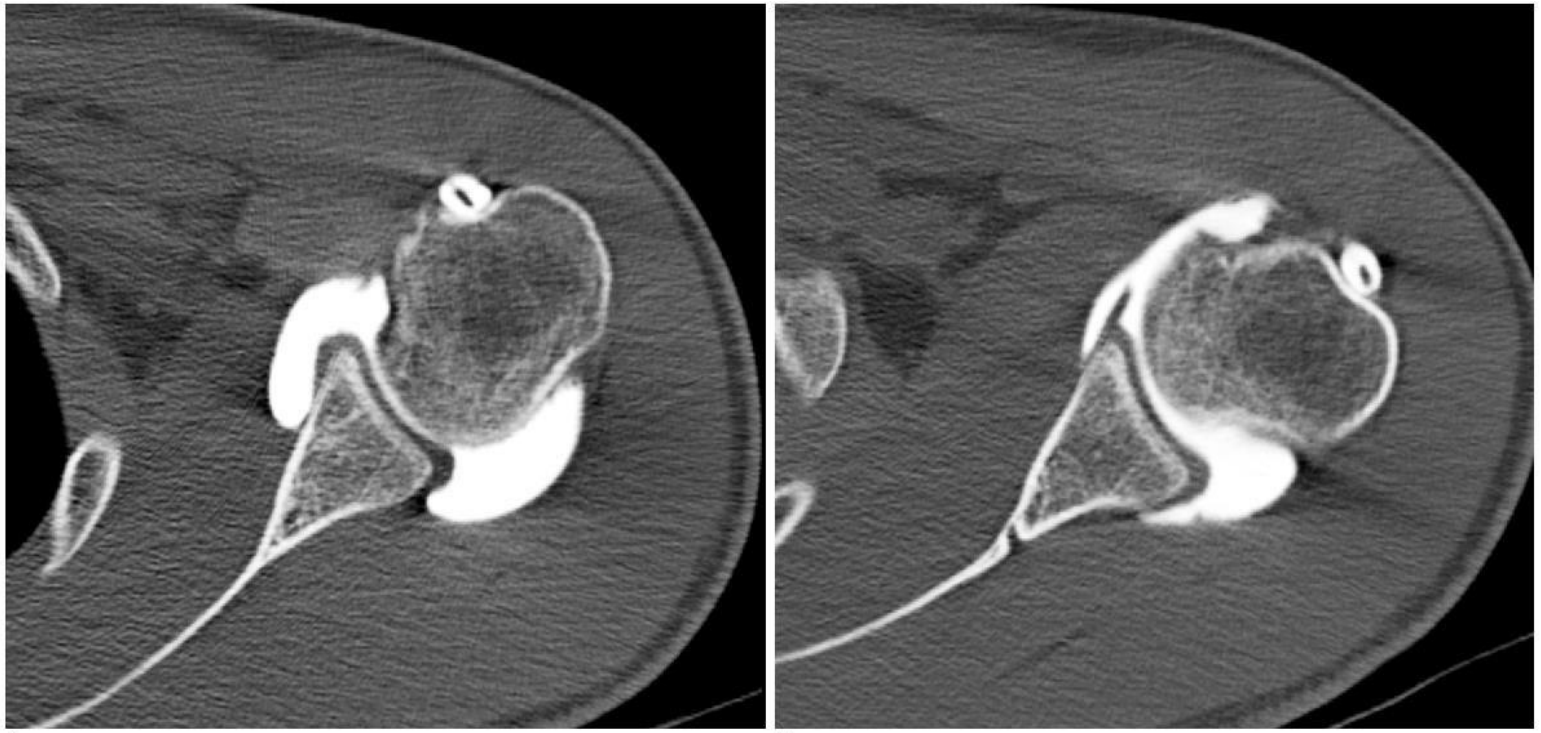
4.shoulder implants and complications

5.inflammatory or septic arthritis bone and soft tissue tumors

6.image guidance CT arthrography

7-if MRI is contraindicated or in the presence of metallic implants

8.glenoid labral tears or rotator cuff tears



A B

Axial CT arthrographic images obtained at 120 kVp and 140 kVp in 24-year-old man for postoperative evaluation of su

Technique

patient position

supine position

ipsilateral arm next to the body - shoulder externally rotated (thumb points outward)

contralateral arm raised above the head

tube voltage

≤140 kVp

tube current

as suggested by the automated current adjustment mode

scout

proximal half of the humerus to the skin above the acromioclavicular joint

scan extent

should include the acromioclavicular joint and the inferior angle of the scapula might vary in the setting of implants

scan direction

craniocaudal

scan geometry

field of view (FOV): 120-250 mm (should be adjusted to increase in-plane resolution)

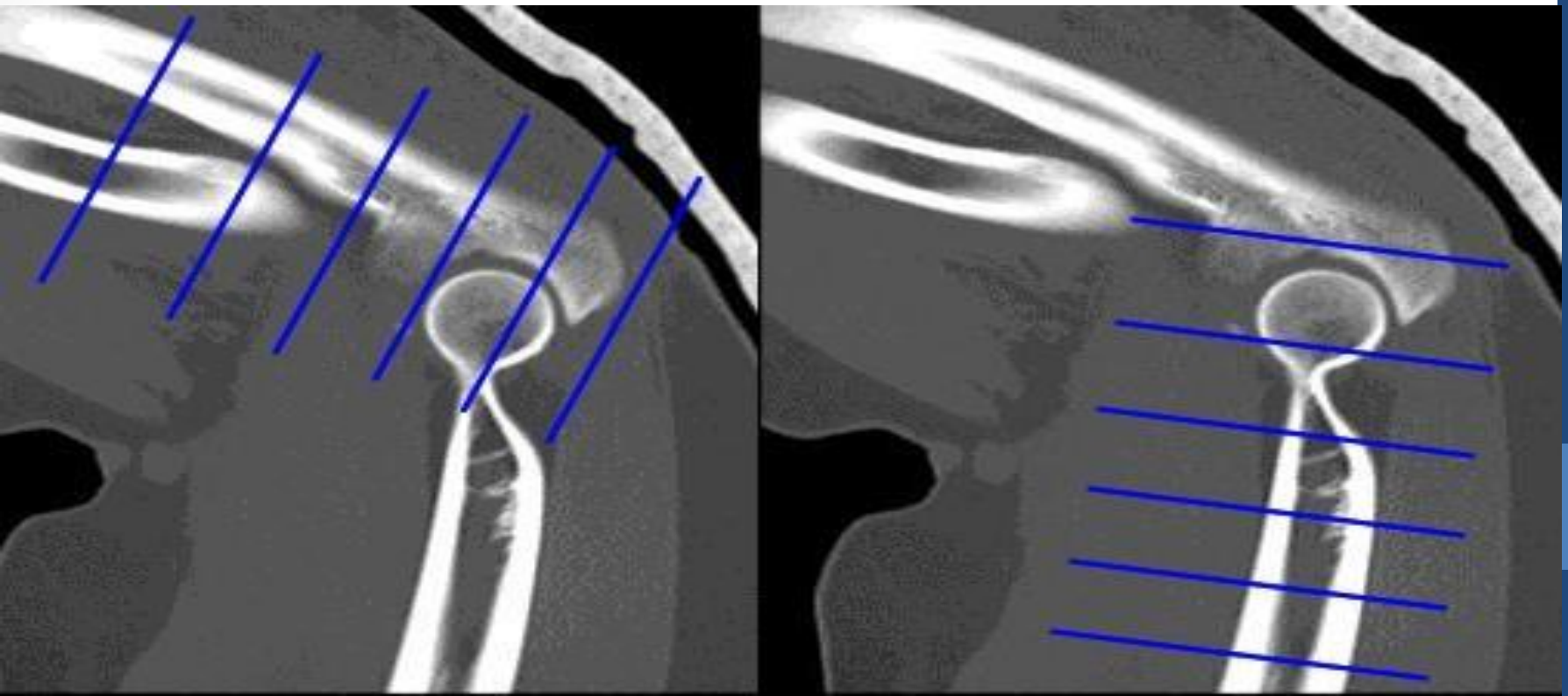
slice thickness: ≤1 mm

reconstruction algorithm: bone, soft tissue

3D reconstruction

CT elbow (protocol)

The CT elbow protocol serves as an examination for the bony assessment of the elbow and is usually performed as a non-contrast study. It can be also combined with a CT arthrogram for the evaluation of chondral and osteochondral injuries.



Indications

1.elbow trauma

2-distal humeral fractures

3-proximal radial and ulnar fractures

4-elbow dislocation

5-coronoid process fractures/posteromedial instability

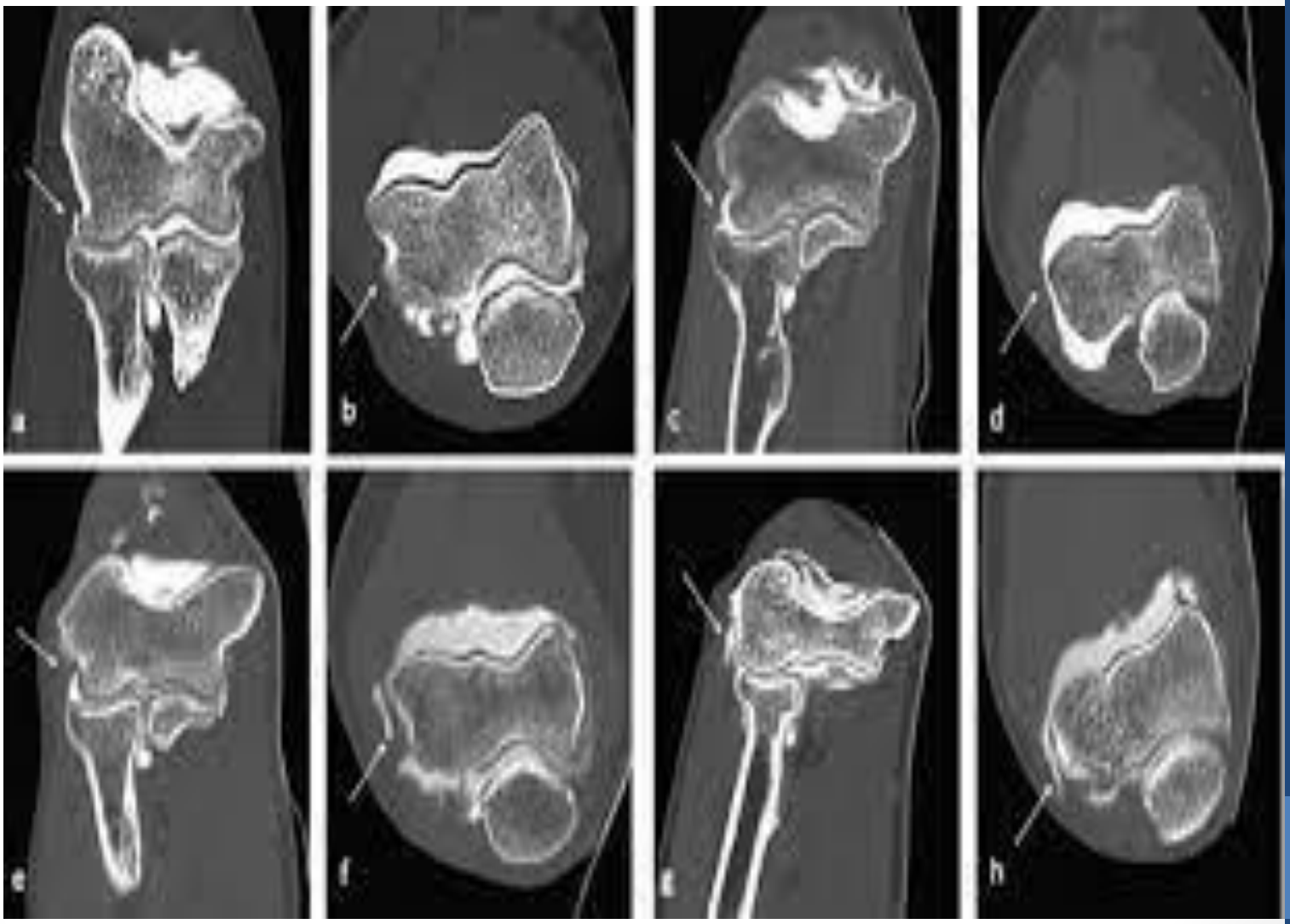
elbow stiffness/osteoarthritis

6.inflammatory or infectious processes

7.bone and soft tissue tumors (if MRI is contraindicated)

8.postoperative follow up, implants and their complications

9.interventions (e.g. CT-guided biopsy)


a
b
c
d
e
f
g
h

Technique

patient position

supine position

the arm in question is raised above the head

the affected elbow should be close to the center of the scanning table if possible elbow extended palm facing upwards

upper body and head bent to the contralateral

side contralateral arm next to the body

tube voltage

≤120 kVp

tube current

as suggested by the automated current adjustment mode (≤150 mAs)

scout

mid-upper arm to mid-forearm

scan extent

including the humeral metaphysis and the proximal third of the ulna and radius might vary depending on the indication

scan direction

caudocranial **scan**

geometry

field of view (FOV): ≤150 mm (should be adjusted to increase in- plane resolution)

slice thickness: ≤0.625 mm, interval: ≤0.3

mm reconstruction algorithm: bone, soft

tissue **contrast injection**

considerations

non-contrast (e.g. fractures)

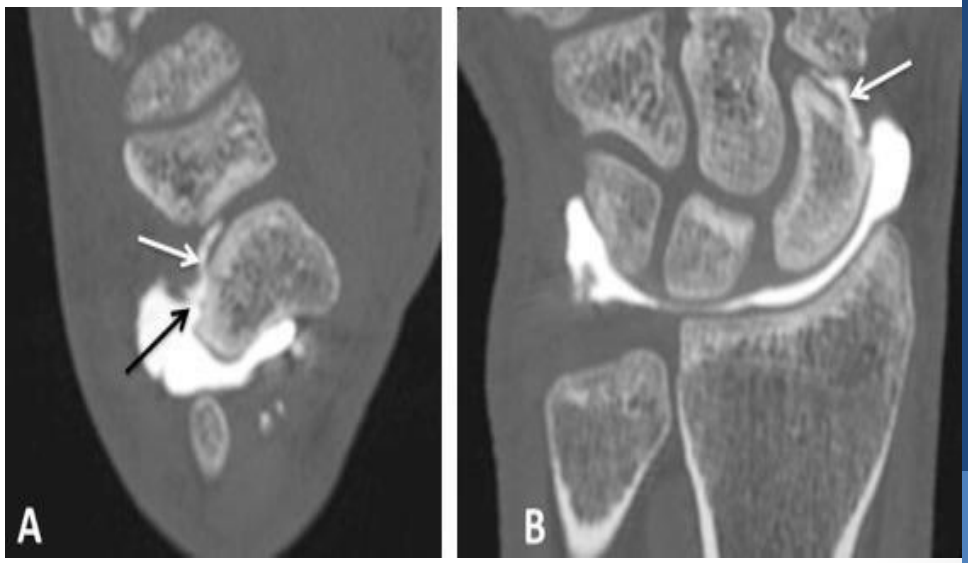
single acquisition with monophasic injection (venous)

contrast volume: 70-100ml with 30-40 mL saline chaser at 3- 5 mL/s

scan delay: 45-60 seconds

CT hand and wrist (protocol)

The CT hand and wrist protocol serves as an examination for the bony assessment of the wrist and is often performed as a non- contrast study and less often as a contrast-enhanced study. A CT wrist can be also conducted as a CT arthrogram for the evaluation of ligamentous injuries and the triangular fibrocartilage complex.



Indications

1.complex distal radial fractures and ulnar fractures

2.scaphoid fractures or carpal fractures

3.carpal instability

4.foreign bodies

5.inflammatory or infectious processes

6.bone and soft tissue tumors (if MRI is contraindicated)

7.postoperative follow up, implants and their complications

8.CT arthrogram

9-ligamentous injury

10-triangular fibrocartilage complex injury

Technique

patient position

prone position

the hand in question is raised above the head in the center of the scanning table the elbow should be extended palm facing downwards

the head can rest on the other arm

tube voltage

≤120 kVp (100 kVp)

tube current

as suggested by the automated current adjustment mode

scout

whole hand to the distal third of the forearm

scan extent

wrist: including radial metaphysis and proximal third of the metacarpal bones hand: includes the entire hand to the radial metaphysis

scan direction

craniocaudal

scan geometry

field of view (FOV): ≤150 mm (should be adjusted to increase in-plane resolution)

slice thickness: ≤0.6mm

reconstruction algorithm: bone, soft tissue

contrast injection considerations

non-contrast (e.g. fractures)

single acquisition with monophasic injection

contrast volume: 70-100ml (0.1 mL/kg) with 30-40 mL saline chaser at 3-5 mL/s

scan delay: 40-60 seconds (venous) or 20-25 seconds (angiogram)

multiplanar reconstructions

sagittal images, coronal images &axial images

THANK YOU

YOU