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

CT scan of petrous bone
CT scan of orbit
CT scan of paranasal sinus
SELLA(pituitary gland)

4 th stage

LECTUER 5

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MSc Radiographic Imaging

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Petrous Bone

Indications:

- loss of hearing
- otitis media
- chronic ear infection
- mastoiditis
- osteochondroma
- EAM
- congenital anomaly
- trauma

تخطيط الأذن مقطعية وضع كرونال

تخطيط الأذن مقطعية وضع اكزيال

Technique

Patient Position

Head first Supine

OM line perpendicular

Scan Area

From the base of the skull to the top of the mastoid air cells

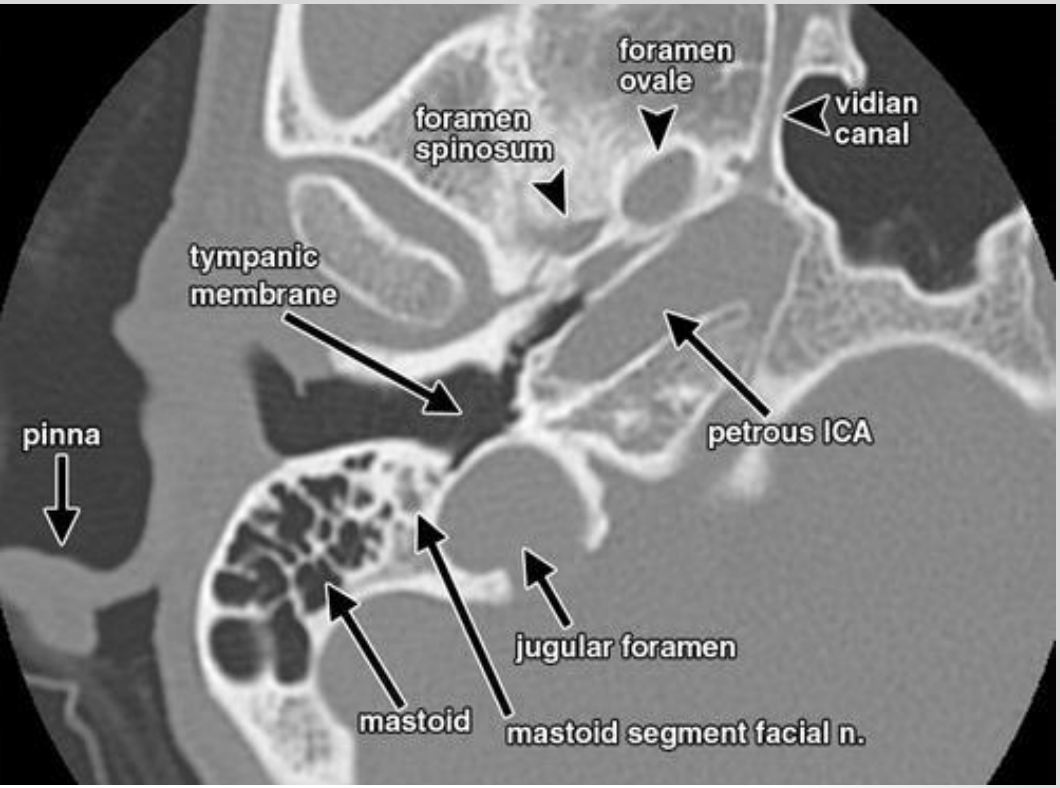
tube voltage and **tube current**

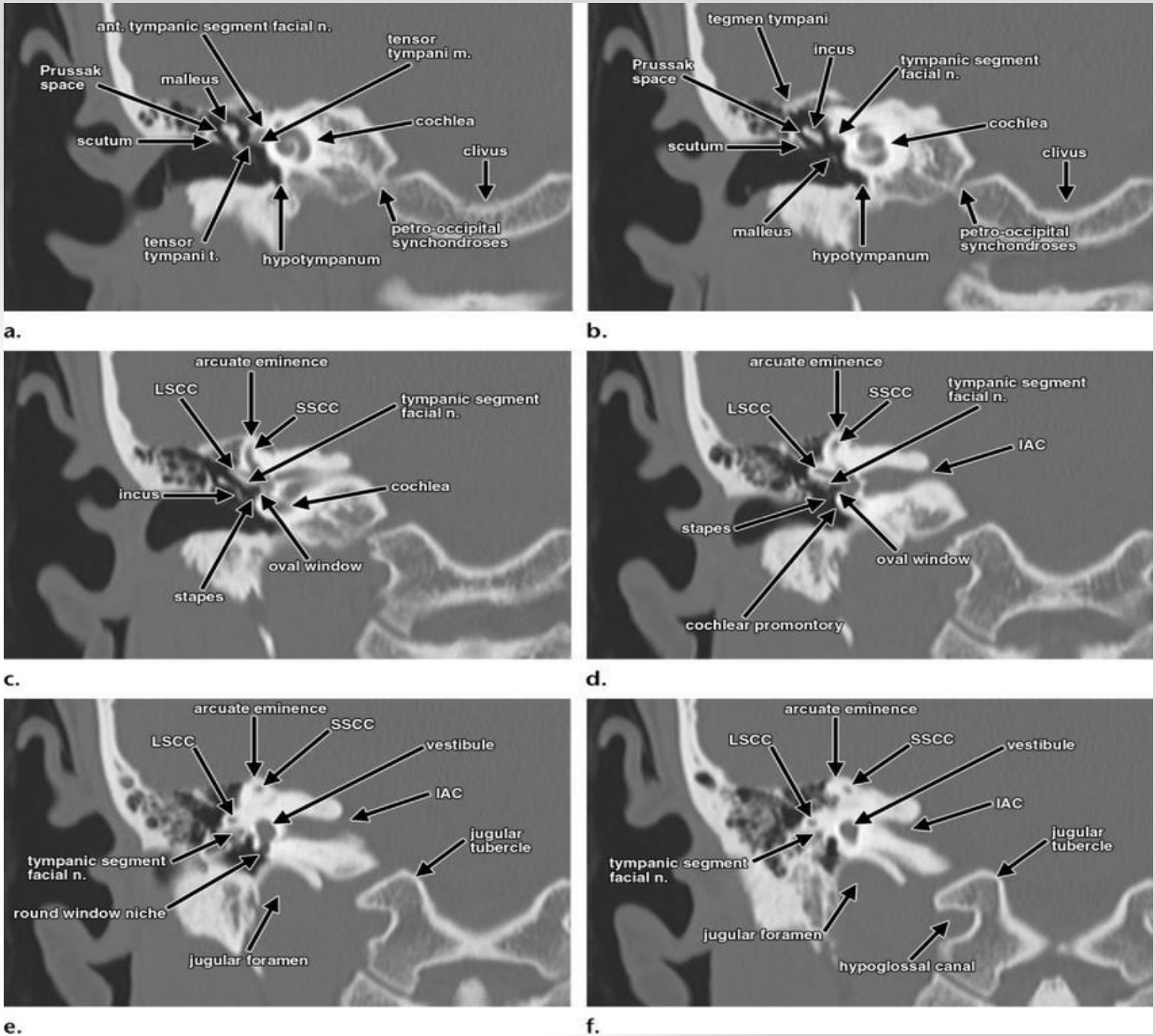
120 kV and 80 mAs slice

thickness:3.0mm

Reconstruction

0.4mm Inner Ear
4mm Base Orbita
0.4 Inner Ear (Right Ear)
0.4 Inner Ear (Left Ear)


foramen ovale
foramen spinosum
vidian canal
tympanic membrane
pinna
petrous ICA
jugular foramen
mastoid
mastoid segment facial n.

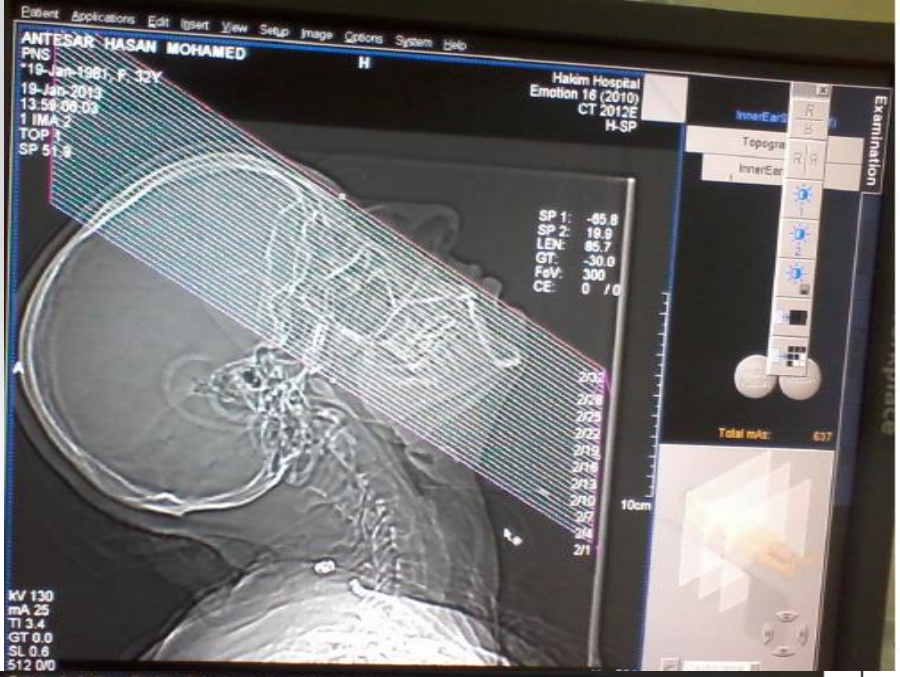

ant. tympanic segment facial n.
tensor tympani m.
Prussak space
malleus
cochlea
scutum
clivus
tensor tympani t.
hypotympanum
petro-occipital synchondroses
a.
tegmen tympani
incus
tympanic segment facial n.
Prussak space
cochlea
scutum
clivus
malleus
hypotympanum
petro-occipital synchondroses
b.
arcuate eminence
LSCC
SSCC
tympanic segment facial n.
incus
cochlea
oval window
stapes
c.
arcuate eminence
SSCC
tympanic segment facial n.
LSCC
IAC
stapes
oval window
cochlear promontory
d.
arcuate eminence
LSCC
SSCC
vestibule
IAC
jugular tubercle
tympanic segment facial n.
round window niche
jugular foramen
e.
arcuate eminence
LSCC
SSCC
vestibule
IAC
jugular tubercle
tympanic segment facial n.
jugular foramen
hypoglossal canal
f.

CT ORBITS

CT scanning is considered the top choice in imaging studies for evaluating orbital trauma.

The study should be performed with nonenhanced axial and coronal 3-mm cuts; multiplanar reformation sections are then performed. The use of contrast material is generally not required.

Other indications include ; Congenital malformations , Neoplasm &Infections (iv contrast is needed)



العين وضع كرونال

العين وضع اكزيال

Technique

patient position

supine

scout

perpendicular to the hard palate

tube voltage and **tube current**

120 kV and 80 mAs

scan extent

Start at the hard palate, Finish superior to the frontal sinuses.

-

scan direction -

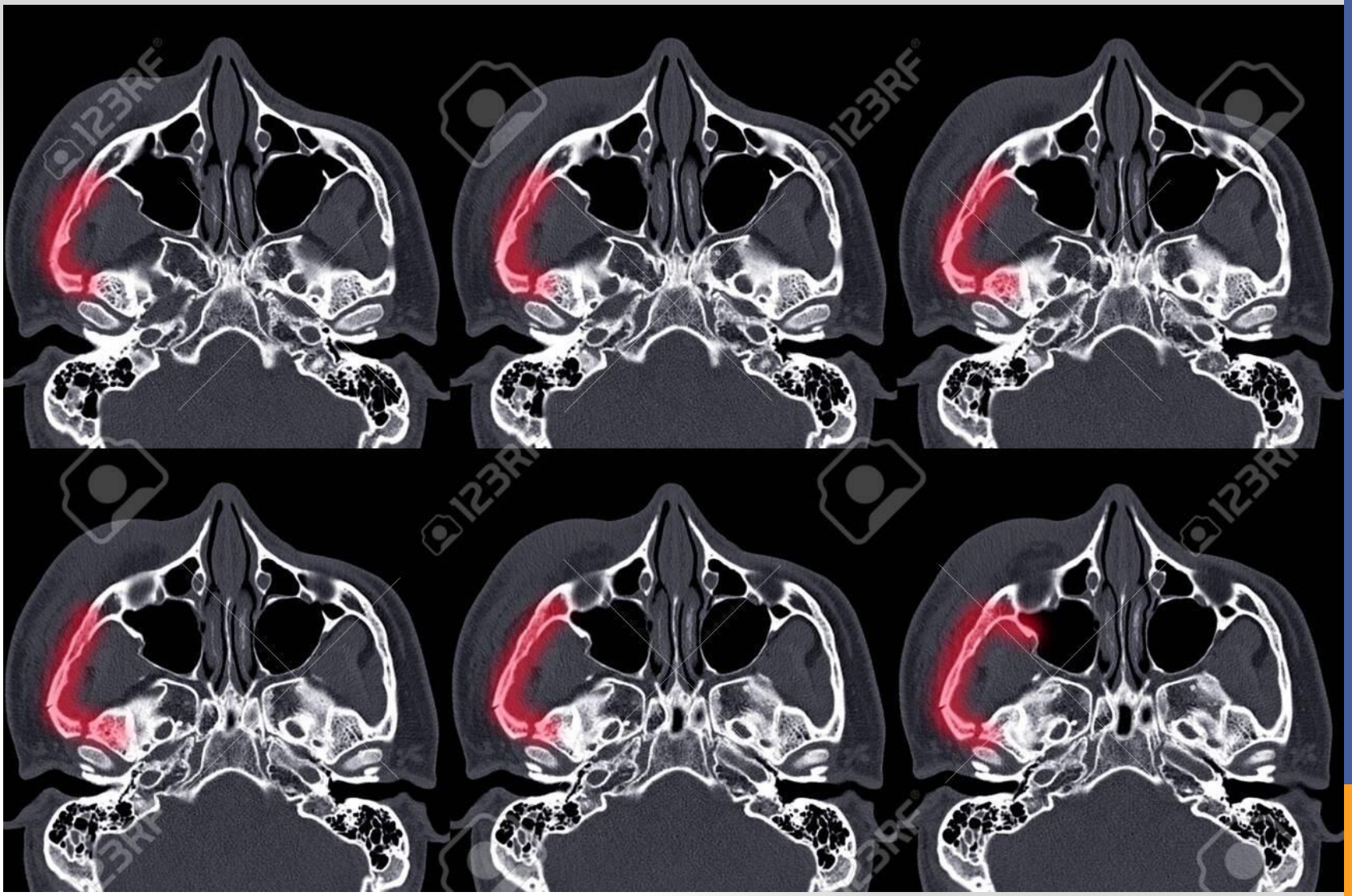
Caudocranial, slice thickness: 3.0 mm

reconstruction window

bone window (e.g. ≥4000 HU), soft tissue window (e.g. 150 to 400 HU)

multiplanar reconstructions


Lens
Temporalis Muscle
Temporal Lobe
Sup. Orbital Fissure
Ant. Clinoid Process
Pituitary Gland
A
Lacrimal Gland
Optic Nerve
Optic Canal
Post. Clinoid Process
Lens
Med Rectus Tendon
Zygoma
Lateral Rectus Muscle
Ophthalmic Artery
Pituitary Gland
R
Iris
Lacrimal Gland
Optic Nerve
Temporalis Muscle
Sphenoid Sinus
Temporal Lobe



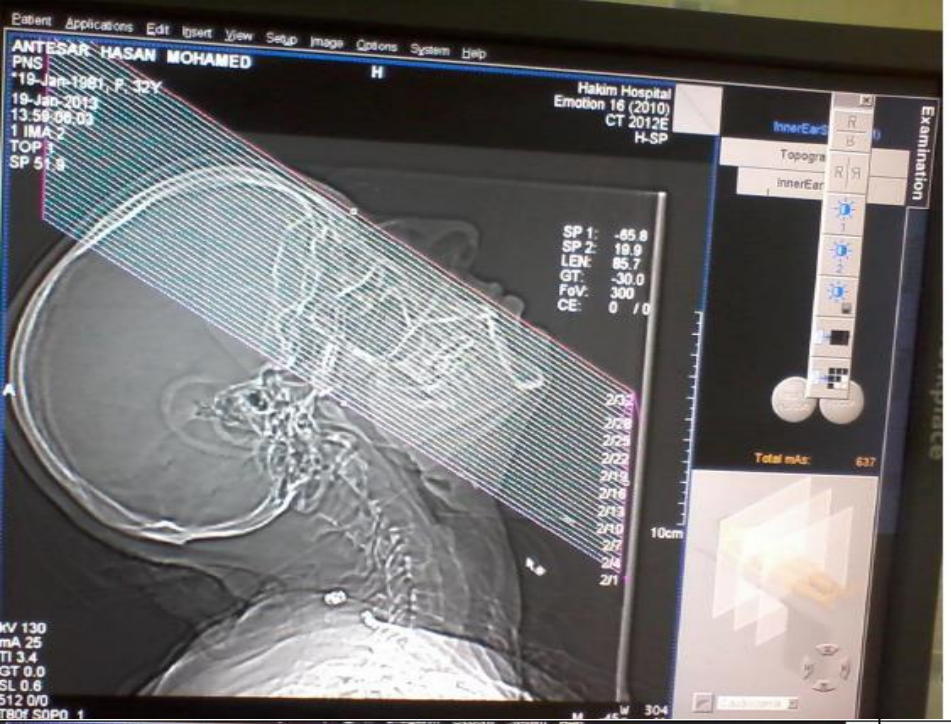
Imaging of Paranasal Sinuses

plain films are no longer considered to be a part of the primary imaging of paranasal sinuses. At best, they give only an overview of the anatomy and underlying pathology, as they are limited to displaying three-dimensional structures in a two-dimensional plane. CT and MR imaging have the advantage of being able to show fine anatomic detail in serial tomographic sections

At our institution, paranasal sinuses are primarily evaluated with CT. MR is used to evaluate tumors and to assess for extension of an infectious process beyond the paranasal sinuses into the adjacent soft tissues. PET/CT is used for staging and restaging of head and neck tumors.

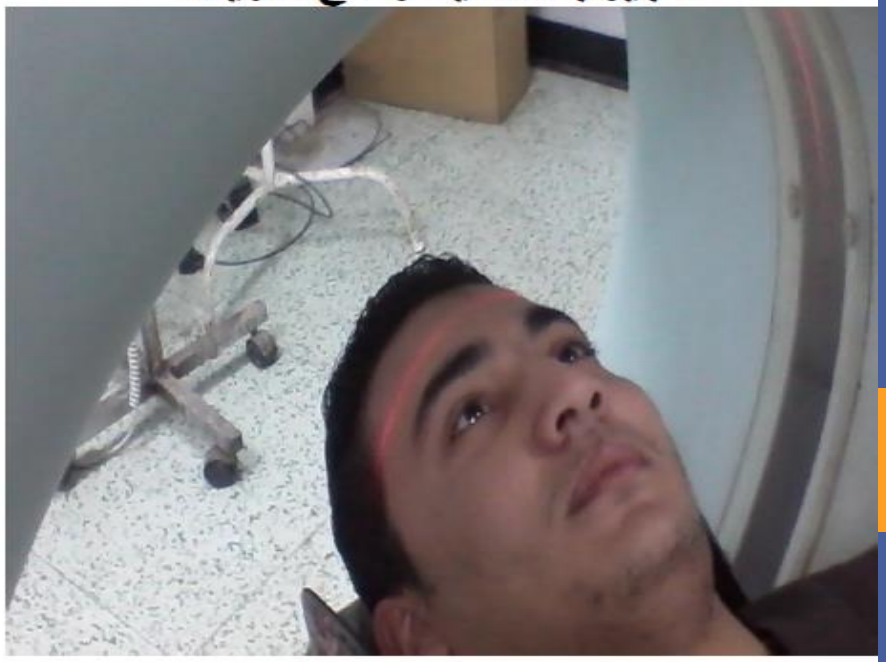
CT paranasal sinus

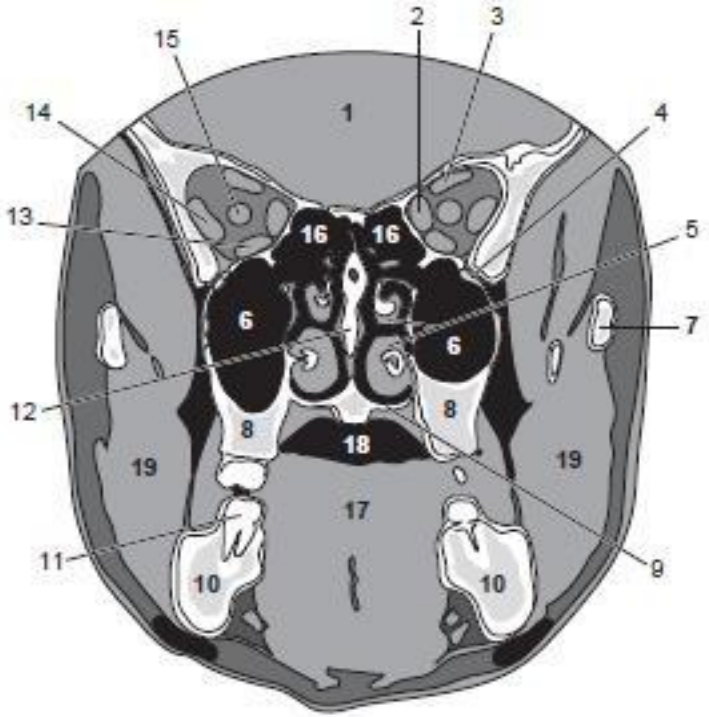
Traditionally, CT imaging of the sinus has been acquired in the axial and coronal planes, using noncontrast high-resolution 3-mm thick contiguous scans. Axial images are obtained with the patient supine on the scanning table and maintaining neutral position of the scanning gantry. This differs from the coronal scans, which are enabled by extension of the patient's neck in either prone or supine position and angling of the scanning gantry to approximate the sinus coronal plane. An increasing number of institutions have abandoned the separate coronal acquisition, because the very thin overlapping sections obtained on newer multidetector scanners can be reformatted to nearly the same quality as a native coronal acquisition. The coronal imaging plane offers best visualization of the drainage pathways of the sinuses, whereas some drainage pathways (such as sphenoid sinus ostia) and sinus walls oriented close to the coronal plane are better seen on axial images.



الجيوب الأنفية وضع كرونال

الجيوب الأنفية وضع اكزيال





1. Frontal lobe
2. Medial rectus m.
3. Superior rectus m.
4. Infraorbital fissure
5. Nasal conchae
6. Maxillary sinus
7. Zygoma
8. Maxillary bone
9. Hard palate
10. Mandible
11. Tooth
12. Nasal bone (nasal septum)
13. Inferior rectus m.
14. Lateral rectus m.
15. Optic nerve/ canal
16. Sphenoid sinus
17. Tongue
18. Oral vestibule
19. Masseter m.

CT paranasal sinus protocol

Indications

1-inflammatory disease: acute rhinosinusitis, gas-fluid levels, mucosal disease, chronic sinusitis, cysts and polyps, & mucoceles

2- foreign body

3- malignancy

4- preoperative assessment

Purpose

The purpose of a CT scan of the paranasal sinuses is to visualize the possible presence of inflammatory or newly formed tissue in the the paranasal cavities.

In neoplastic, inflammatory and infectious disorders, a CT scan of the paranasal sinuses is performed to demonstrate bony erosions, osteolytic lesions, and calcifications.

If neoplasia is suspected, the use of an intravenous contrast medium is indicated.

Technique

patient position

supine

scout

perpendicular to the hard palate

tube voltage and **tube current**

125 kV and 80–160 mAs

scan extent

from the hard palate to above the end of the frontal sinuses

scan direction

caudocranial

scan geometry

field of view (FOV): 140–160 mm

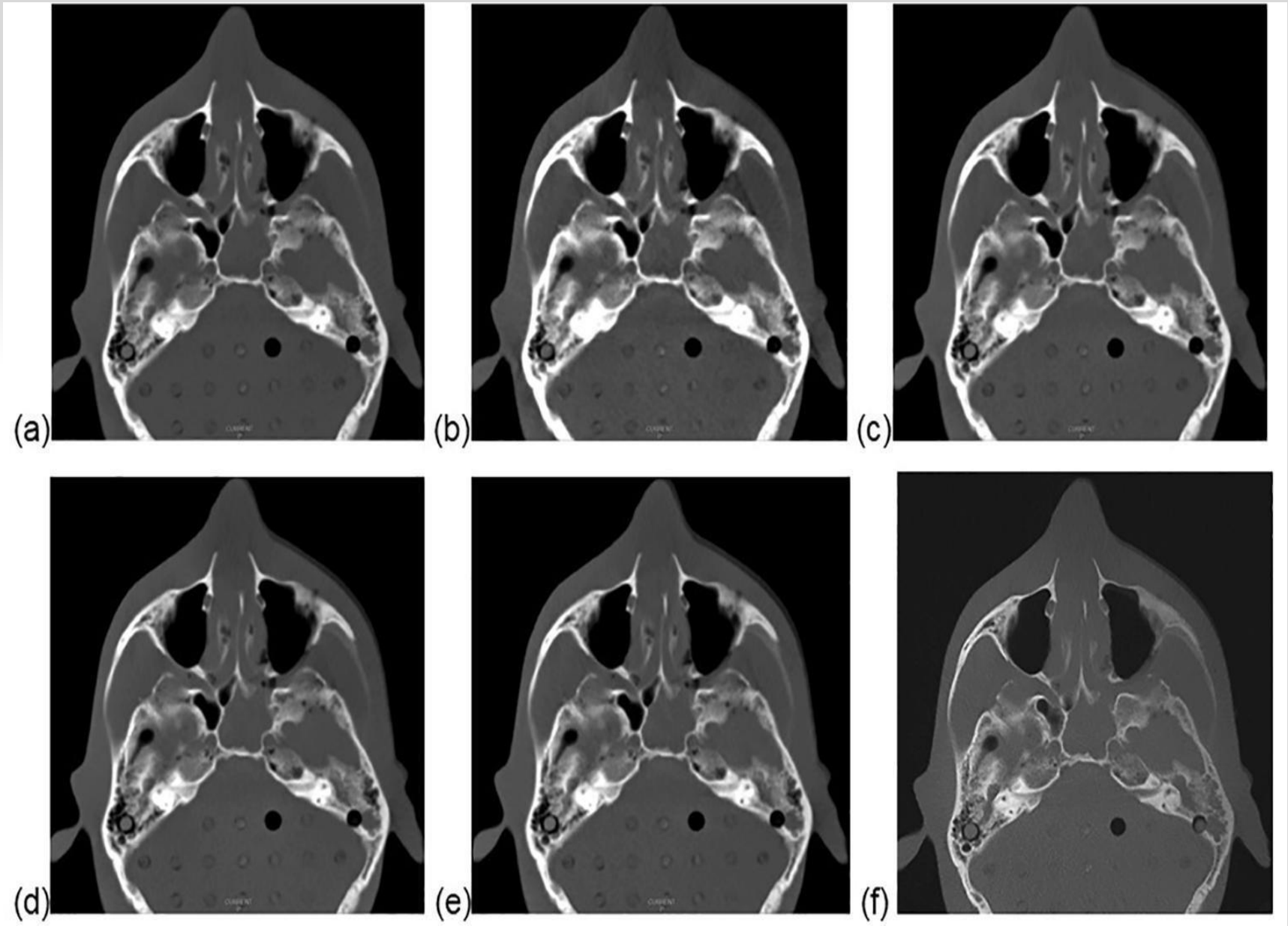
slice thickness: 0.625–1.0 mm

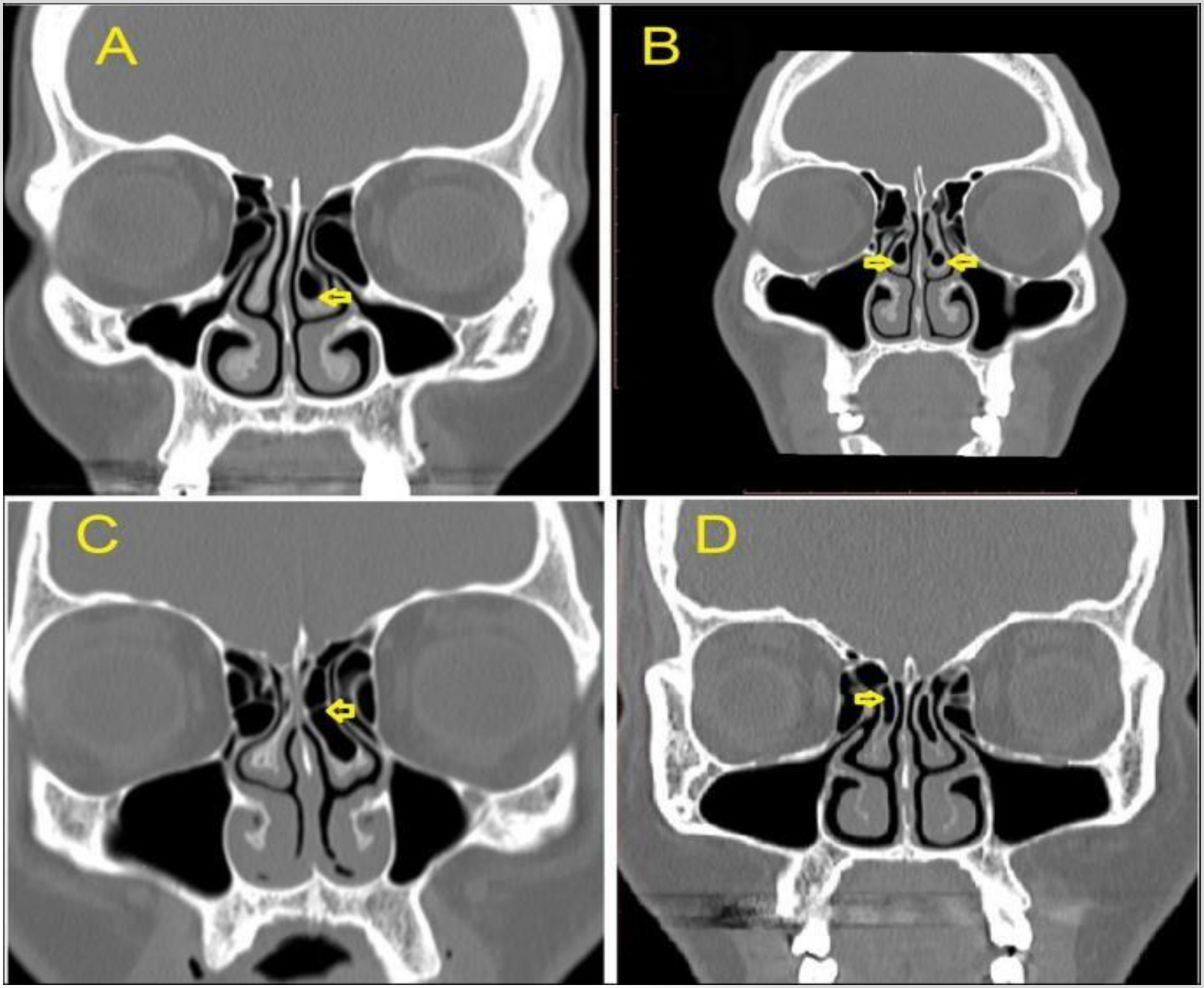
reconstruction window

bone window (e.g. ≥4000 HU), soft tissue window (e.g. 150 to 400 HU)

multiplanar reconstructions

coronal and sagittal images


(a)
(b)
(c)
(d)
(e)
(f)


A
B
C
D

SELLA(pituitary gland)

Indications:

Suspicion of sellar or hypophyseal alterations (endocrinological diseases, visual defects , alterations of ocular motility).

الغدة النخامية وضع كرونا ل

الغدة النخامية وضع اكزيال

Image criteria:

Visualization of:

- Entire hypophyseal region including osseous walls
- Vessels after intravenous contrast media.

Patient position: Supine for axial scans; supine or prone for coronal scans.

-Volume of investigation: From 0.5 cm below to 0.5 cm above the hypophyseal region.

-Scan projection radiograph: Lateral from C2 to above skull base.

-Nominal slice thickness: 2-3 mm.

-Inter-slice distance/pitch: Contiguous or a pitch = 1.0.

-FOV: Head dimension (about 24 cm); secondary reduction of FOV is necessary for evaluation of subtle pathology.

-Gantry tilt: OM line for axial scanning; according to the patient position for coronal scanning

Image criteria:

-X-ray tube voltage (kV): Standard.

-Tube current and exposure time product (mAs): Should be as low as consistent with required image quality.

-Reconstruction algorithm: Soft tissue or high resolution.

Window width: 140-300 HU (soft tissue), 2000-3000 HU (bones).

Window level: 30-40 HU (soft tissue), 200-400 HU (bones)

Pitfalls:

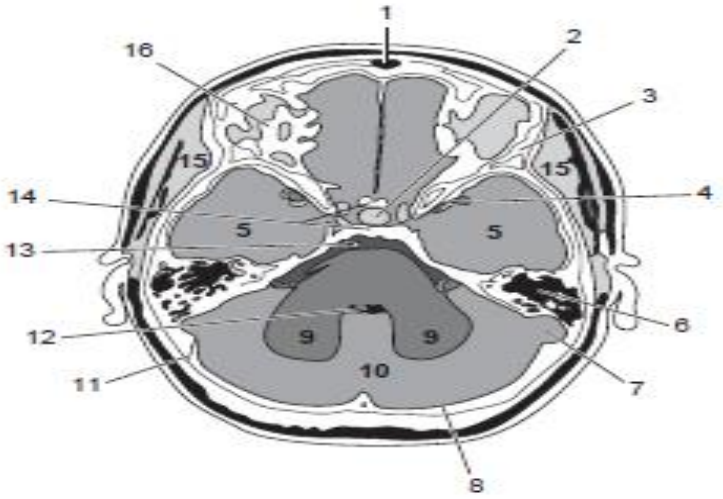
• Foreign bodies (beam hardening artifacts)

• Artifacts from dental prothesis/fillings.

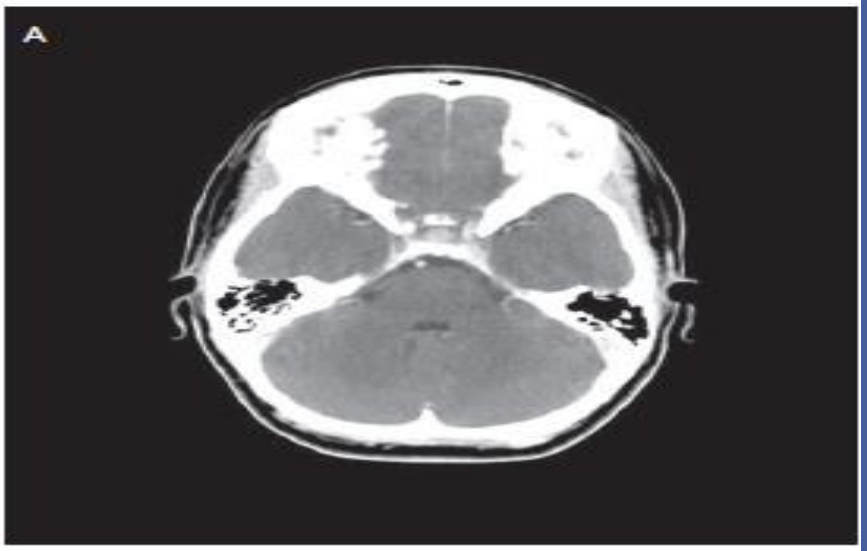
Modification to technique:

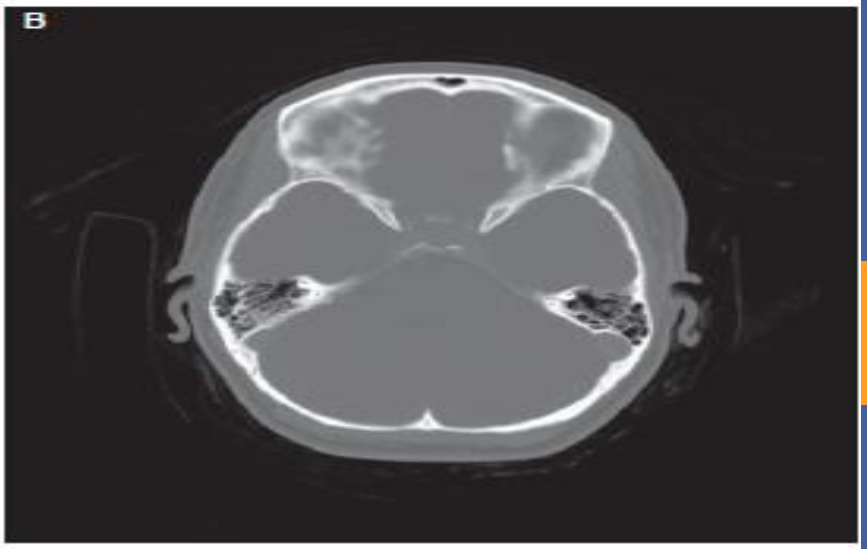
Change of gantry angulation or patient position to avoid artifact.

IV contrast: 50-80 ml based on indication.



1. Frontal sinus
2. Pituitary
3. Sphenoid bone
4. Middle cerebral a.
5. Temporal lobe
6. Mastoid air cells in left temporal bone
7. Sigmoid sinus
8. Occipital bone
9. Cerebellar peduncles
10. Cerebellum
11. Right lamboid suture
12. Fourth ventricle
13. Basilar a.
14. Sella tursica
15. Temporalis m.
16. Frontal bone, orbital roof





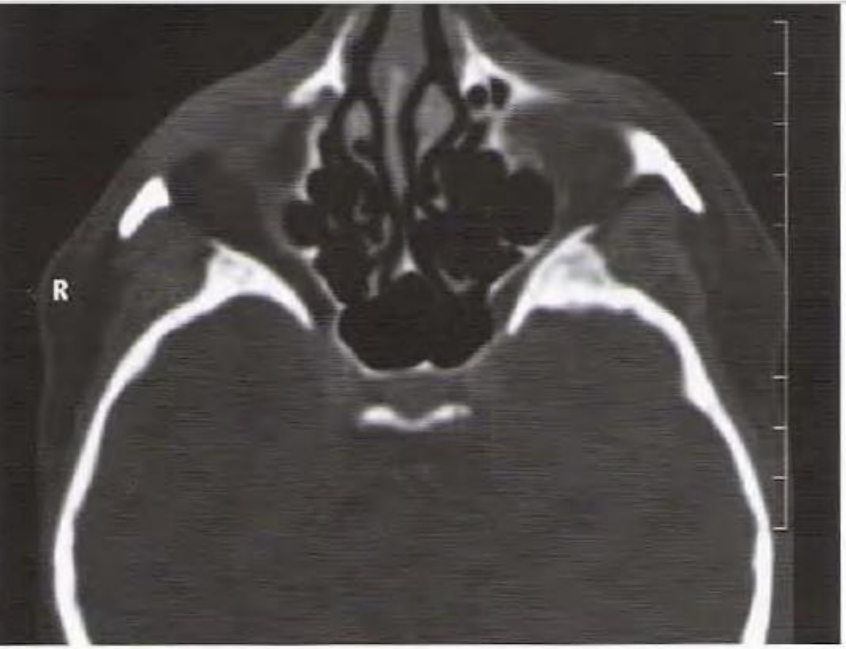


Fig. 36.1a

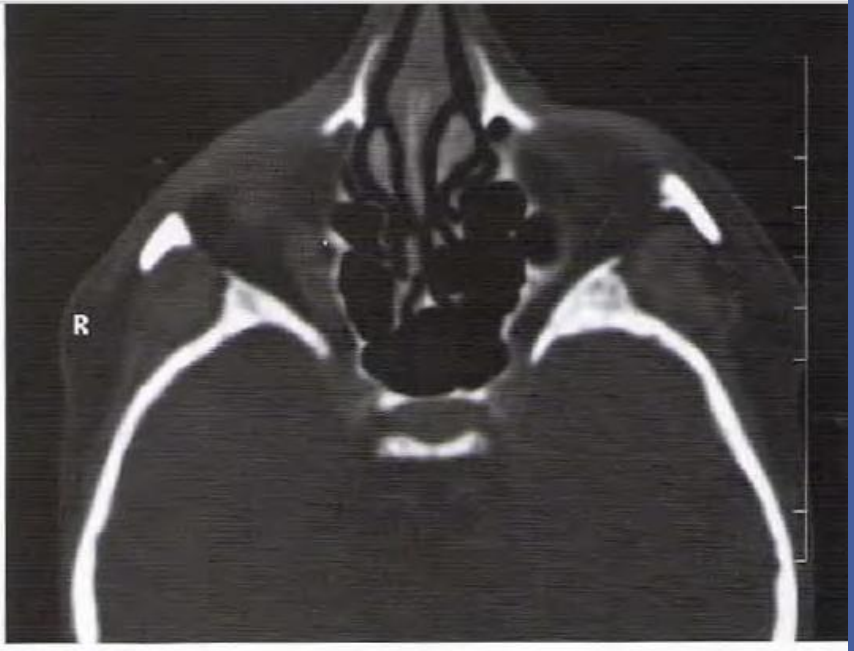


Fig. 36.2a

THANK YOU