Oral & Maxillo-facial Traumatology

(Radiographic Diagnosis)

Epidemiology

- Facial fracture in children
  - Less common (< 10% of all facial fractures occur in children)
  - Less severe than adults
  - Most common etiology is fall
  - Reason: midface is less prominent, sinuses are less pneumatized, more elasticity of bones
  - Fractures that are more frequent in children than in adults
    - Mandibular condyle
    - Orbital roof

Introduction

Full assessment of the maxillofacial region requires :

careful examination & radiographic investigation

- Role of imaging
  - Identify fractures, fragment displacement and rotation, stable bone for use in surgical repair
  - Identify soft tissue injuries

Basics: Plain Film Radiography

There are 5 relative different radiodensities in medical x-ray. This is presented from the least dense to the most dense particles (Dark to bright)

	Density	Appearance
– Air	least	dark
– Fat	↓	less dark, but still dark
– Soft tissue		medium
– Bone		bright
– Metal	most	brightest

Plain Film Radiography

- **Facial series**
  - Water's view (PA view with cephalad angulation)
  - Caldwell view (PA view)
  - Towne's view
  - Lateral view

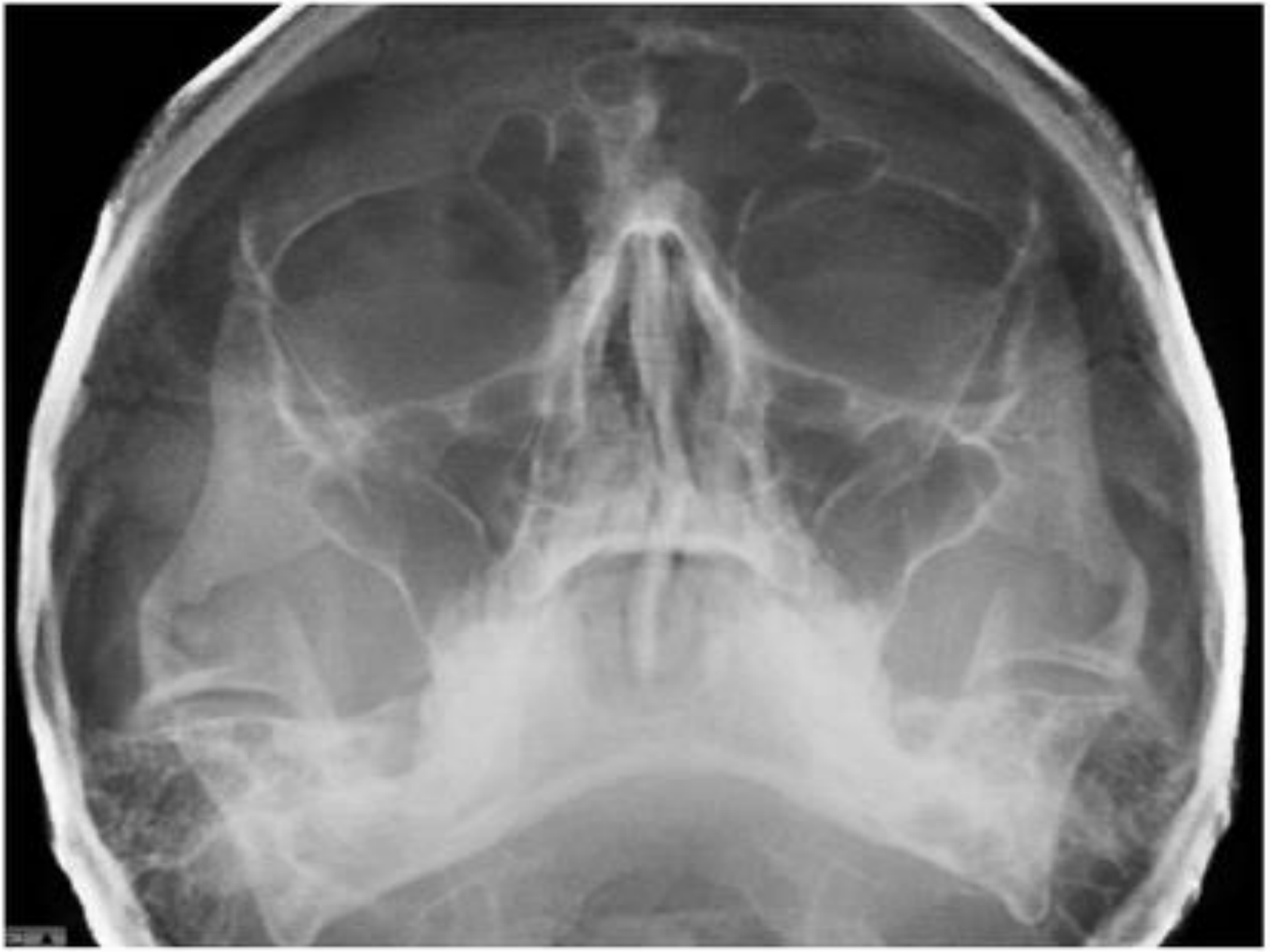
- **Mandible**
  - Oblique view, Towne's view
  - Orthopanthogram

Occipito-mental Views
"water`s view"

- *Indicated* for diagnosis of :

  Zygomatic bone fracture, maxillary sinuses, maxilla & nasal bones.

- *Disadvantage: not always possible for pt. to extend his neck 30 degree*



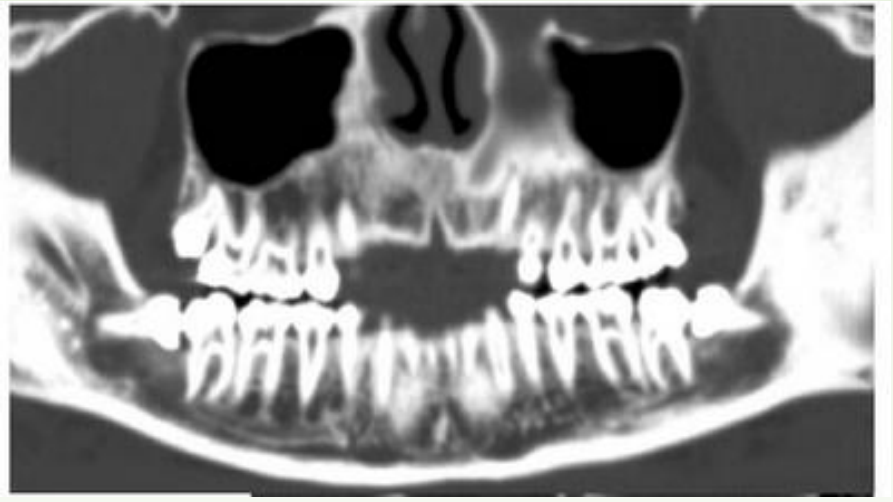
Caldwells` View

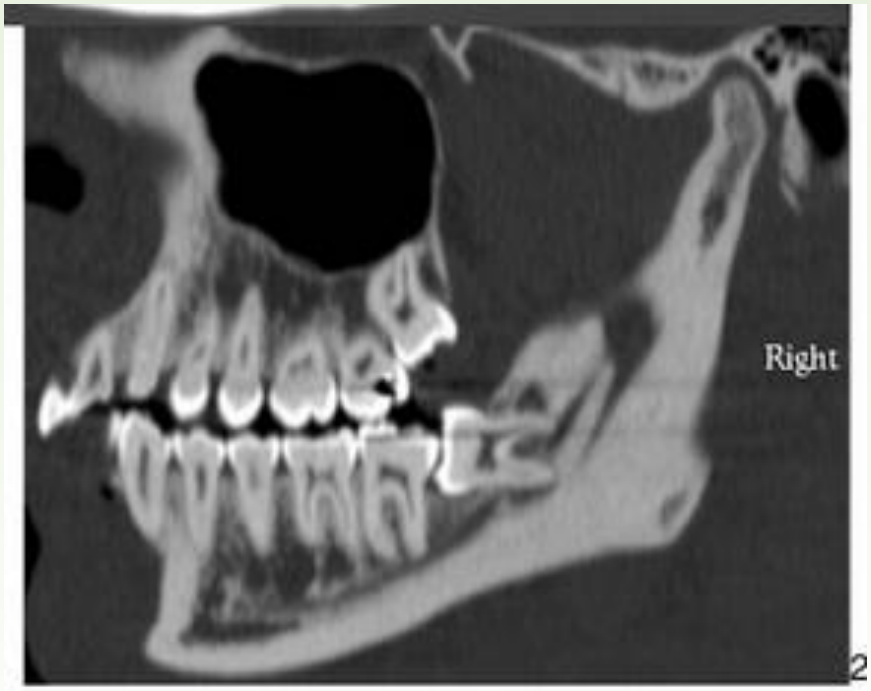
- *Excellent view for* : entire rim of the orbit, especially the superio-medial rim & to view for Ethmoid sinus

Ortho-Pantogram

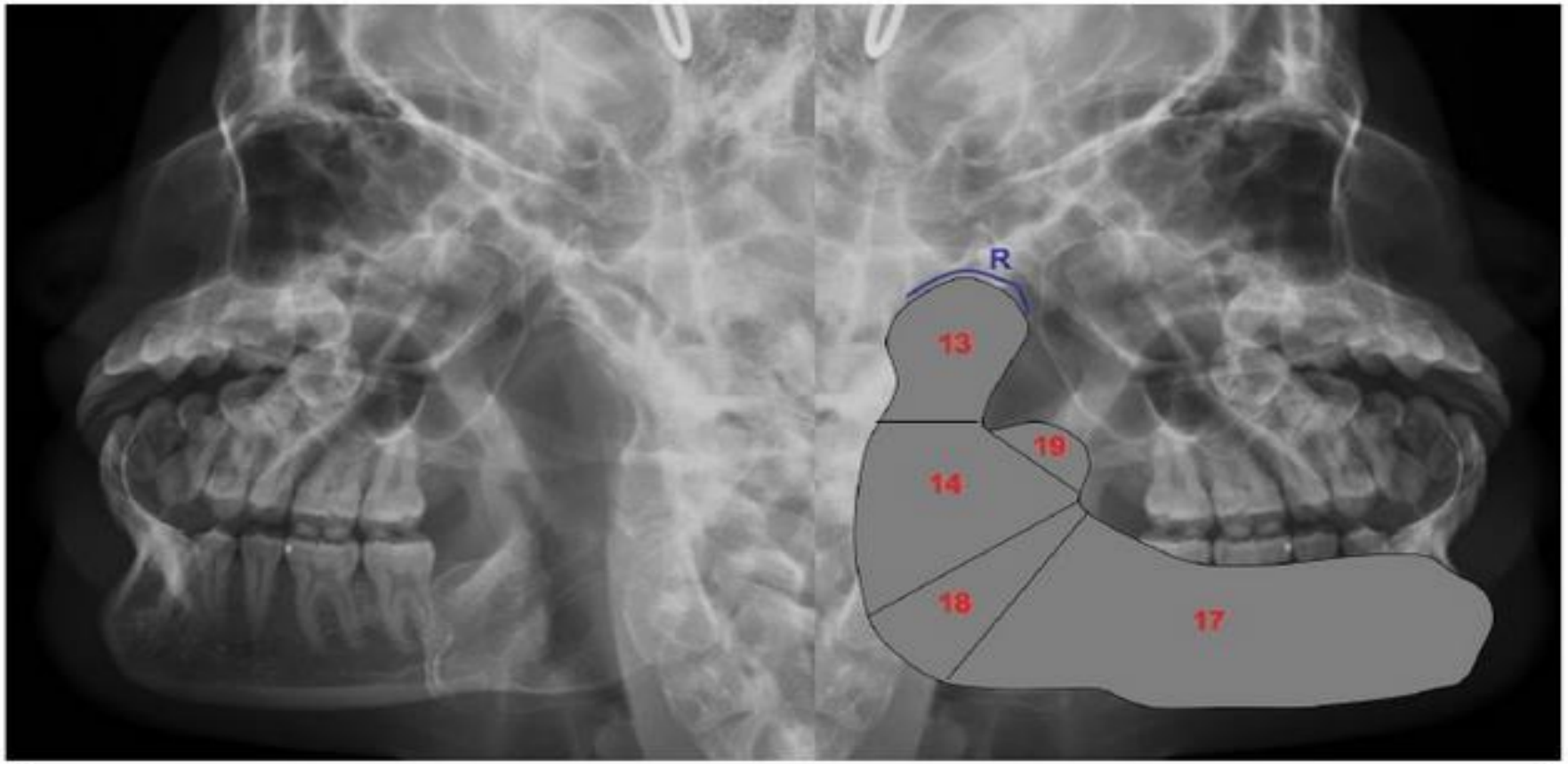
- Two lateral views of mandible are joined together.

Ortho-Pantogram





Oblique View of the Mandible



Oblique View of Mandible

Key structures

R = Temporomandibular joint

13 = Mandible, condyle	14 = Mandible, ramus	17 = Mandible, body
18 = Mandible, angle	19 = Mandible, coronoid process	20 = Mandible, symphysis

Area to Be Covered

Oblique view of mandible used in evaluation of : impacted teeth & fracture of mandible,

Ramus, condylar and coronoid processes, body and mentus of mandible

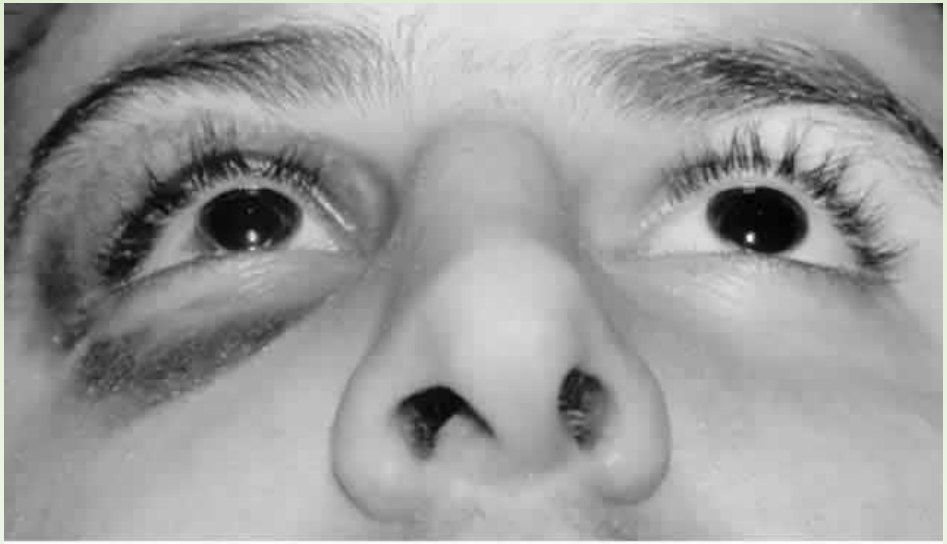
Computerized Tomography (CT)

- There is **no superimposition in CT**.
- CT gives more information on different tissue density.
- CT works by
  - Passing a thin **x-ray** beam through the body of the patient in the axial plane, as the x-ray tube moves in a continuous arc around the patient.

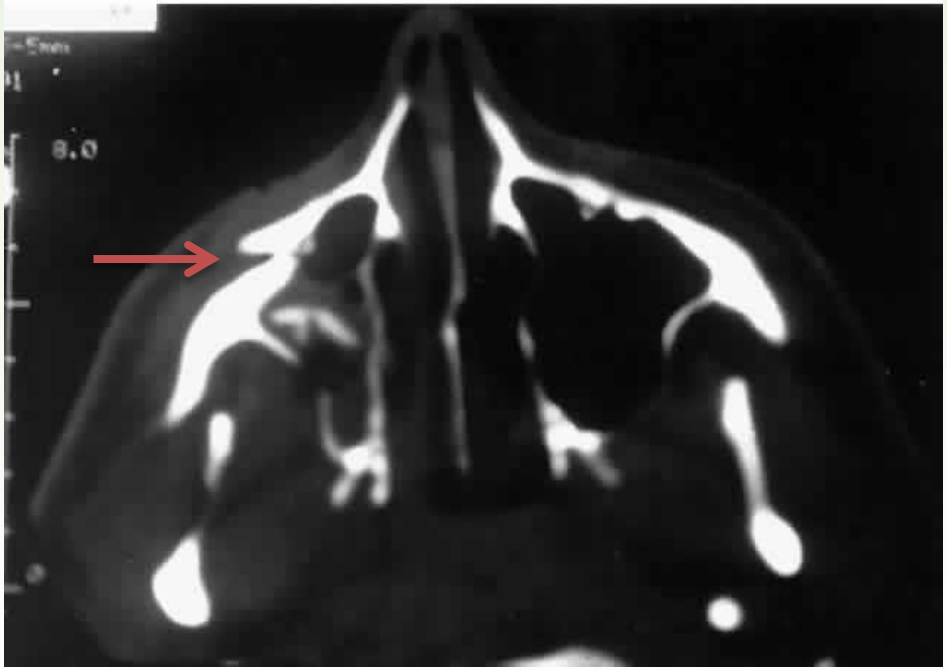
➢ **Indication:**

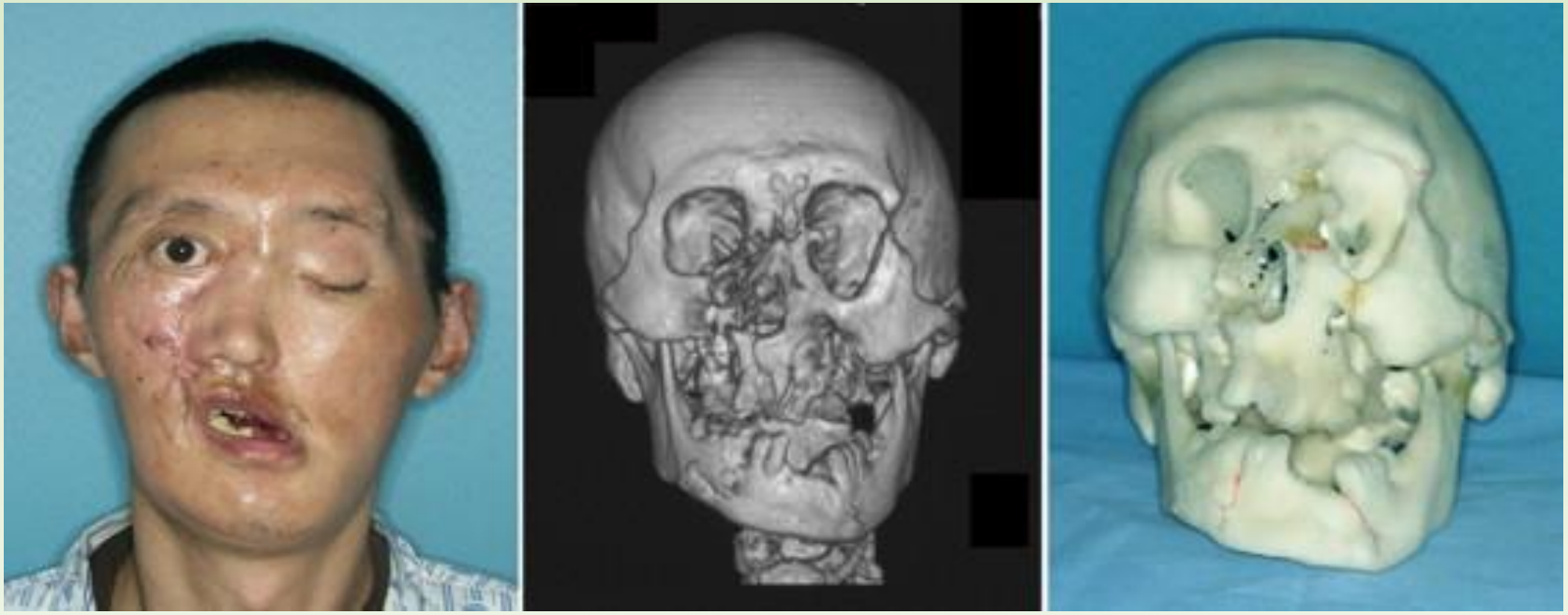
- **Injuries of frontal sinus & naso-ethmoidal area.**
- **Injuries of middle third of face.**
- **Imaging orbital floor & wall injuries.**
- **Pan –facial fractures.**
- **Condyle bilateral fractures.**

A. Patient with right zygomatico-orbital fracture.
Note flattening of right malar eminence and slight right lateral canthal ligament dystopia.



B. Axial CT scan shows displaced right zygomatico-orbital fracture.





Example of severe facial deformity secondary to pan-facial fractures before definitive treatment.

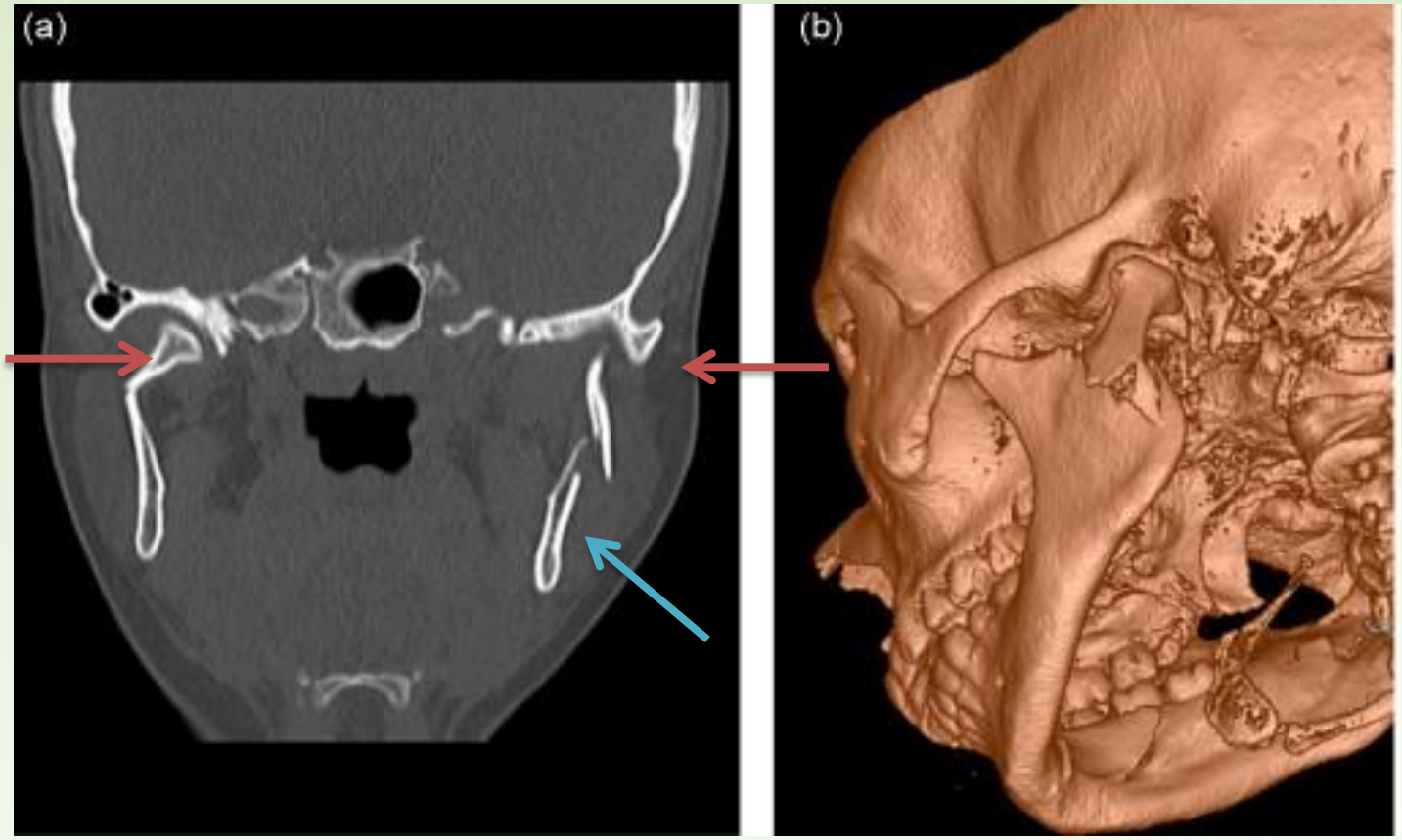
A, Preoperative facial photograph.

B, Three-dimensional CT showing the mandibular fracture in the tooth-bearing region. The left side of the mid-face has severely displaced fractures and right side has bone defects.

C, Stereolithic model based on CT data to assist in treatment planning.

Cone Beam Computed Scanning (CBCT)

- It's a type with low-dose radiation per pt. volume.
- *Indicated for* : mandibular & basic orbital imaging.
- But, soft tissue definition of the image is inferior to conventional CT scanning.



Coronal view CT

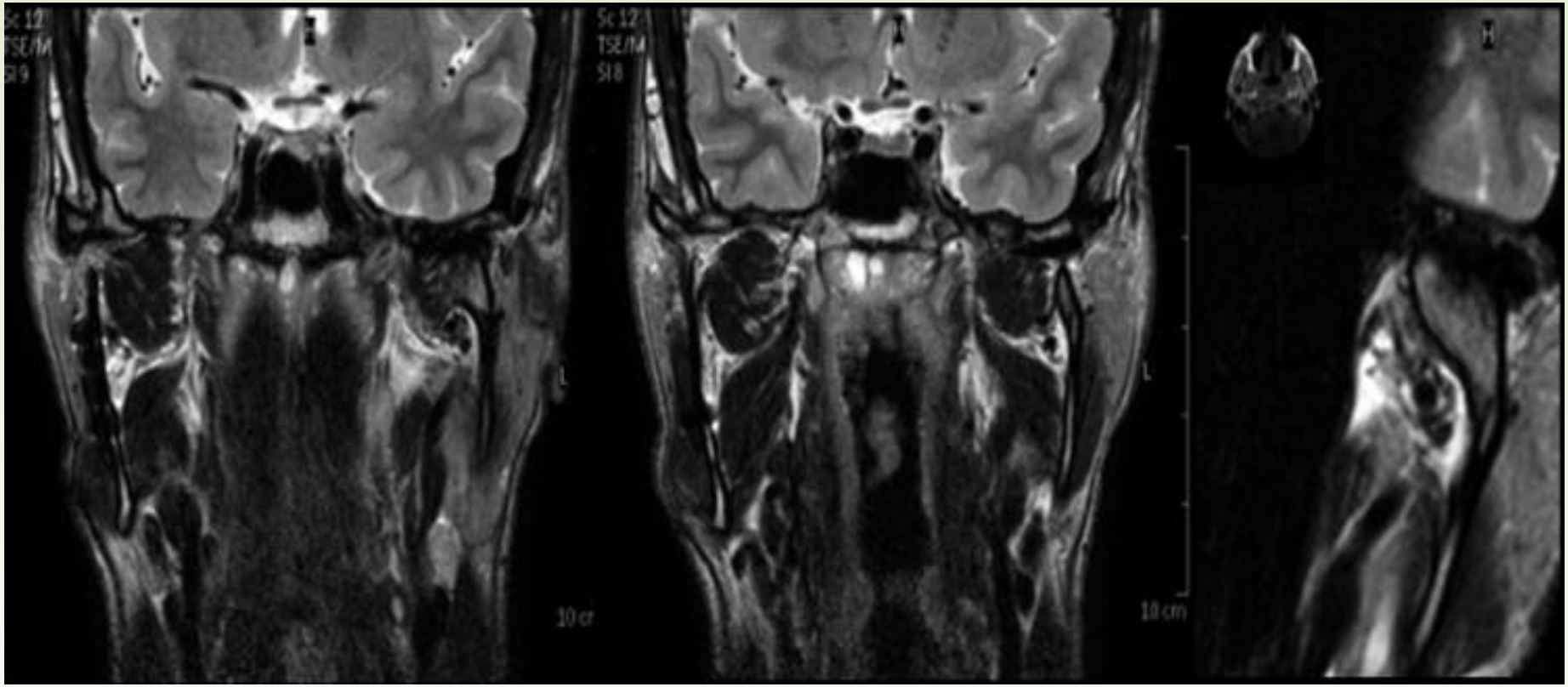
(a) shows a bilateral displaced condylar mandible fracture with a displaced fragment of the left sub-condylar fracture and an additional right mandibular ramus fracture is noted

(b). The intraoperative endoscopic view shows three mini-plates used for trans-oral osteo-synthesis of the comminuted sub-condylar fracture.

MRI

- MRI uses very powerful magnets, ranging from 0.3 to 3 Tesla (in clinical practice).
- The patient is placed in the magnet bore, radio waves are passed through the body in particular sequences. The body tissues respond by emitting the pulses, which are then recorded by a detector, sent to computer.

- *Indicated:* for diagnosis of CFS leak and sometimes for orbital fractures.



Bi-condylar fractures

TABLE OF RADIOGRAPHIC TECHNIQUES

SR	GENERAL ANATOMICAL AREA	PROJECTIONS	COMMON INDICATIONS
1	Facial bones, upper mid third	Waters projection	Injuries
2	Zygomatic arch	Jug Handle projection	Injury
3	Orbits	- Occipitomental projection - Lateral cephalometric projection	- Injury - Blow out fracture
4	Nasal bones	- Occipitomental projection - Lateral cephalometric projection	
5	Maxilla	- Oblique projection and - Occlusal & periapical projection	Minor injury
6	Mandible	- Posteroanterior projection - Lateral jaw projection	Injury
7	Symphysis menti / Central Mandible	- PA oblique projection - Occlusal projection	Injury
8	TMJ	- Lateral oblique projection - Transcranial view - Transpharyngeal view - TMJ Tomography	- Internal Dearrangement - Secondary osteoarthritis - Fracture dislocation
9	Maxillary Sinus	- Occipitomental view - Occipitofrontal view - Lateral projection	