Maxillofacial Trauma

By- Dr. Sonal Anchlia

Pathophysiology

- Maxillofacial fractures result from either blunt or penetrating trauma.
- Penetrating injuries are more common in city hospitals.
  - Midfacial and zygomatic injuries.
- Blunt injuries are more frequently seen in community hospitals.
  - Nose and mandibular injuries.

Pathophysiology

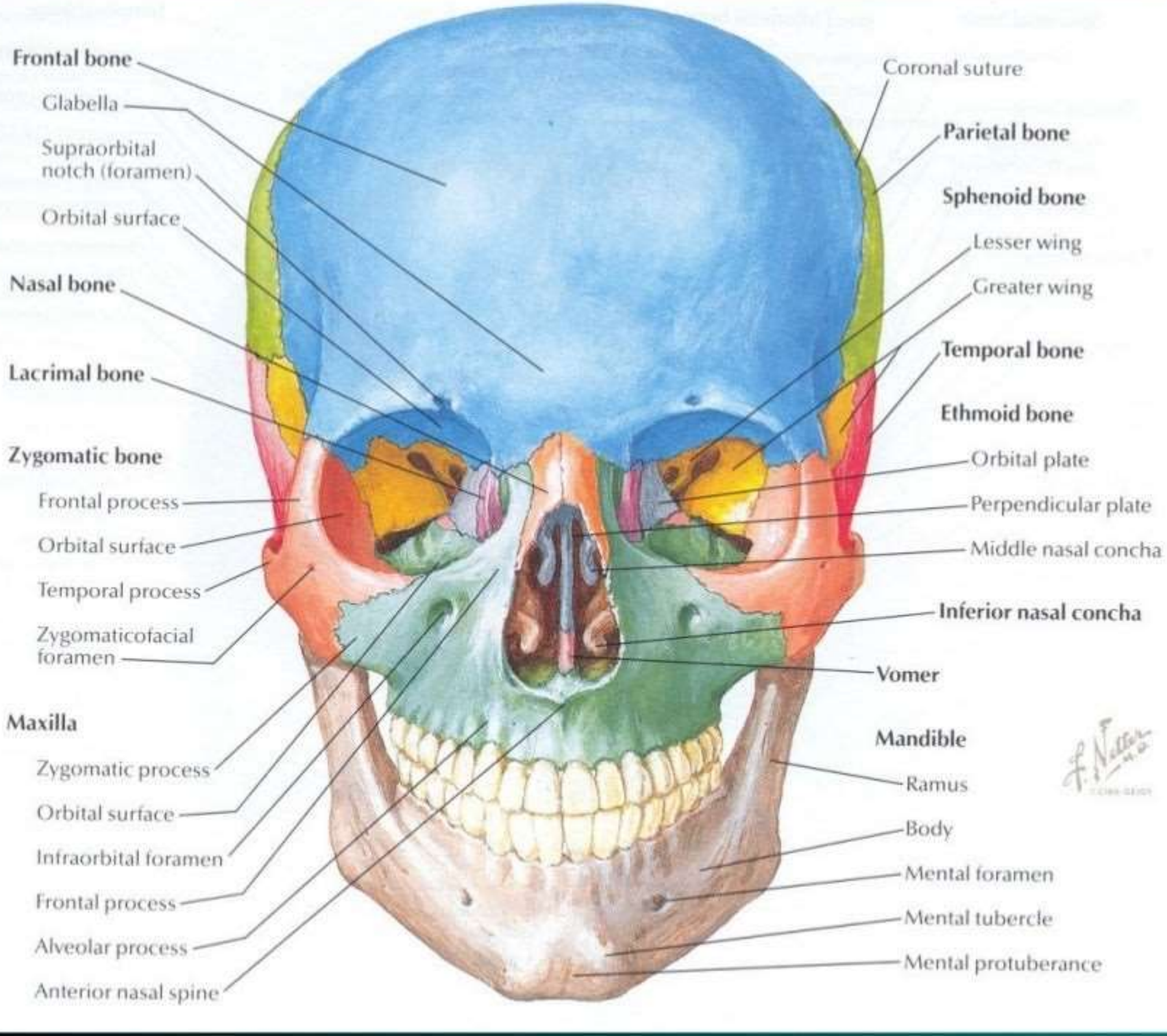
- High Impact:
  - Supraorbital rim – 200 G
  - Symphysis of the Mandible –100 G
  - Frontal – 100 G
  - Angle of the mandible – 70 G
- Low Impact:
  - Zygoma – 50 G
  - Nasal bone – 30 G

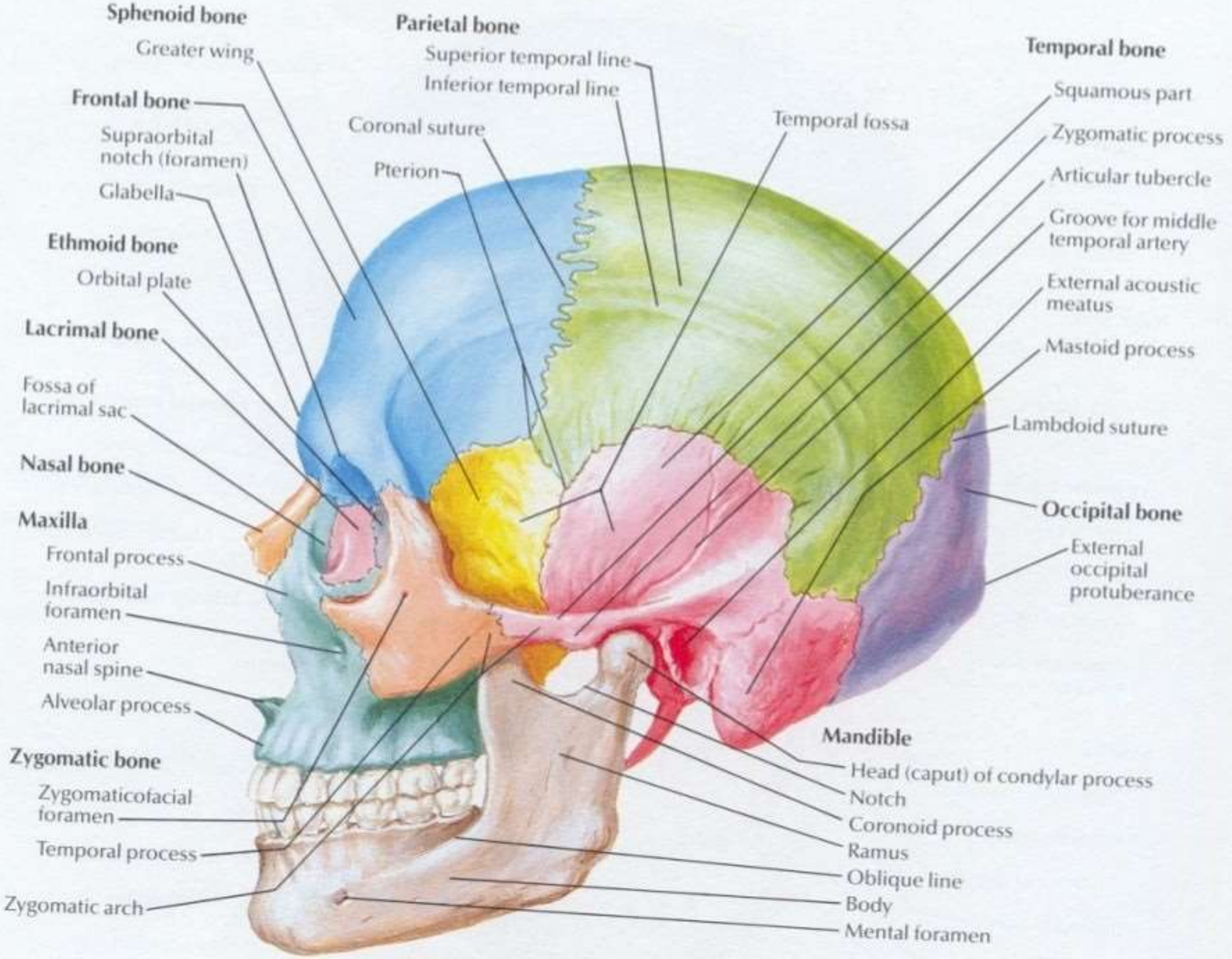
Etiology

- @60% of patients with severe facial trauma have multisystem trauma and the potential for airway compromise.
  - 20-50% concurrent brain injury.
  - 1-4% cervical spine injuries.
  - Blindness occurs in 0.5-3%

Etiology

- 25% of women with facial trauma are victims of domestic violence.
  - Increases to 30% if an orbital wall fx is present.
- 25% of patients with severe facial trauma will develop Post Traumatic Stress Disorder


Frontal bone
Glabella
Supraorbital notch (foramen)
Orbital surface
Nasal bone
Lacrimal bone
Zygomatic bone
Frontal process
Orbital surface
Temporal process
Zygomaticofacial foramen
Maxilla
Zygomatic process
Orbital surface
Infraorbital foramen
Frontal process
Alveolar process
Anterior nasal spine
Coronal suture
Parietal bone
Sphenoid bone
Lesser wing
Greater wing
Temporal bone
Ethmoid bone
Orbital plate
Perpendicular plate
Middle nasal concha
Inferior nasal concha
Vomer
Mandible
Ramus
Body
Mental foramen
Mental tubercle
Mental protuberance


Sphenoid bone
Greater wing
Parietal bone
Superior temporal line
Inferior temporal line
Temporal bone
Squamous part
Frontal bone
Supraorbital notch (foramen)
Coronal suture
Temporal fossa
Zygomatic process
Pterion
Glabella
Articular tubercle
Groove for middle temporal artery
Ethmoid bone
Orbital plate
External acoustic meatus
Lacrimal bone
Mastoid process
Fossa of lacrimal sac
Lambdoid suture
Nasal bone
Occipital bone
Maxilla
Frontal process
External occipital protuberance
Infraorbital foramen
Anterior nasal spine
Alveolar process
Mandible
Head (caput) of condylar process
Zygomatic bone
Notch
Zygomaticofacial foramen
Coronoid process
Temporal process
Ramus
Oblique line
Zygomatic arch
Body
Mental foramen

Emergency Management Airway Control

- Control airway:
  - Chin lift.
  - Jaw thrust.
  - Oropharyngeal suctioning.
  - Manually move the tongue forward.
  - Maintain cervical immobilization

Emergency Management Intubation Considerations

- Avoid nasotracheal intubation:
  - Nasocranial intubation
  - Nasal hemorrhage
- Avoid Rapid Sequence Intubation:
  - Failure to intubate or ventilate.
- Consider an awake intubation.
- Sedate with benzodiazepines.

Emergency Management Intubation Considerations

- Consider fiberoptic intubation if available.
- Alternatives include percutaneous transtracheal ventilation and retrograde intubation.
- Be prepared for cricothyroidotomy.

Emergency Management Hemorrhage Control

- Maxillofacial bleeding:
  - Direct pressure.
  - Avoid blind clamping in wounds.
- Nasal bleeding:
  - Direct pressure.
  - Anterior and posterior packing.
- Pharyngeal bleeding:
  - Packing of the pharynx around ET tube.

History

- Obtain a history from the patient, witnesses and or EMS.
- AMPLE history
- Specific Questions:
  - Was there LOC? If so, how long?
  - How is your vision?
  - Hearing problems?

History

- Specific Questions:
  - Is there pain with eye movement?
  - Are there areas of numbness or tingling on your face?
  - Is the patient able to bite down without any pain?
  - Is there pain with moving the jaw?

Physical Examination

- Inspection of the face for asymmetry.
- Inspect open wounds for foreign bodies.
- Palpate the entire face.
  - Supraorbital and Infraorbital rim
  - Zygomatic-frontal suture
  - Zygomatic arches

Physical Examination

- Inspect the nose for asymmetry, telecanthus, widening of the nasal bridge.
- Inspect nasal septum for septal hematoma, CSF or blood.
- Palpate nose for crepitus, deformity and subcutaneous air.
- Palpate the zygoma along its arch and its articulations with the maxilla, frontal and temporal bone.

Physical Examination

- Check facial stability.
- Inspect the teeth for malocclusions, bleeding and step-off.
- Intraoral examination:
  - Manipulation of each tooth.
  - Check for lacerations.
  - Stress the mandible.
  - Tongue blade test.
- Palpate the mandible for tenderness, swelling and step-off.

Physical Examination

- Check visual acuity.
- Check pupils for roundness and reactivity.
- Examine the eyelids for lacerations.
- Test extra ocular muscles.
- Palpate around the entire orbits..

Physical Examination

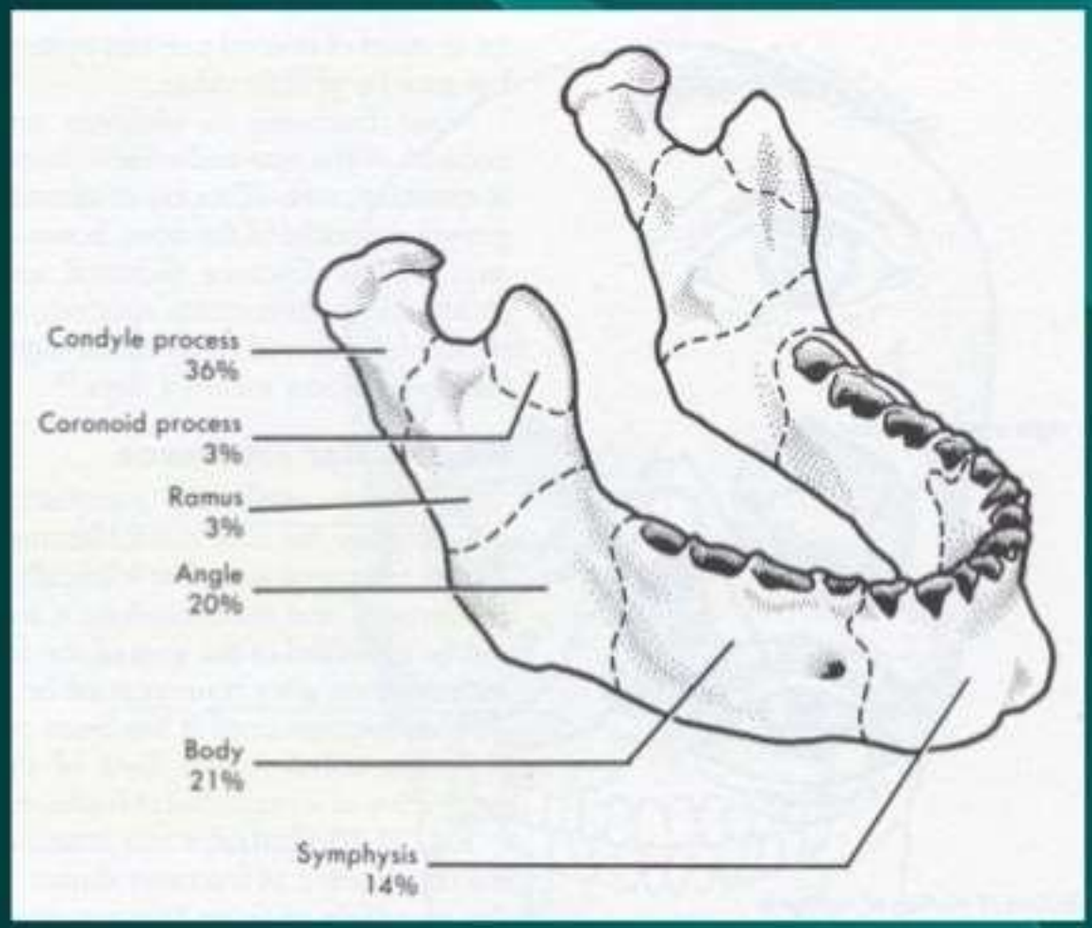
- Examine the cornea for abrasions and lacerations.
- Examine the anterior chamber for blood or hyphema.
- Perform fundoscopic exam and examine the posterior chamber and the retina.

Physical Examination

- Examine and palpate the exterior ears.
- Examine the ear canals.
- Check nuero distributions of the supraorbital, infraorbital, inferior alveolar and mental nerves.

Mandible Fractures Pathophysiology

- Mandibular fractures are the third most common facial fracture.
- Assaults and falls on the chin account for most of the injuries.
- Multiple fractures are seen in greater then 50%.
- Associated C-spine injuries – 0.2-6%.

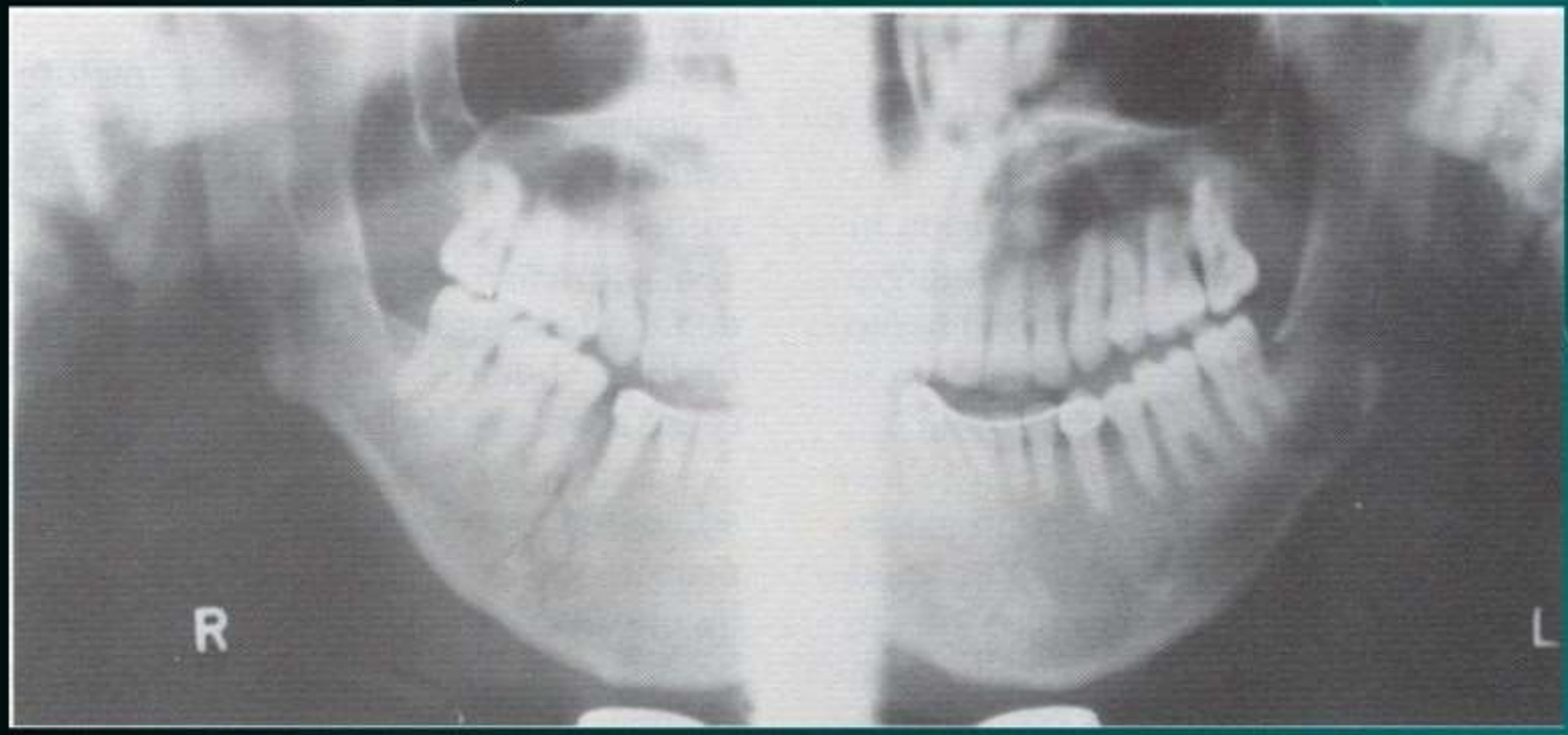


Mandible Fractures
Clinical findings

- Mandibular pain.
- Malocclusion of the teeth
- Separation of teeth with intraoral bleeding
- Inability to fully open mouth.
- Preauricular pain with biting.
- Positive tongue blade test.

Mandible Fractures

- Radiographs:
  - Panoramic view
  - Plain view: PA, Lateral and a Townes view



Mandibular Fractures Treatment

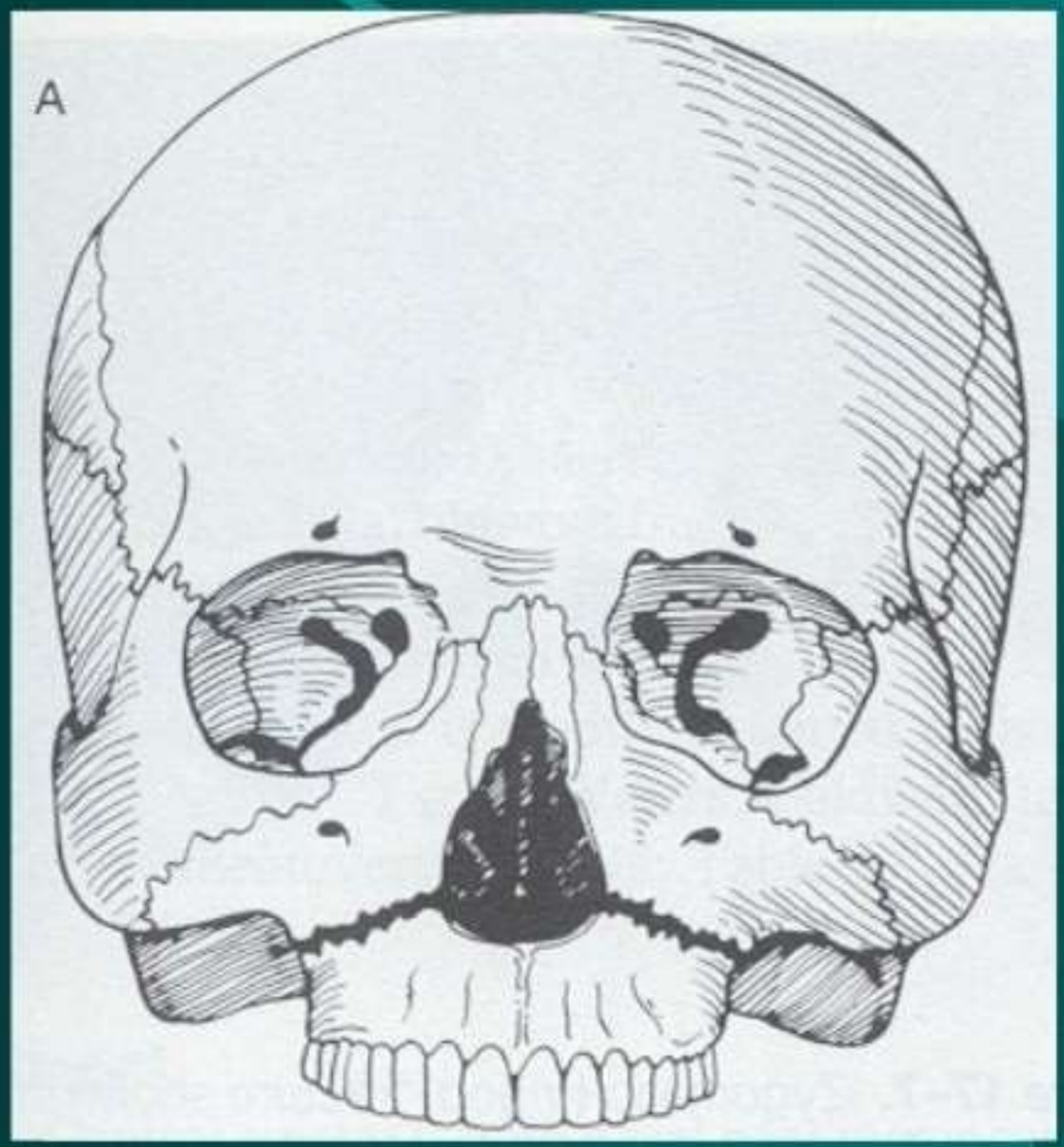
- Nondisplaced fractures:
  - Analgesics
  - Soft diet
  - oral surgery referral in 1-2 days
- Displaced fractures, open fractures and fractures with associated dental trauma
  - Urgent oral surgery consultation
- All fractures should be treated with antibiotics and tetanus prophylaxis.

Maxillary Fractures

- High energy injuries.
- Impact 100 times the force of gravity is required .
- Patients often have significant multisystem trauma.
- Classified as LeFort fractures.

Maxillary Fractures
LeFort I

- Definition:
  - Horizontal fracture of the maxilla at the level of the nasal fossa.
  - Allows motion of the maxilla while the nasal bridge remains stable.

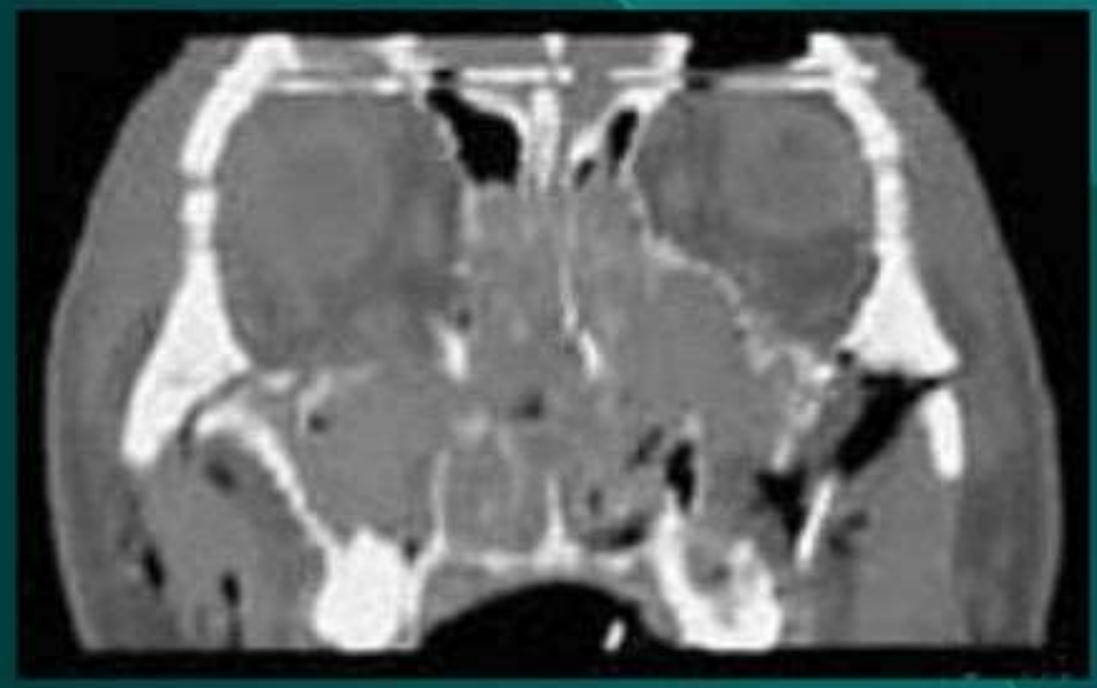


Maxillary Fractures
LeFort I

- Clinical findings:
  - Facial edema
  - Malocclusion of the teeth
  - Motion of the maxilla while the nasal bridge remains stable

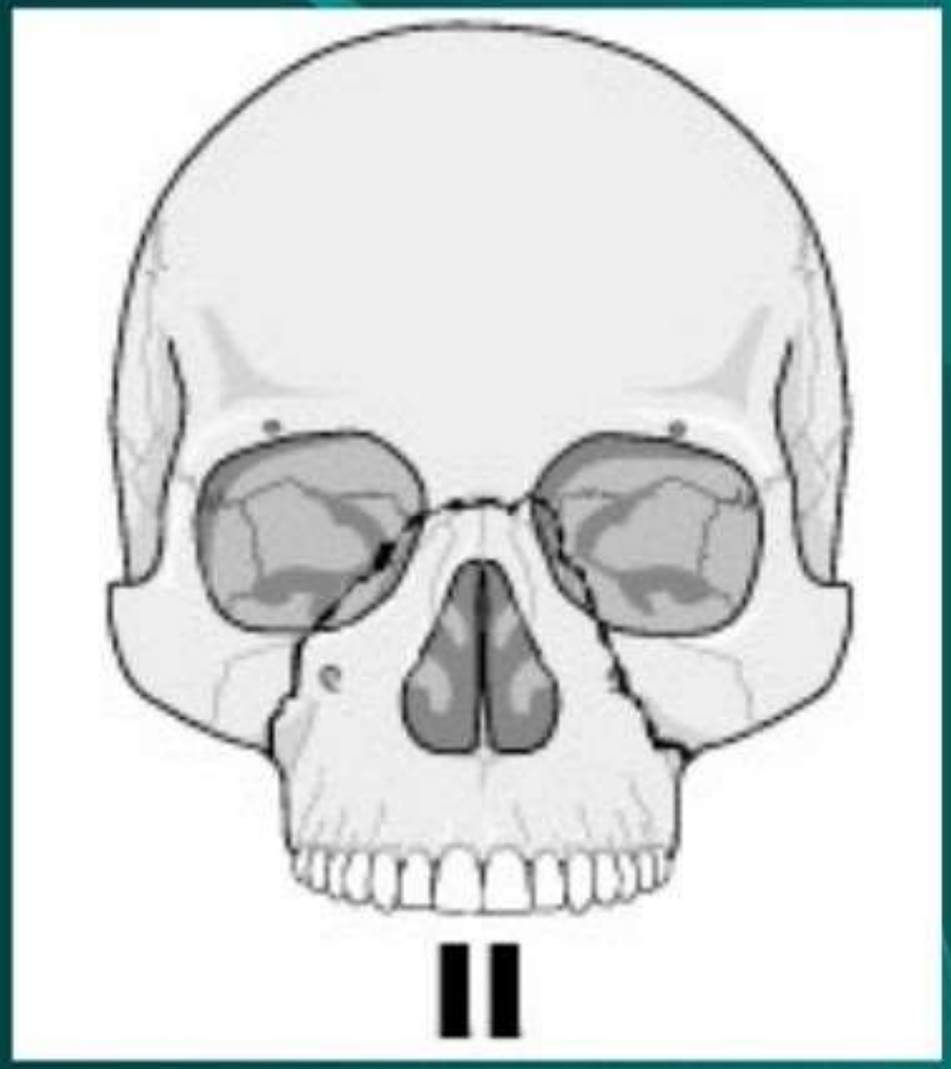
Maxillary Fractures
LeFort I

- Radiographic findings:
  - Fracture line which involves
    - Nasal aperture
    - Inferior maxilla
    - Lateral wall of maxilla
- CT of the face and head
  - coronal cuts
  - 3-D reconstruction



Maxillary Fractures
LeFort II

- Definition:
  - Pyramidal fracture
    - Maxilla
    - Nasal bones
    - Medial aspect of the orbits

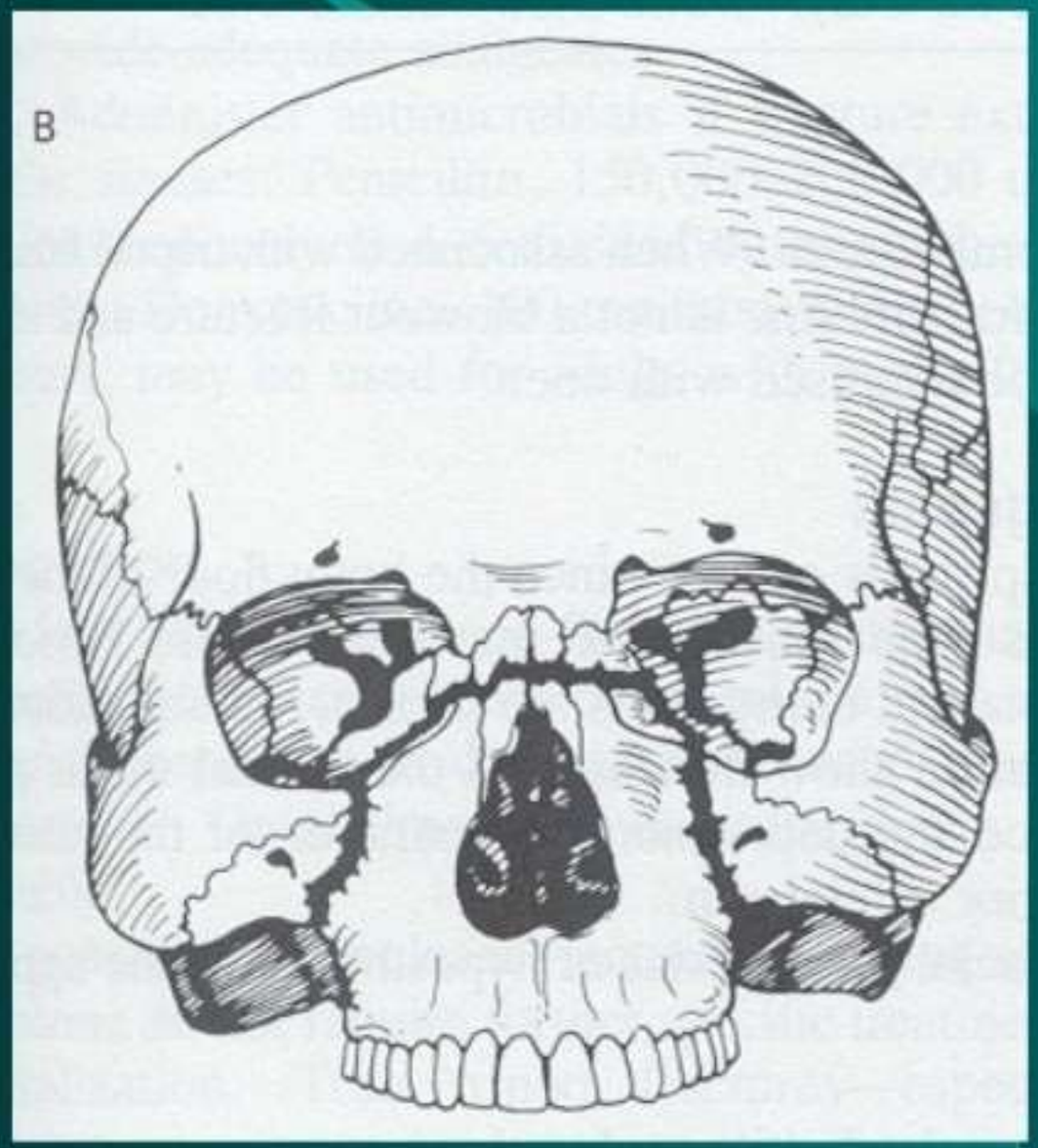


Maxillary Fractures
LeFort II

- Clinical findings:
  - Marked facial edema
  - Nasal flattening
  - Traumatic telecanthus
  - Epistaxis or CSF rhinorrhea
  - Movement of the upper jaw and the nose.

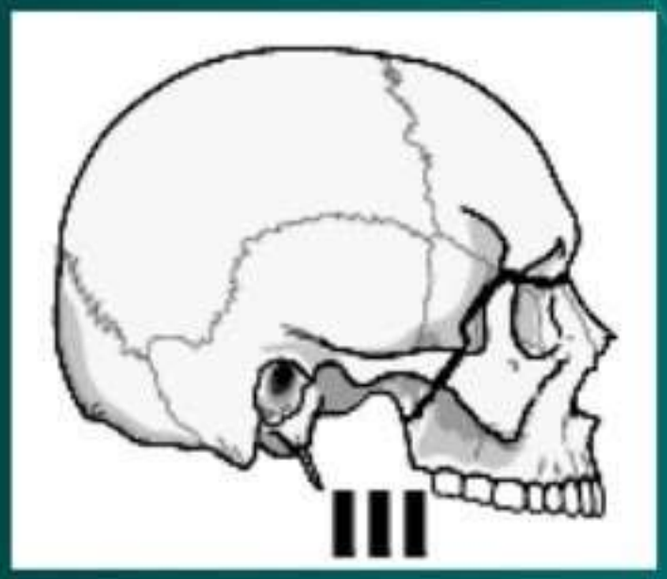
Maxillary Fractures
LeFort II

- Radiographic imaging:
  - Fracture involves:
    - Nasal bones
    - Medial orbit
    - Maxillary sinus
    - Frontal process of the maxilla
- CT of the face and head



Maxillary Fractures
LeFort III

- Definition:
  - Fractures through:
    - Maxilla
    - Zygoma
    - Nasal bones
    - Ethmoid bones
    - Base of the skull

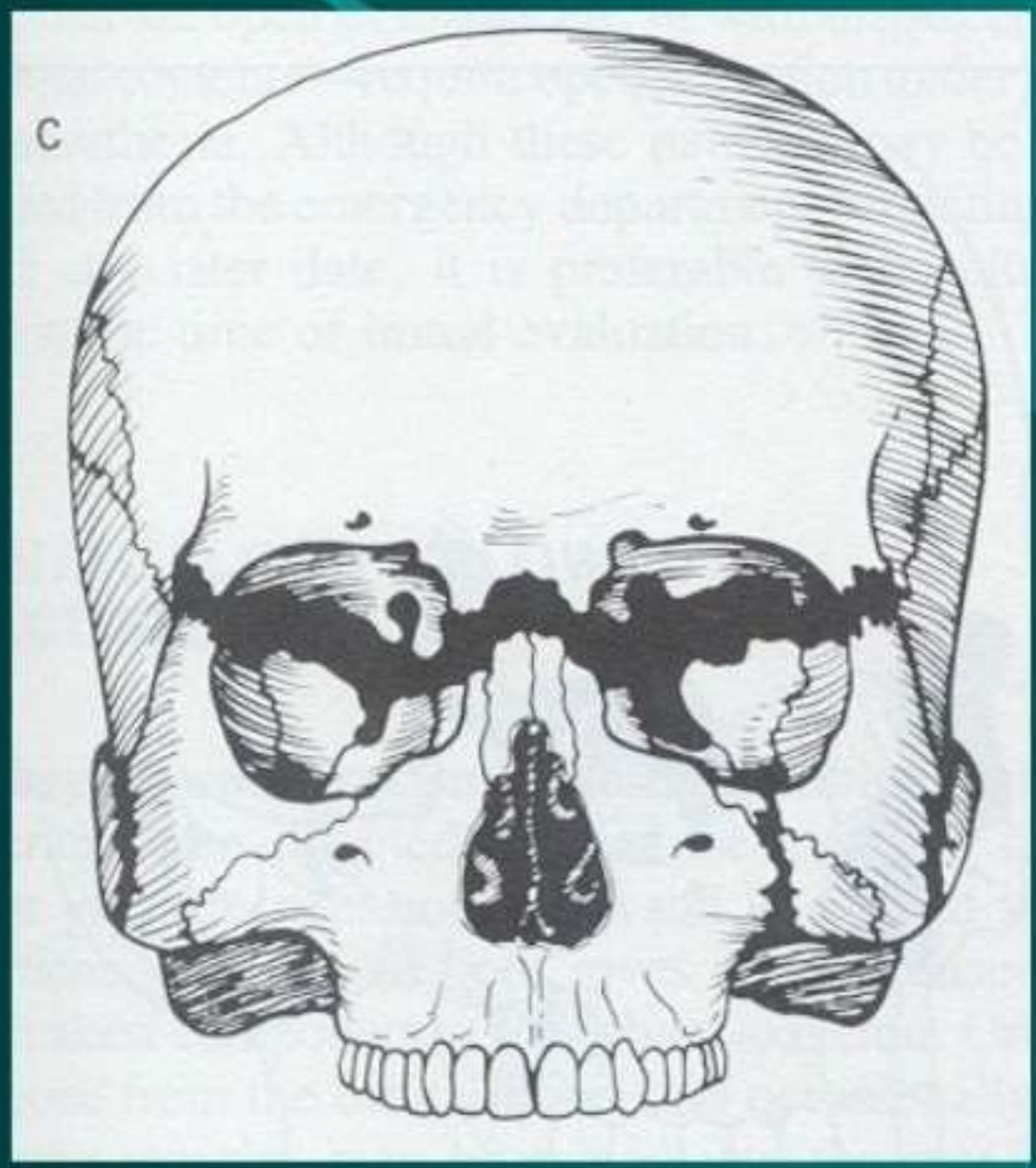


Maxillary Fractures
LeFort III

- Clinical findings:
  - Dish faced deformity
  - Epistaxis and CSF rhinorrhea
  - Motion of the maxilla, nasal bones and zygoma
  - Severe airway obstruction

Maxillary Fractures
LeFort III

- Radiographic imaging:
  - Fractures through:
    - Zygomaticfrontal suture
    - Zygoma
    - Medial orbital wall
    - Nasal bone
- CT Face and the Head



Maxillary Fractures Treatment

- Secure and airway
- Control Bleeding
- Head elevation 40-60 degrees
- Consult with maxillofacial surgeon
- Consider antibiotics
- Admission

Zygoma Fractures

- The zygoma has 2 major components:
  - Zygomatic arch
  - Zygomatic body
- Blunt trauma most common cause.
- Two types of fractures can occur:
  - Arch fracture (most common)
  - Tripod fracture (most serious)

Zygoma Arch Fractures

- Can fracture 2 to 3 places along the arch
  - Lateral to each end of the arch
  - Fracture in the middle of the arch
- Patients usually present with pain on opening their mouth.

Zygoma Arch Fractures
Clinical Findings

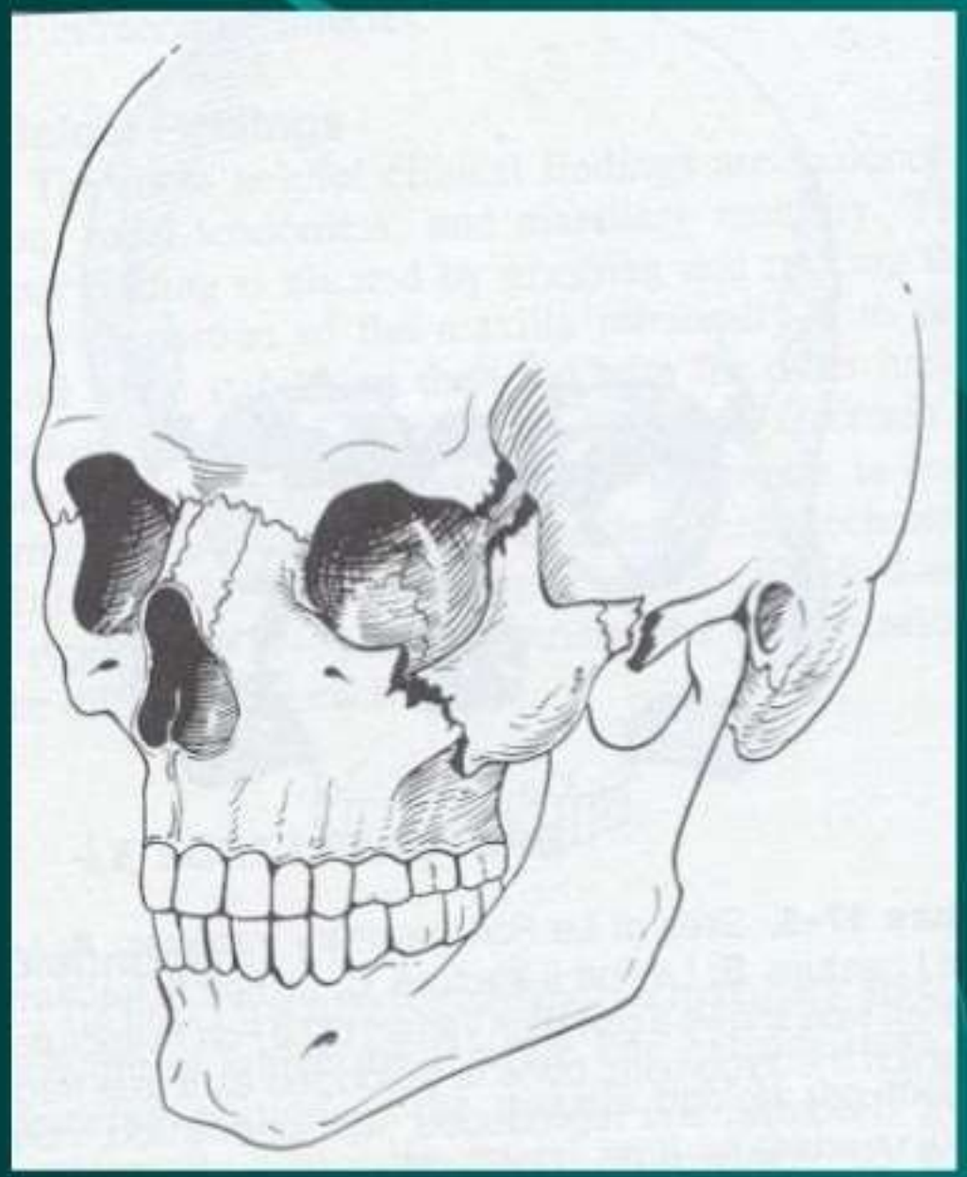
- Palpable bony defect over the arch
- Depressed cheek with tenderness
- Pain in cheek and jaw movement
- Limited mandibular movement

Zygoma Arch Fractures Imaging Studies & Treatment

- Radiographic imaging:
  - Submental view (bucket handle view)
- Treatment:
  - Consult maxillofacial surgeon
  - Ice and analgesia
  - Possible open elevation

Zygoma Tripod Fractures

- Tripod fractures consist of fractures through:
  - Zygomatic arch
  - Zygomaticofrontal suture
  - Inferior orbital rim and floor



Zygoma Tripod Fractures
Clinical Features

- Clinical features:
  - Periorbital edema and ecchymosis
  - Hypesthesia of the infraorbital nerve
  - Palpation may reveal step off
  - Concomitant globe injuries are common

Zygoma Tripod Fractures Imaging Studies

- Radiographic imaging:
  - Waters, Submental and Caldwell views
- Coronal CT of the facial bones:
  - 3-D reconstruction

Zygoma Tripod Fractures Treatment

- Nondisplaced fractures without eye involvement
  - Ice and analgesics
  - Delayed operative consideration 5-7 days
  - Decongestants
  - Broad spectrum antibiotics
  - Tetanus
- Displaced tripod fractures usually require admission for open reduction and internal fixation.

Orbital Blowout Fractures

- Blow out fractures are the most common.
- Occur when the the globe sustains a direct blunt force
- 2 mechanisms of injury:
  - Blunt trauma to the globe
  - Direct blow to the infraorbital rim

Orbital Blowout Fractures
Clinical Findings

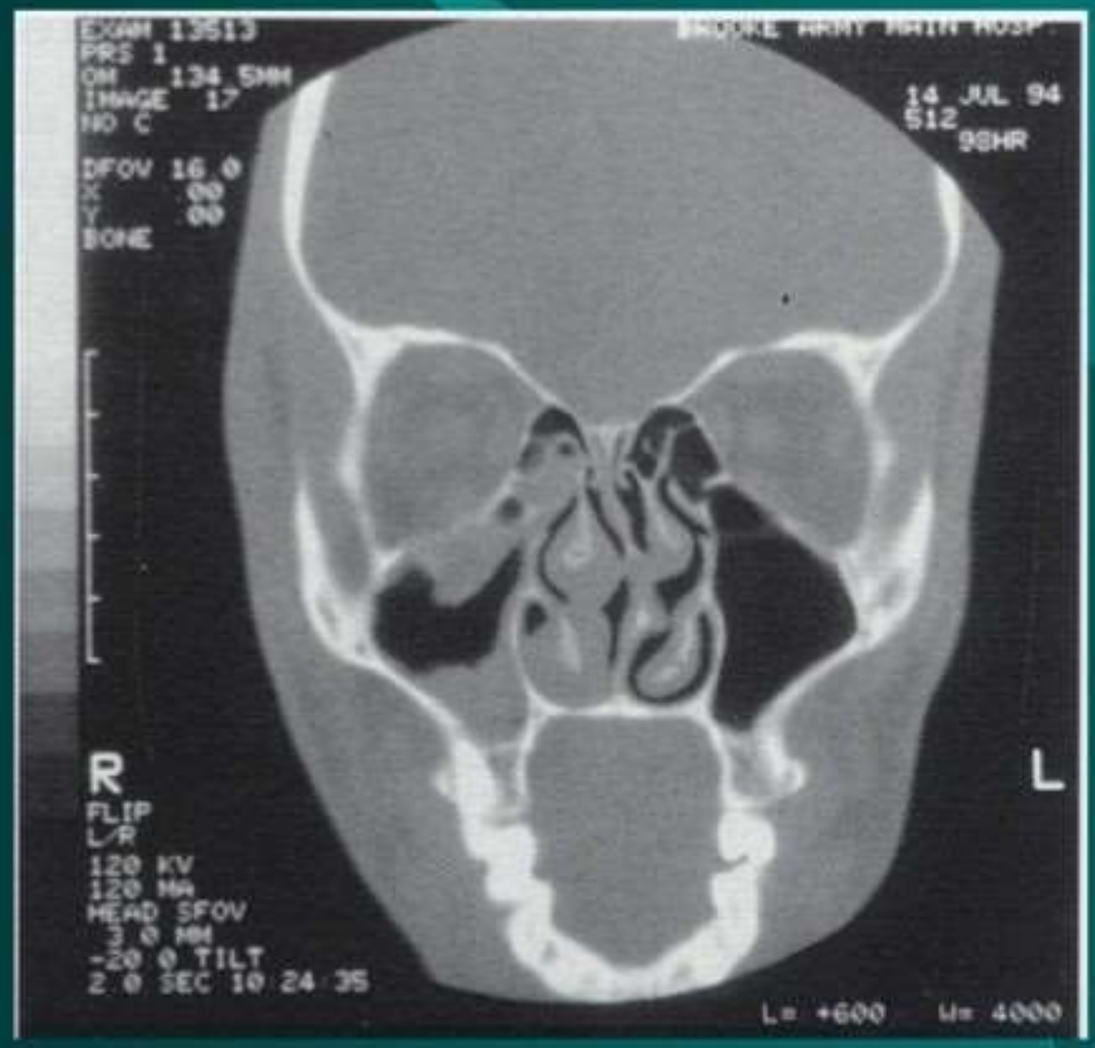
- Periorbital tenderness, swelling, ecchymosis.
- Enopthalmus or sunken eyes.
- Impaired ocular motility.
- Infraorbital anesthesia.
- Step off deformity

Orbital Blowout Fractures
Imaging studies

- Radiographs:
  - Hanging tear drop sign
  - Open bomb bay door
  - Air fluid levels
  - Orbital emphysema

Orbital Blowout Fractures Imaging studies

- CT of orbits
  - Details the orbital fracture
  - Excludes retrobulbar hemorrhage.
- CT Head
  - R/o intracranial injuries



Orbital Blowout Fractures Treatment

- Blow out fractures without eye injury do not require admission
  - Maxillofacial and ophthalmology consultation
  - Tetanus
  - Decongestants for 3 days
  - Prophylactic antibiotics
  - Avoid valsalva or nose blowing
- Patients with serious eye injuries should be admitted to ophthalmology service for further care.

Frontal Sinus/ Bone Fractures Pathophysiology

- Results from a direct blow to the frontal bone with blunt object.
- Associated with:
  - Intracranial injuries
  - Injuries to the orbital roof
  - Dural tears

Frontal Sinus/ Bone Fractures Clinical Findings

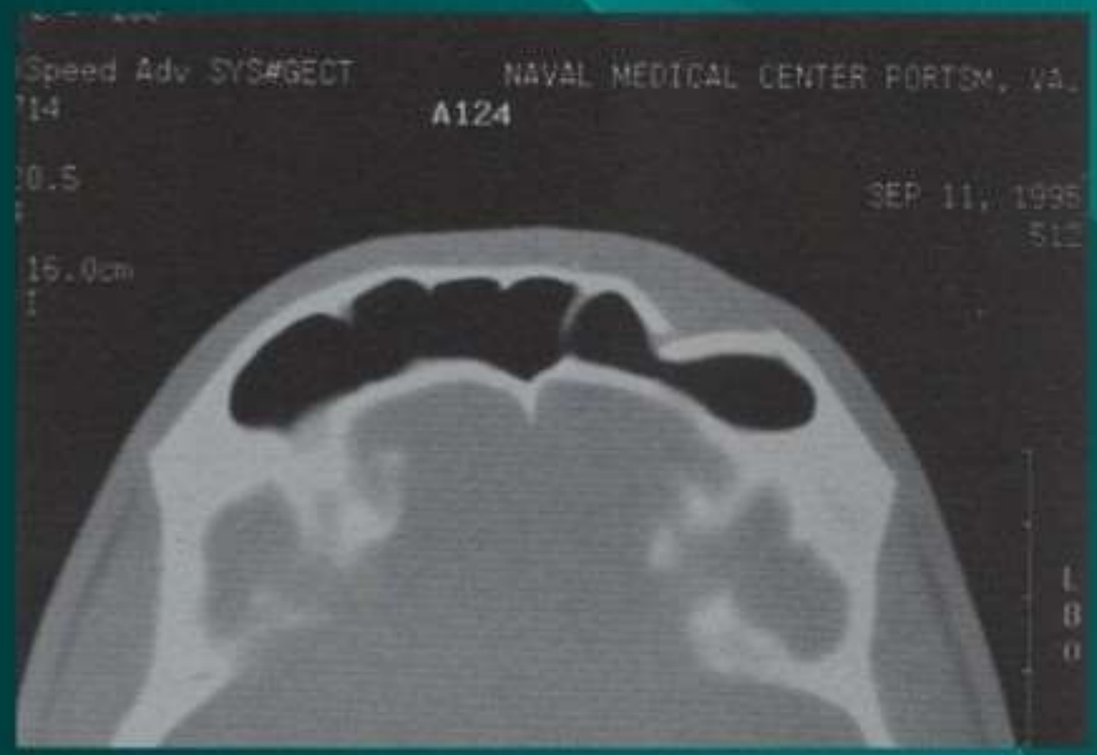
- Disruption or crepitance orbital rim
- Subcutaneous emphysema
- Associated with a laceration

Frontal Sinus/ Bone Fractures Diagnosis

- Radiographs:
  - Facial views should include Waters, Caldwell and lateral projections.
  - Caldwell view best evaluates the anterior wall fractures.

Frontal Sinus/ Bone Fractures Diagnosis

- CT Head with bone windows:
  - Frontal sinus fractures.
  - Orbital rim and nasoethmoidal fractures.
  - R/O brain injuries or intracranial bleeds.



Frontal Sinus/ Bone Fractures Treatment

- Patients with depressed skull fractures or with posterior wall involvement.
  - ENT or nuerosurgery consultation.
  - Admission.
  - IV antibiotics.
  - Tetanus.
- Patients with isolated anterior wall fractures, nondisplaced fractures can be treated outpatient after consultation with neurosurgery.

Frontal Sinus/ Bone Fractures Complications

- Associated with intracranial injuries:
  - Orbital roof fractures.
  - Dural tears.
  - Mucopyocoele.
  - Epidural empyema.
  - CSF leaks.
  - Meningitis.

Nasal Fractures

- Most common of all facial fractures.
- Injuries may occur to other surrounding bony structures.
- 3 types:
  - Depressed
  - Laterally displaced
  - Nondisplaced

Nasal Fractures

- Ask the patient:
  - "Have you ever broken your nose before?"
  - "How does your nose look to you?"
  - "Are you having trouble breathing?"

Nasal Fractures

- Clinical findings:
  - Nasal deformity
  - Edema and tenderness
  - Epistaxis
  - Crepitus and mobility

Nasal Fractures

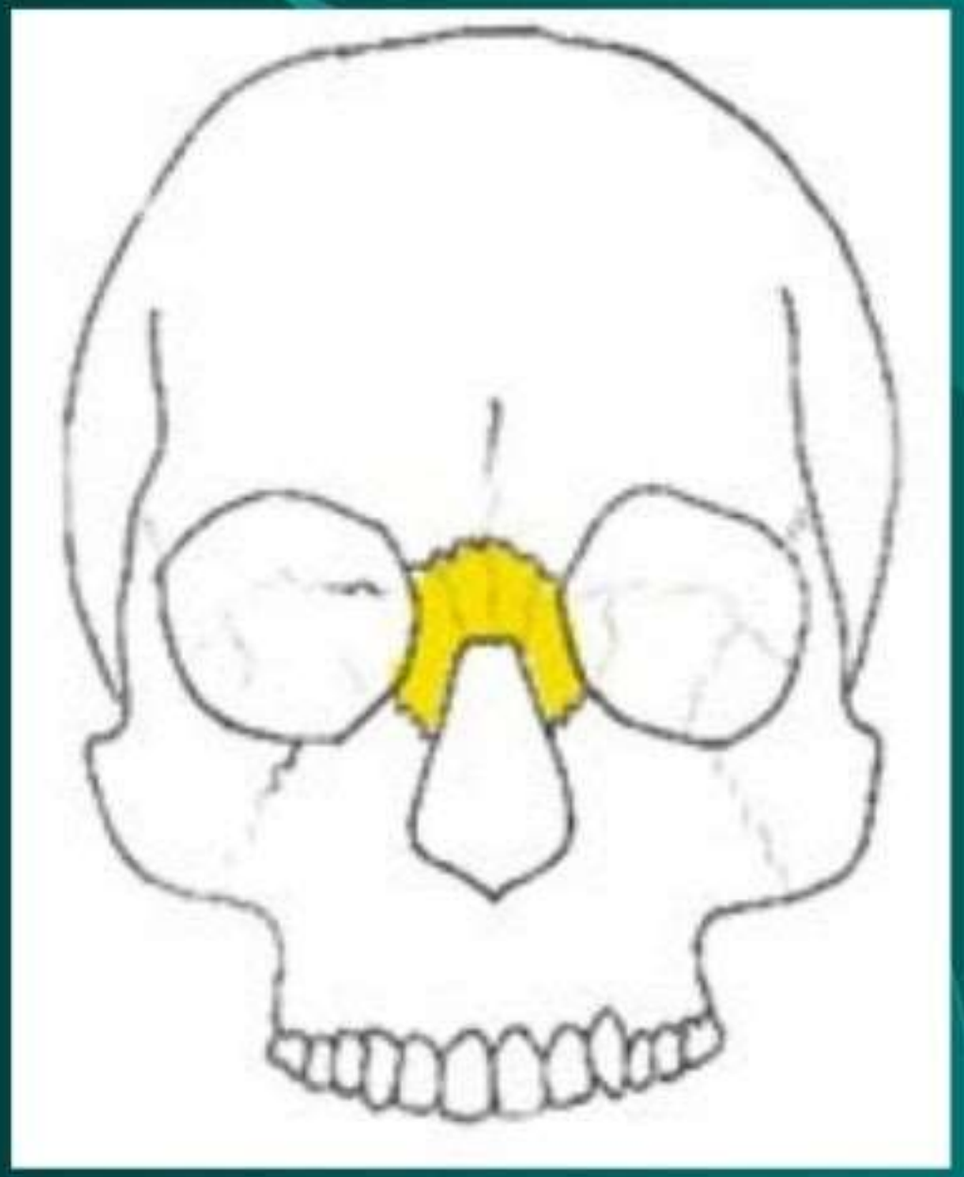
- Diagnosis:
  - History and physical exam.
  - Lateral or Waters view to confirm your diagnosis.

Nasal Fractures

- Treatment:
  - Control epistaxis.
  - Drain septal hematomas.
  - Refer patients to ENT as outpatient.

Naso-Ethmoidal-Orbital Fracture

- Fractures that extend into the nose through the ethmoid bones.
- Associated with lacrimal disruption and dural tears.
- Suspect if there is trauma to the nose or medial orbit.
- Patients complain of pain on eye movement.



Naso-Ethmoidal-Orbital Fracture

- Clinical findings:
  - Flattened nasal bridge or a saddle-shaped deformity of the nose.
  - Widening of the nasal bridge (telecanthus)
  - CSF rhinorrhea or epistaxis.
  - Tenderness, crepitus, and mobility of the nasal complex.
  - Intranasal palpation reveals movement of the medial canthus.

Naso-Ethmoidal-Orbital Fracture

- Imaging studies:
  - Plain radiographs are insensitive.
  - CT of the face with coronal cuts through the medial orbits.
- Treatment:
  - Maxillofacial consultation.
  - ? Antibiotic