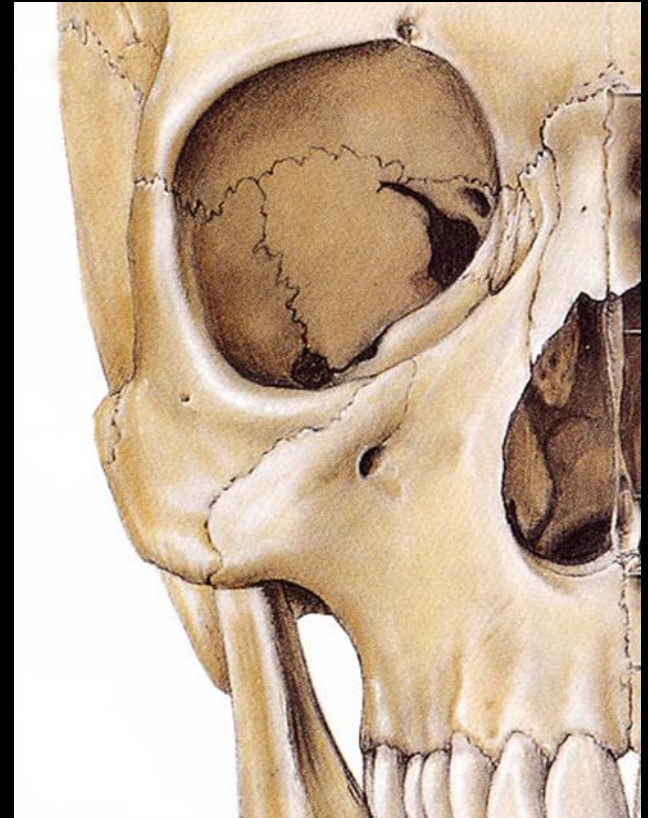




Facial fractures



Mohammad Reza Moaddeli D.M.D , OMF
Assistant professor

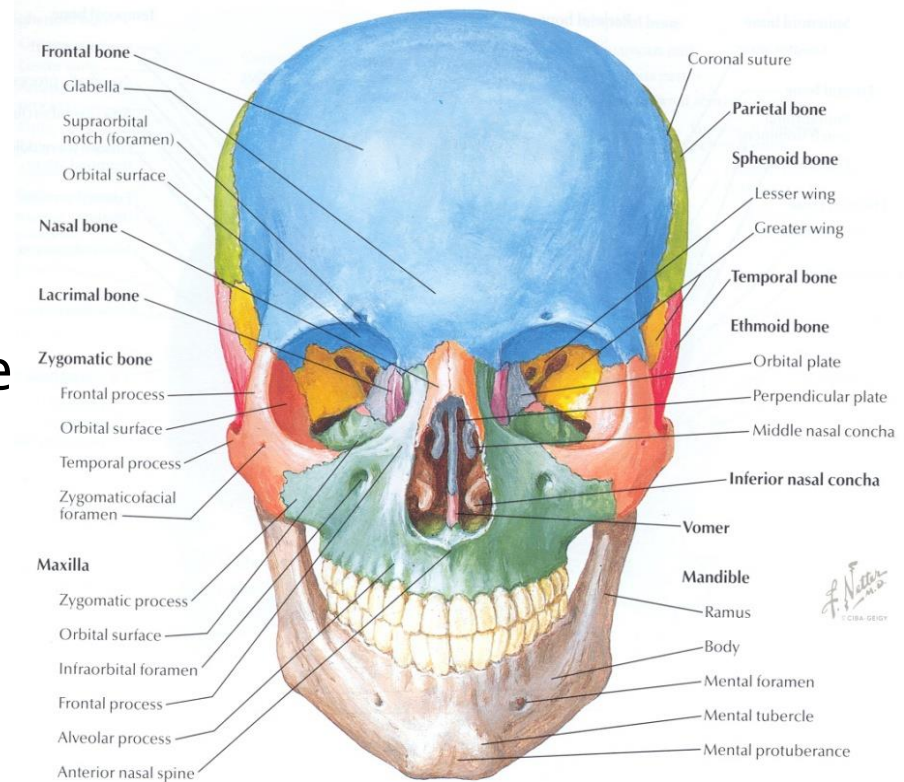
Hormozgan University of Medical Sciences, Bandar Abbas Faculty of
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Department of Oral and Maxillofacial Surgery

Maxillofacial Region

1. Fractures of the Nasal Pyramid

2. Fractures of the Central Midface

- Le Fort Fractures

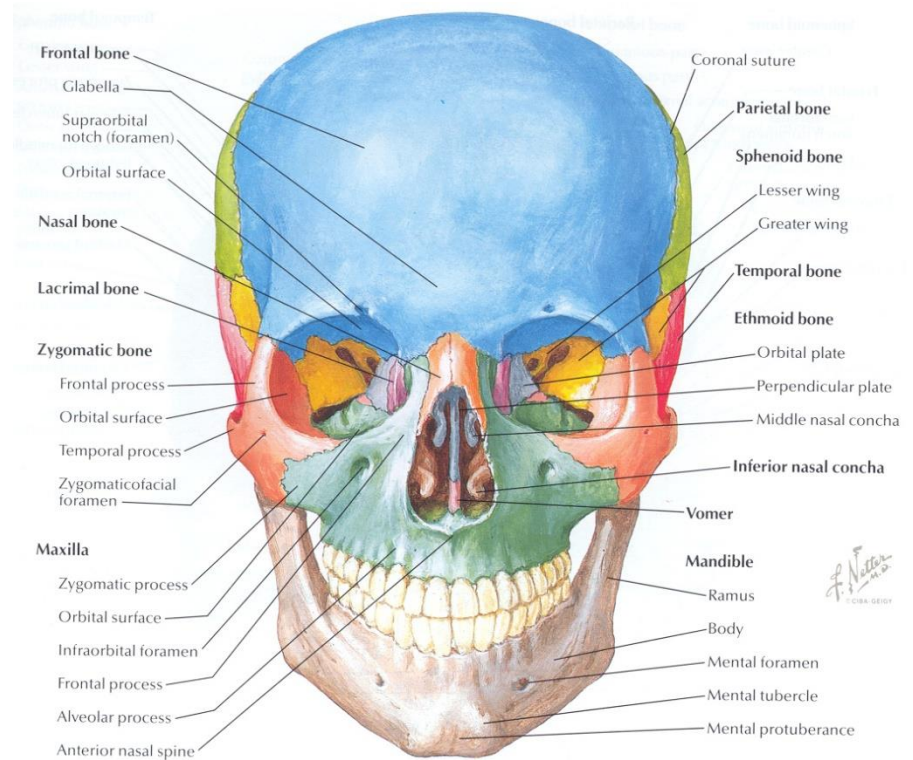


Maxillofacial Region

3. Fractures of the Lateral Midface

4. Fractures of the Frontal bone

5. Fractures or dislocation of the mandible



Etiology

- Traffic accidents
- Interpersonal violence
- Sporadic accidents
- Home accidents
- Occupational accidents
- Shot-gun injuries
- Women – consider the possibility of domestic violence

History

■ Questions:

- Was there LOC, nausea/vomiting, headache? (Head Trauma related questions)
- How is your vision?
- Hearing problems?
- Is there pain with eye movement?
- Are there areas of numbness or tingling on your face?
- Able to bite down without any pain?
- Is there pain with moving the jaw?

Physical Examination

Inspection

- Open wounds for foreign bodies
- Facial asymmetry
- Nose for deviation, widening of bridge
- Nasal septum for septal hematoma, CSF or blood
- Ears for blood or CSF
- Malocclusion



Physical Examination

Inspection



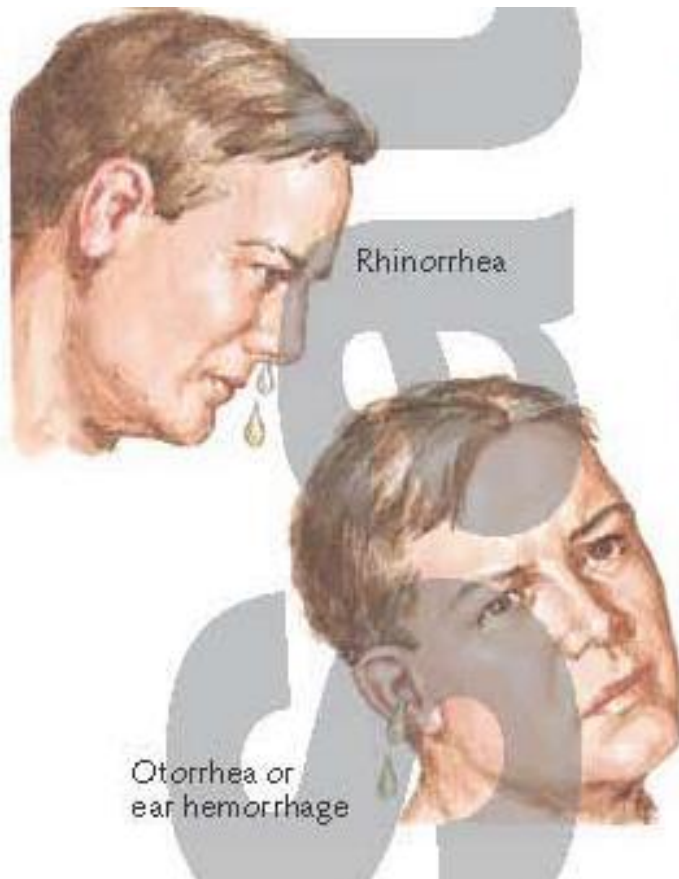
- Battle's sign



- Raccoon eyes

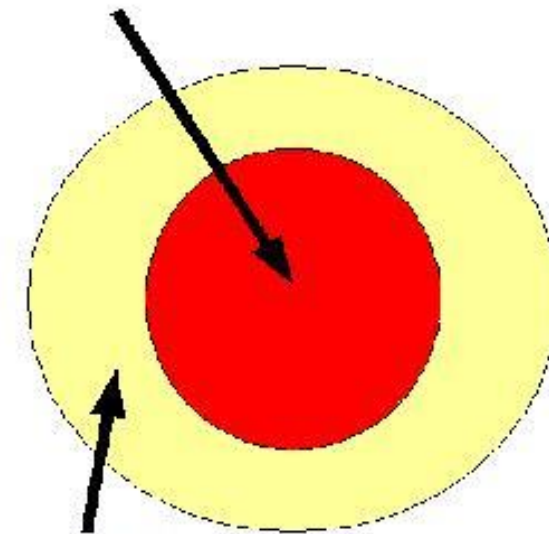
Physical Examination

Inspection



- Otorrhea, Rhinorrhea

Blood



CSF

- Halo Sign

- Not sensitive or specific but can be used as a preliminary test for CSF in blood
- Dipstick
- Beta transferrin

Physical Examination

Palpation

- Palpate the entire face.
 - Supraorbital and Infraorbital rim
 - Zygomatic-frontal suture
 - Zygomatic arches
- Nose - crepitus, deformity and subcutaneous air
- Zygoma along its arch and its articulations with the maxilla, frontal and temporal bone
- Mandible for tenderness, swelling

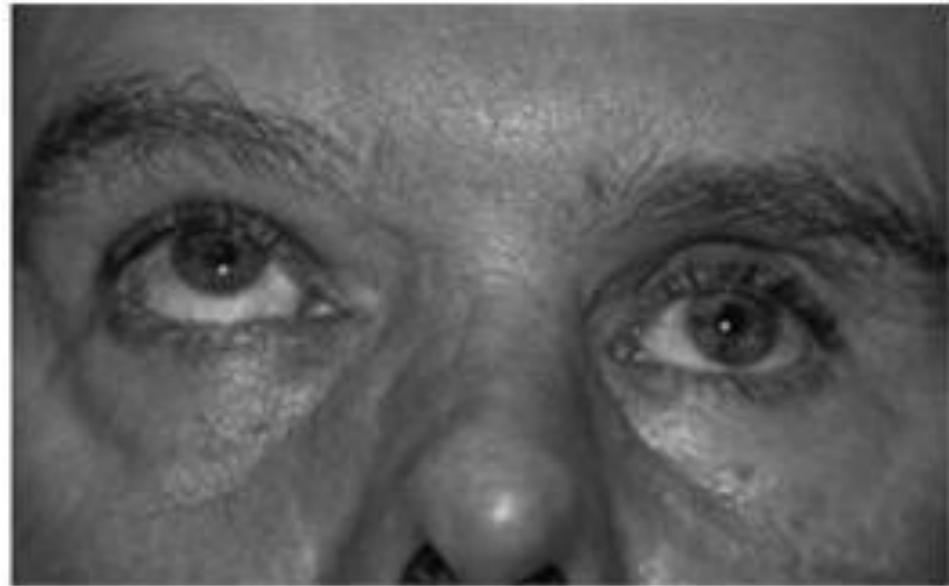
Physical Examination

- Intraoral examination:
 - Inspect the teeth for malocclusions, bleeding
 - Manipulation of each tooth
 - Check for lacerations
 - Mandibular movements

Physical Examination

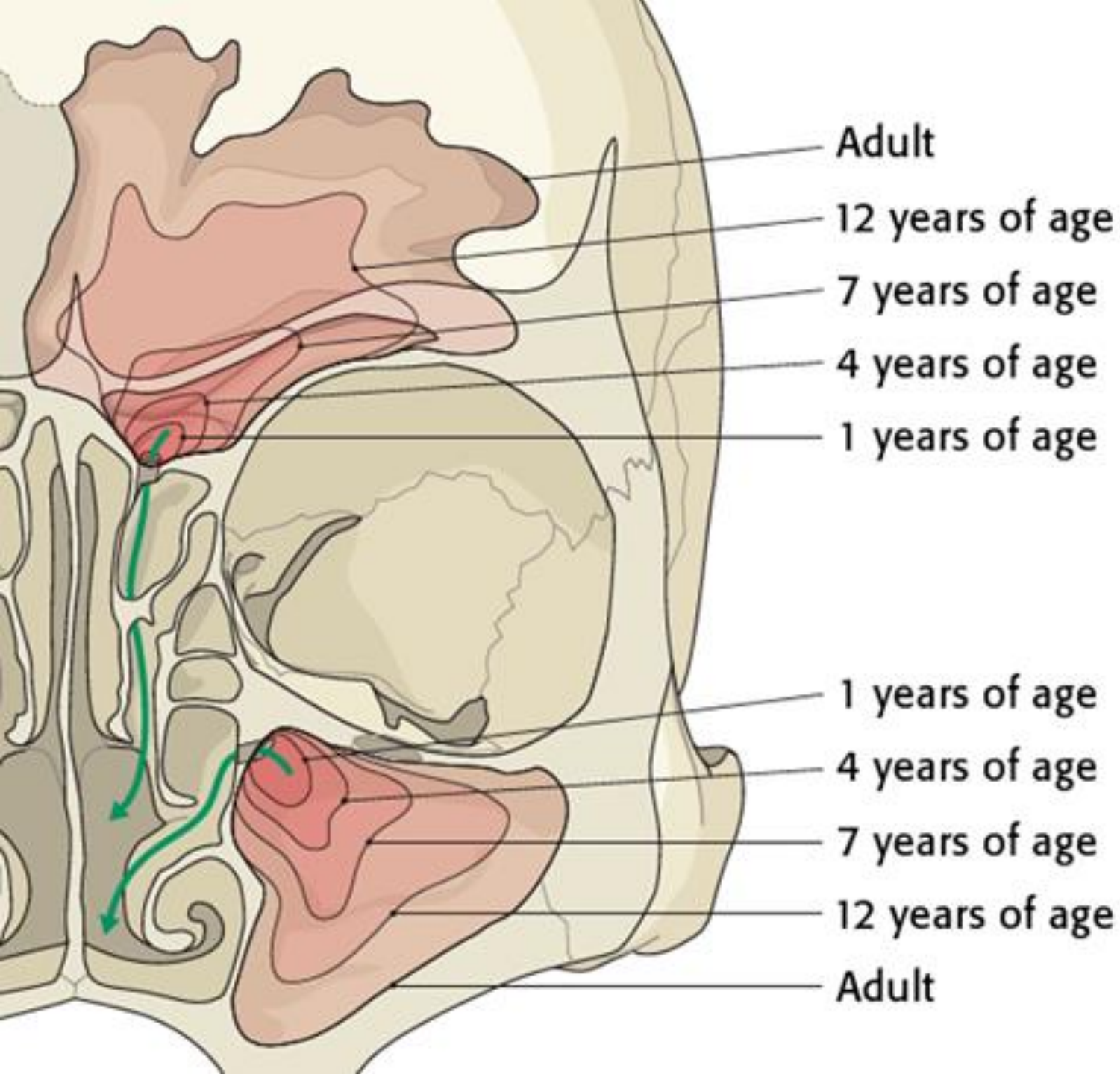
Ophthalmologic exam

- Visual acuity
- Pupils for shape and reactivity
- Eyelids for lacerations
- Extra ocular muscles
- Palpate around the orbits



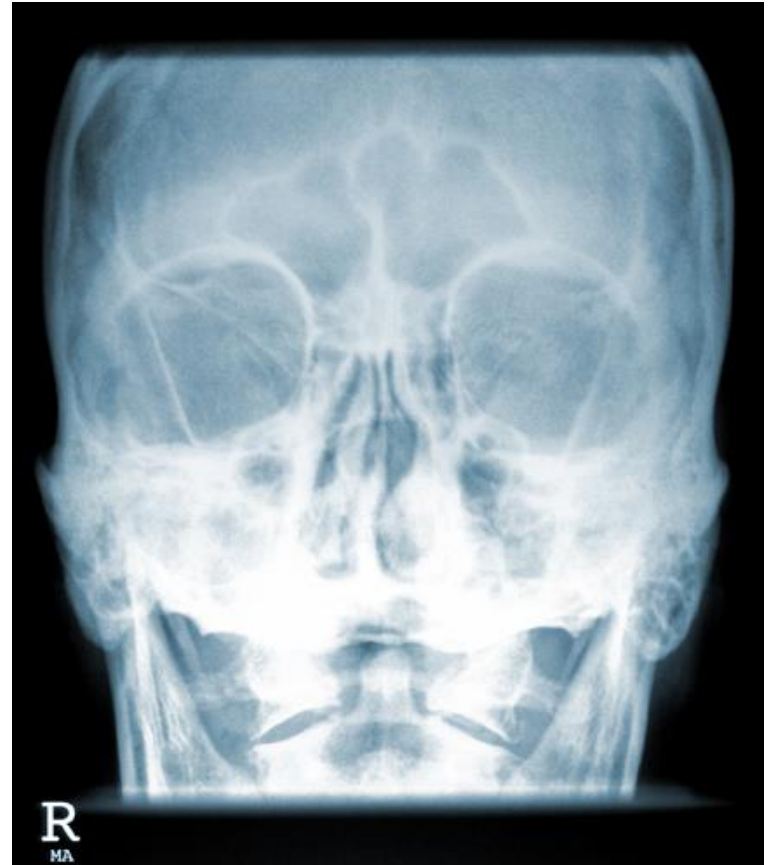
Diagnostic Imaging

- Plain films
 - Confirm suspected clinical diagnosis
 - Determine extent of injury
 - Document fractures
- CT scan



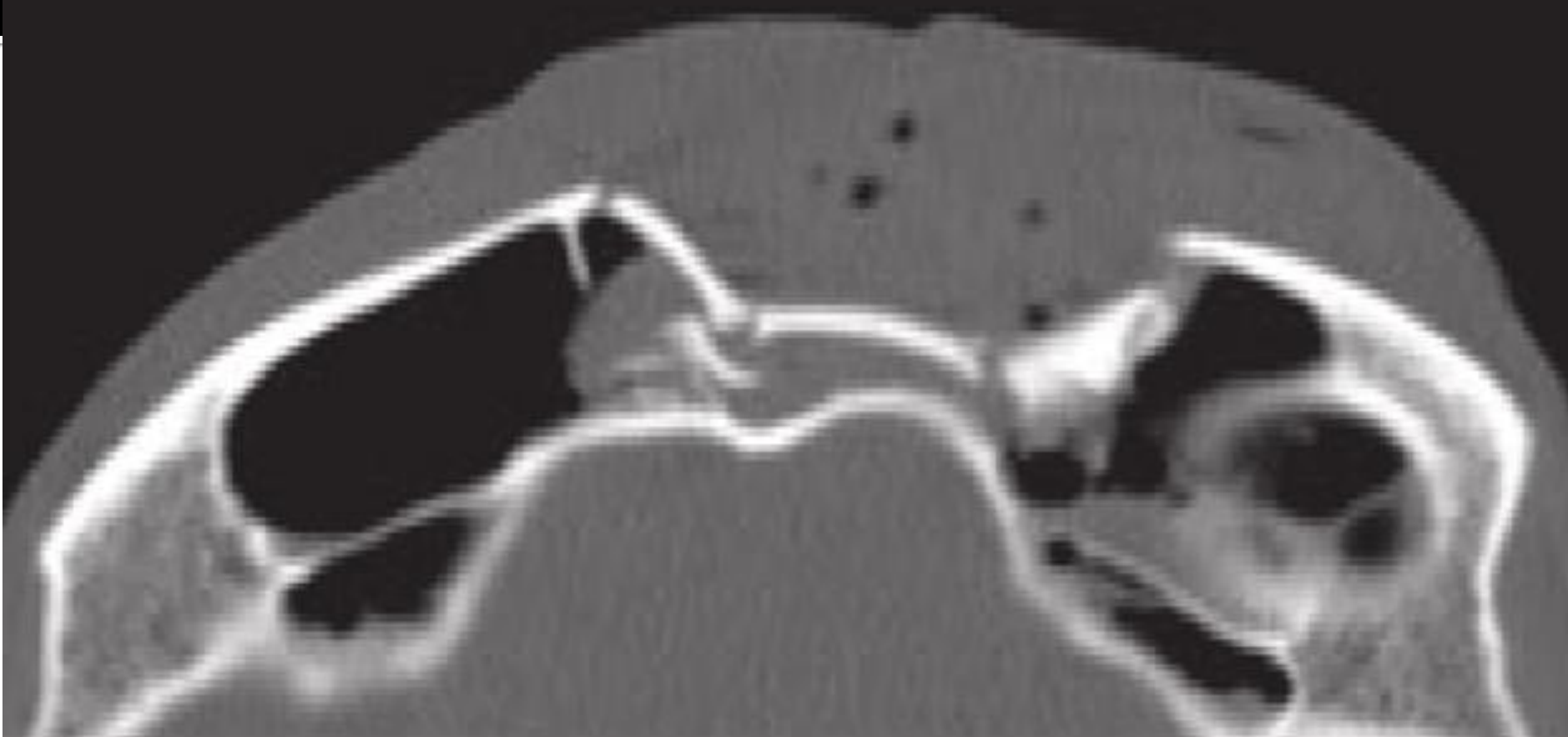
Frontal Sinus Fracture

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



Frontal Sinus Fractures Epidemiology

- Frontal sinus fractures are relatively uncommon and account for only 5-15% of maxillofacial fractures with a preponderance of male patients.
- The most common frontal sinus fractures involve a combination of the anterior and posterior tables with or without frontal recess involvement (about 2/3).
- Isolated anterior table fractures account for only approximately 1/3.



B Strong

AO

Clinical & radiologic evaluation

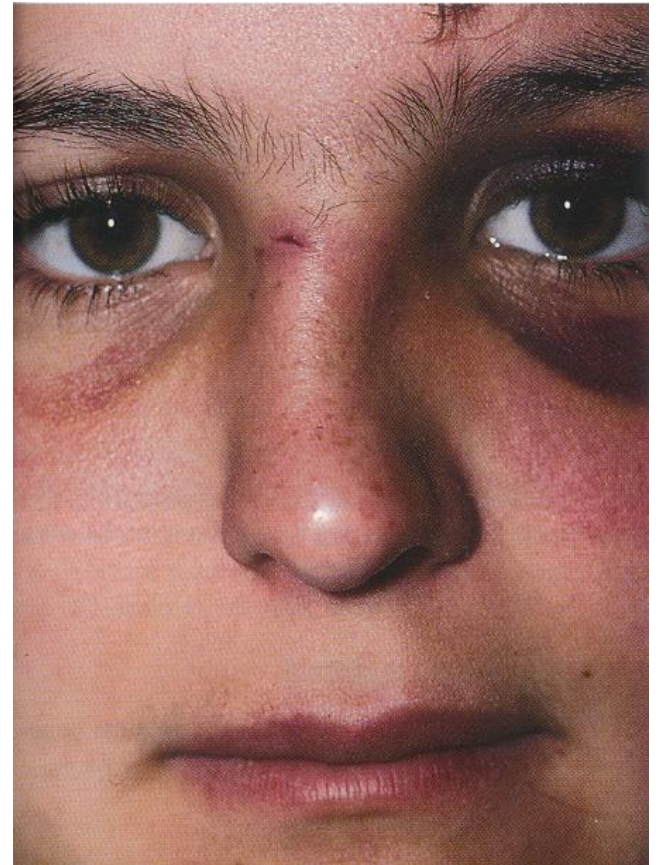
- A focused exam of the frontal sinus should include evaluation for any contour deformity and/or frontal lacerations and neurosensory deficits
- Conscious patients should be questioned for the presence of clear nasal drainage or salty posterior nasal drainage that might be indicative of a CSF leak.
- Examination of deep wounds should be performed under sterile technique, as these can be through and through injuries
- A high resolution CT scan with axial, coronal, sagittal and 3-D reconstruction is the **gold standard** for diagnosis

Frontal Sinus Fractures

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

Nasal Fractures

- The third most common fracture of the human skeleton
- The most commonly fractured bony structures of the maxillofacial complex (50%)
- Likewise, the most commonly **missed** facial fracture
- Protruding position coupled with its relative lack of support

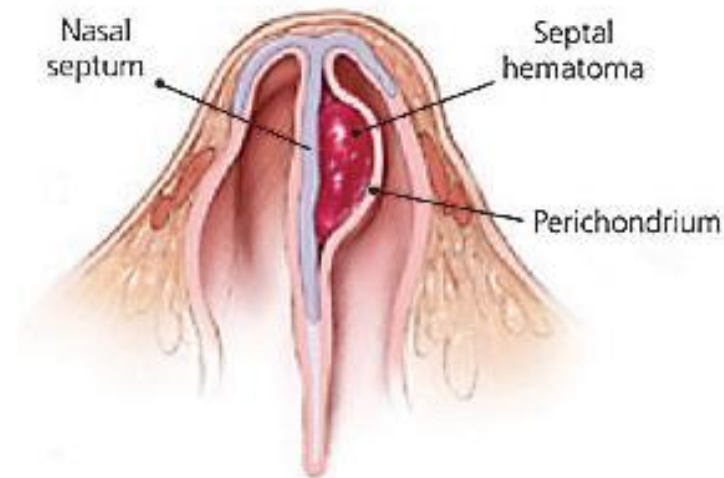


Nasal Fractures

- Open or closed fracture
- Signs
 - Depression or displacement of nasal bones
 - Edema of nose
 - Epistaxis
 - Fracture of septal cartilage with displacement or mobility
 - Crepitus on palpation

Nasal Fractures

- All nasal injuries should be evaluated for septal hematoma



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- Untreated- result in septal necrosis and saddle nose deformity
- Can become infected- result in a septal abscess

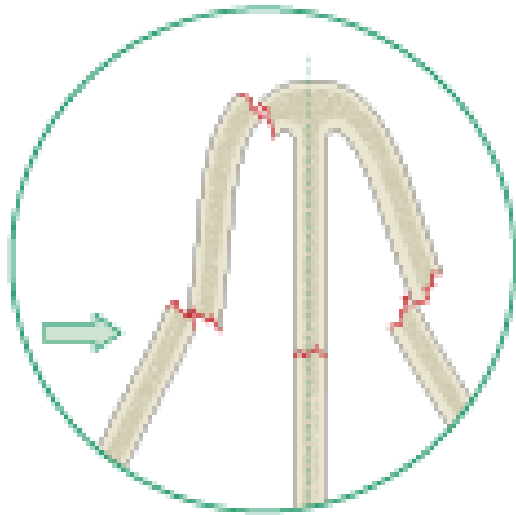
Classification

- There is no standardized, world-wide accepted classification for nasal fractures
- Ondik et al 2009 and AO provide a simple classification systems based on clinical findings

Classification of Nasal and Septal Fractures

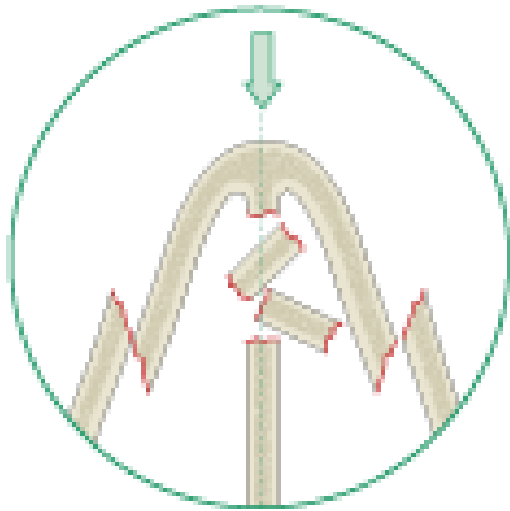
Type	Description	Characteristics
I	Simple straight	Unilateral or bilateral displaced fracture without resulting midline deviation.
II	Simple deviated	Unilateral or bilateral displaced fracture with resulting midline deviation.
III	Comminution of nasal bones	Bilateral nasal bone comminution and crooked septum with preservation of midline septal support; septum does not interfere with bony reduction.
IV	Severely deviated nasal and septal fractures	Unilateral or bilateral nasal fractures with severe deviation or disruption of nasal midline, secondary to either severe septal fracture or septal dislocation. May be associated with comminution of the nasal bones and septum, which interfere with reduction of fractures.
V	Complex nasal and septal fractures	Severe injuries including lacerations and soft tissue trauma, acute saddling of nose, open compound injuries, and avulsion of tissue.

AO Classification : Laterally displaced fractures



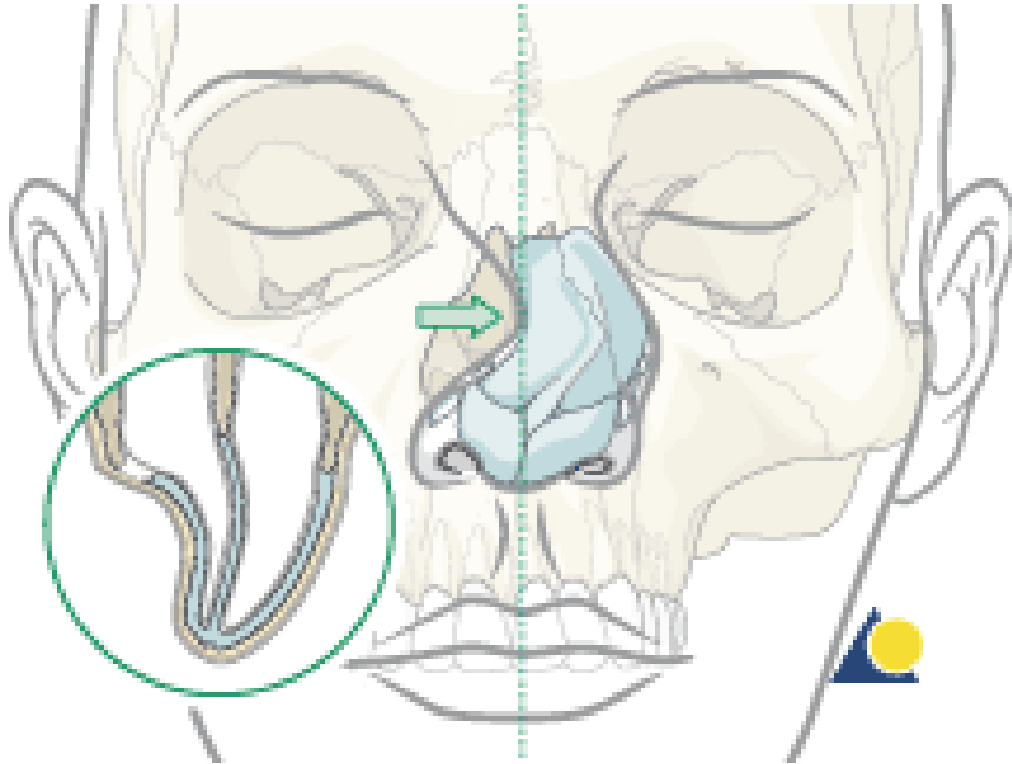
- Occur secondary to a lateral blow to the nose.
- The nasal bones are pushed medially on the side of the impact and laterally on the contralateral side.
- They make up the majority of nasal fractures.
- Most of them can be managed by closed reduction.

Posteriorly depressed fractures



- Posteriorly depressed fractures occur secondary to a direct blow over the nasal bones,
- which are pushed inside to the ascending process of the maxilla.
- The nasal septum is always involved.
- This type of fracture can be associated with NOE fractures.

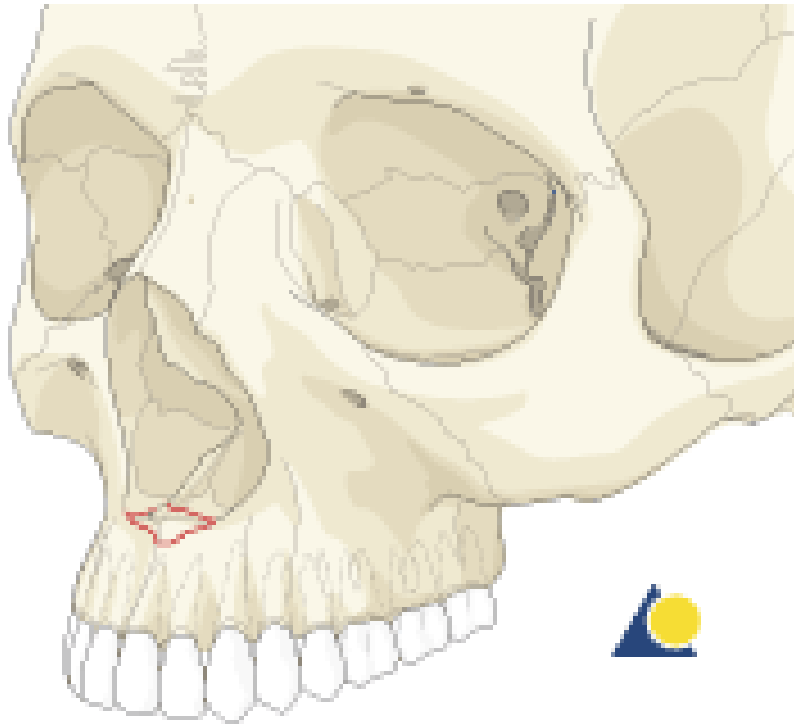
Disarticulation of upper lateral cartilage



- A disarticulation of upper lateral cartilage
- Usually due to a localized strong blow to the central third of the nose, as in car accidents with the steering wheel hitting the nose
- The upper lateral cartilage can be avulsed from the bone.



Anterior nasal spine fracture



- Can occur in isolation or in association with other nasal fractures.
- Displaced fractures are often associated with nasal septum dislocations and/or fractures
- Occurs in association to degloving injuries of the upper labial vestibule as in a steering wheel injury
- Isolated anterior nasal spine fractures do not usually require treatment.

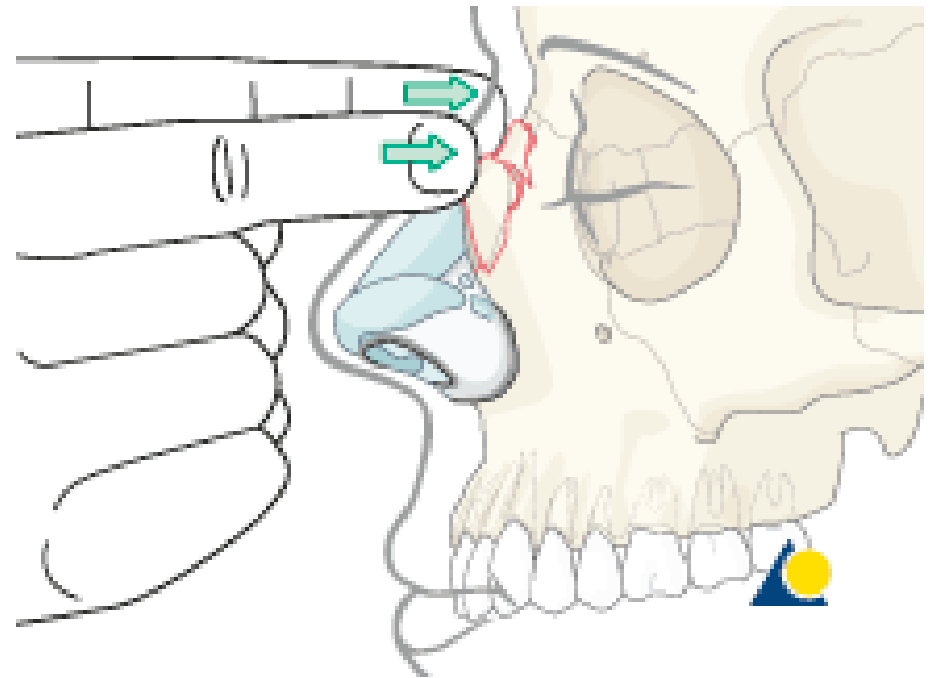
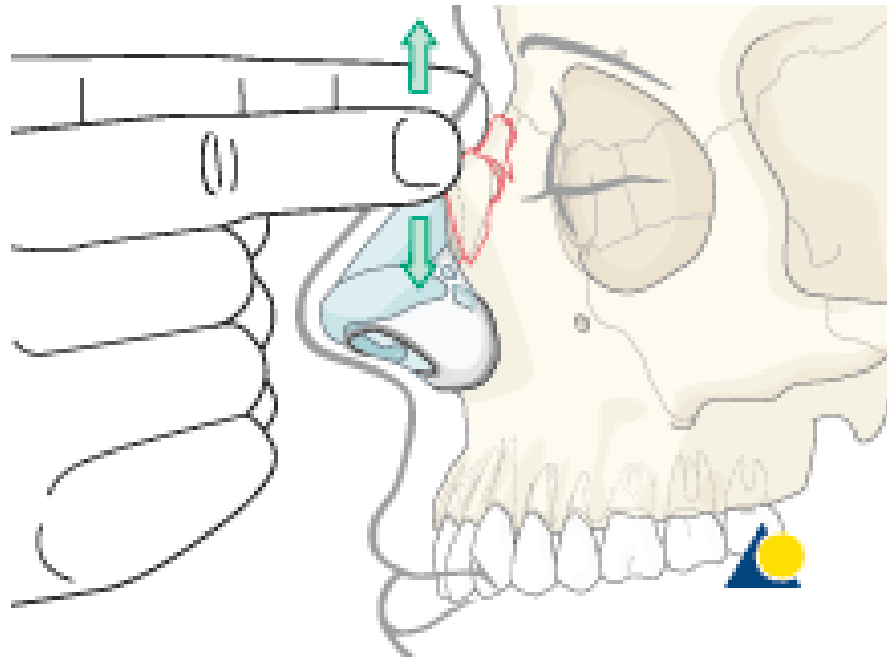
Nasal septum dislocations and/or fractures

- The nasal septum is almost always involved in nasal fractures and must be evaluated to determine if treatment is necessary.
 - If the impact force is weak, nasal bone displacement is usually present without septal fractures.
 - With more significant forces the septum will be fractured.
- Nasal septal injuries often lead to nasal airway compromise.
- Septal injuries may result in a loss of support of the cartilaginous nasal dorsum which can require cosmetic reconstruction.

Diagnosis

- History of the patient, physical examination and imaging.
- The direction and strength of the impact should be noted.
- Pre-existing nasal or septal deformities should also be considered.
- A history of nasal bleeding may indicate a mucosal laceration.
- Skin laceration over the nasal area may guide fracture diagnosis to the specific anatomical area.

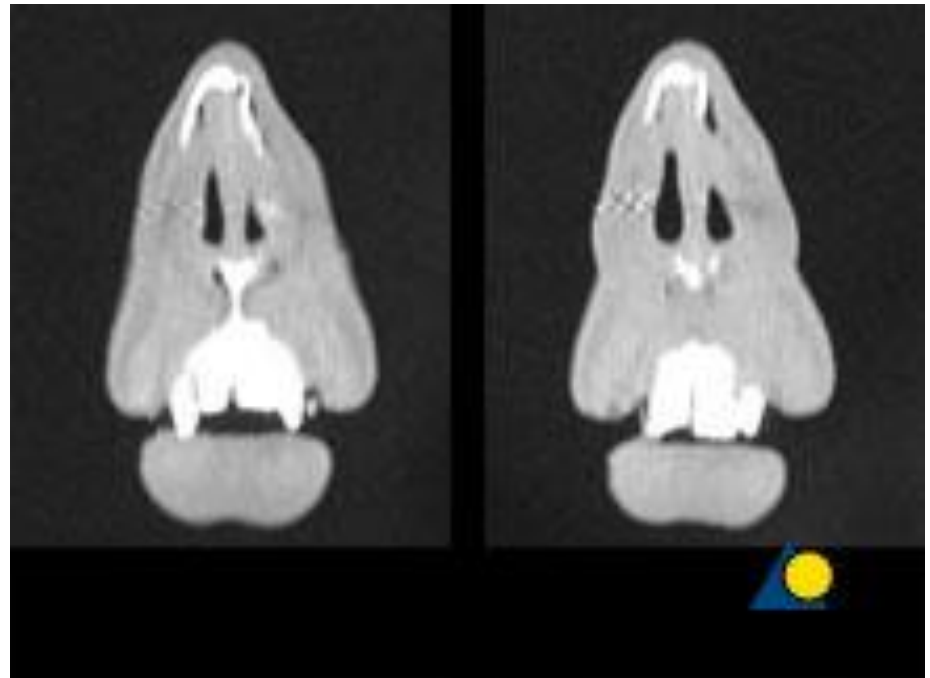
Physical examination



Imaging

- Plain films of the nose.
- The greatest weakness of plain films is their inability to assess the injury for correct management.
- The management of nasal bone fractures is based primarily on **clinical assessment** of appearance and function.
- CT scans are - helpful to make a more accurate diagnosis of nasal bone fractures.

Imaging



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

- Le Fort's classification
 - Le Fort I (transverse maxillary)
 - Le Fort II (pyramidal)
 - Le Fort III (craniofacial dysjunction)

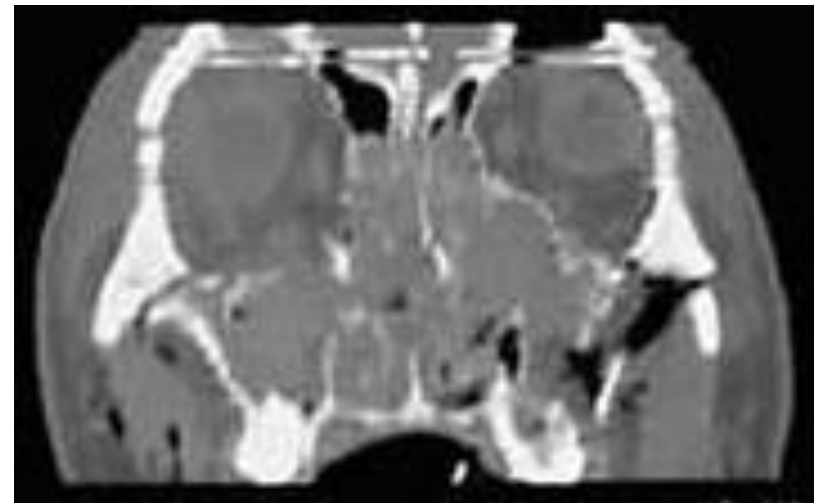
Le Fort I



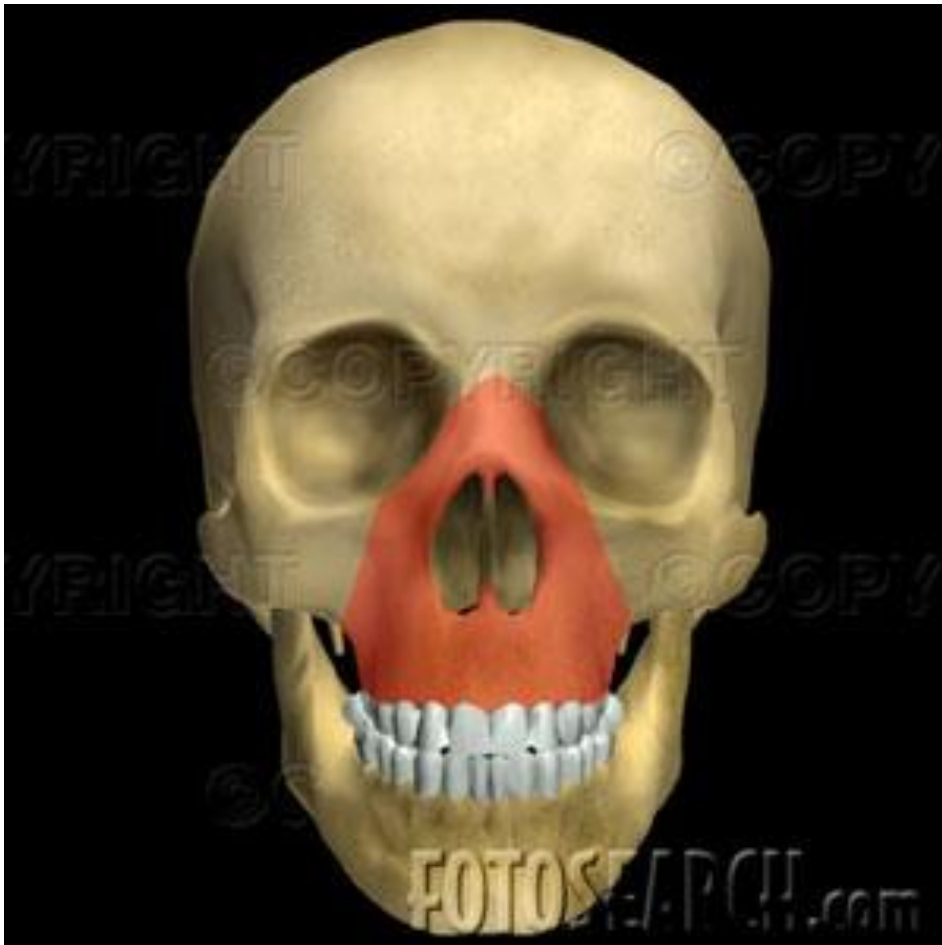
- Low transverse fracture of maxilla involving palate
- Facial edema
- Mobility of hard palate and upper teeth
- Malocclusion

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



Le Fort II

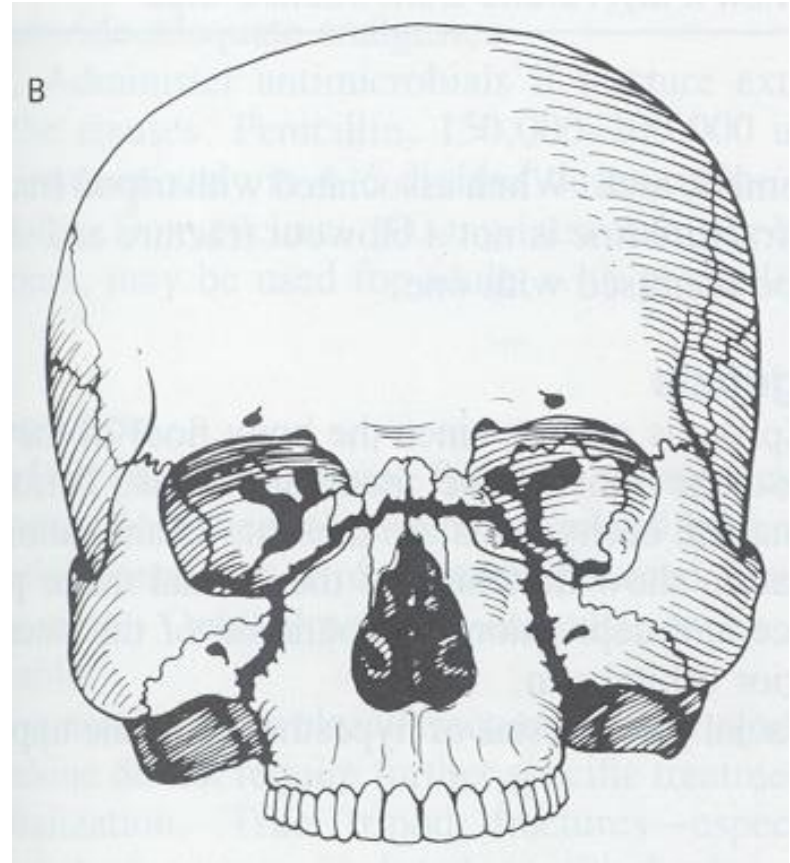


- Pyramidal fracture with detachment of maxilla
- Facial edema
- Epistaxis
- Bilateral periorbital edema and ecchymosis

Maxillary Fractures

LeFort II

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



Le Fort III



Le Fort III

- Complete disruption of attachments of facial skeleton to cranium
- Movement of all facial bones in relation to the cranial base with manipulation of the teeth and hard palate
 - Open patient's mouth and grasp the maxilla arch
 - Place the other hand on the forehead
 - Gently move back and forth, up and down - check for movement of maxilla

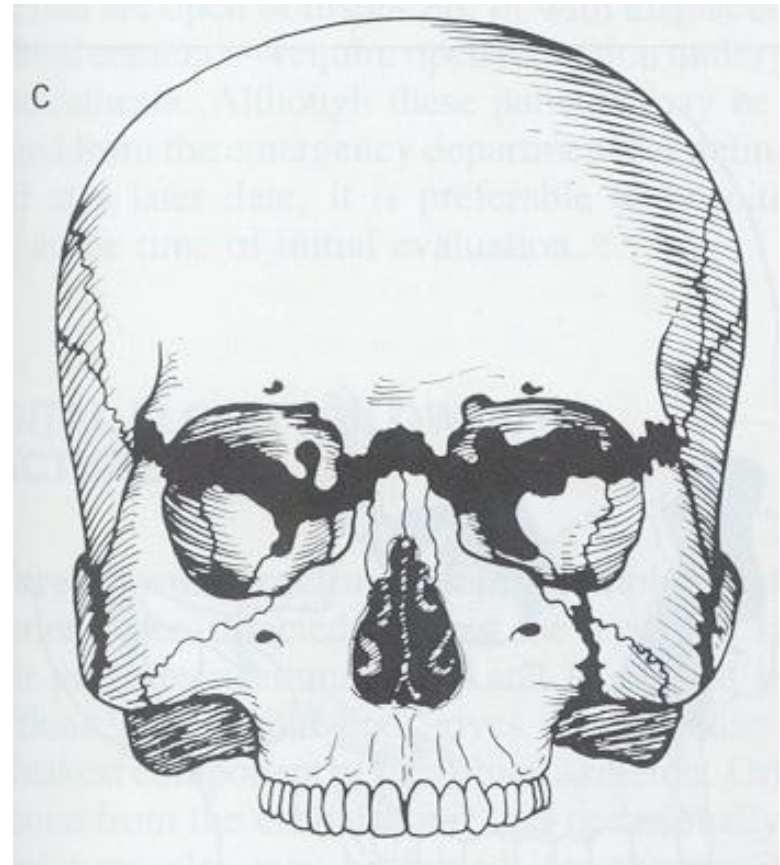
Le Fort III

- Massive edema with facial elongation, flattening – “Dish faced deformity”
- Epistaxis and CSF rhinorrhea
- Motion of the maxilla, nasal bones and zygoma



Maxillary Fractures LeFort III

- Radiographic imaging:
 - Fractures through:
 - Zygomaticfrontal suture
 - Zygoma
 - Medial orbital wall
 - Nasal bone

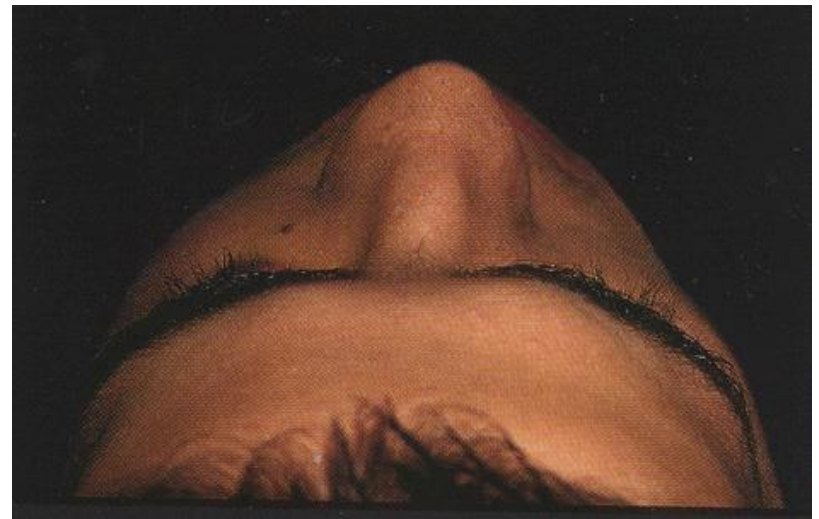


Zygoma Fractures

- ZMC fractures are the second most common facial fracture
- The zygoma has 2 major components:
 - Zygomatic arch
 - Zygomatic body
- Two types of fractures can occur:
 - Isolated Arch fracture -most common
 - Tripod fracture - most serious

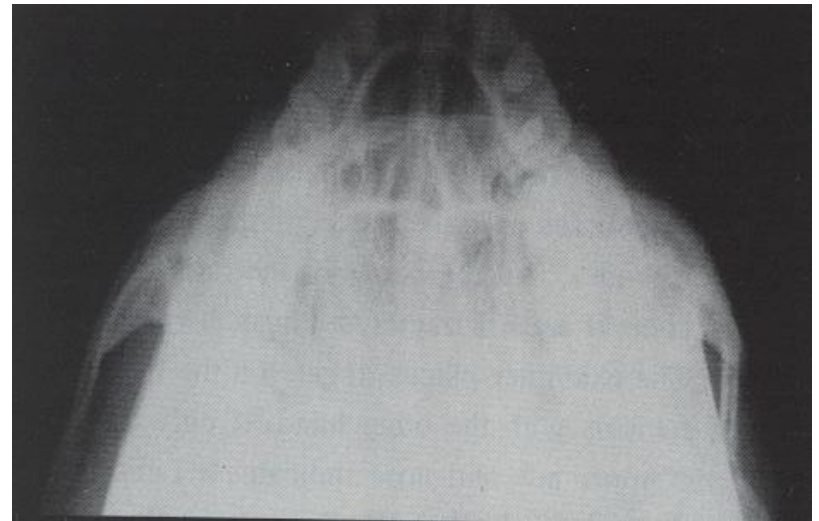
Zygoma Arch Fractures

- Palpable bony defect over the arch
- Flattening of the cheek
- Pain in cheek and jaw movement
- Limited mandibular movement



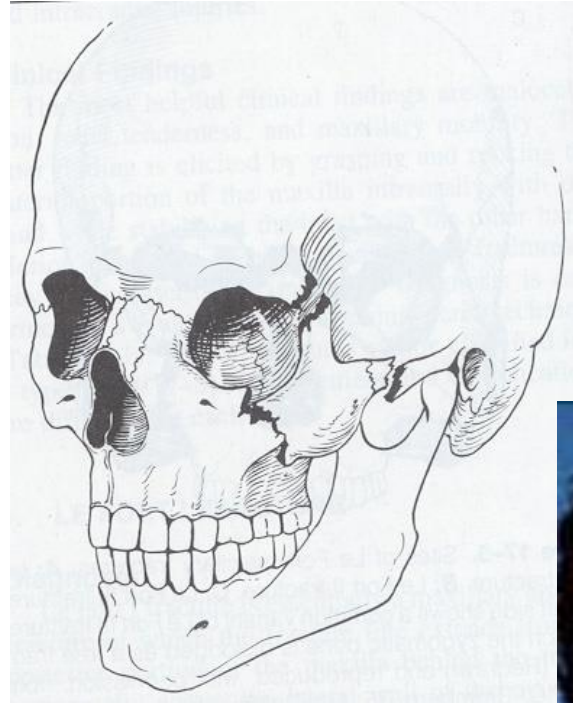
Zygoma Arch Fractures

- Radiographic imaging:
 - Submental view
 - Computed tomographic scan (gold standard)



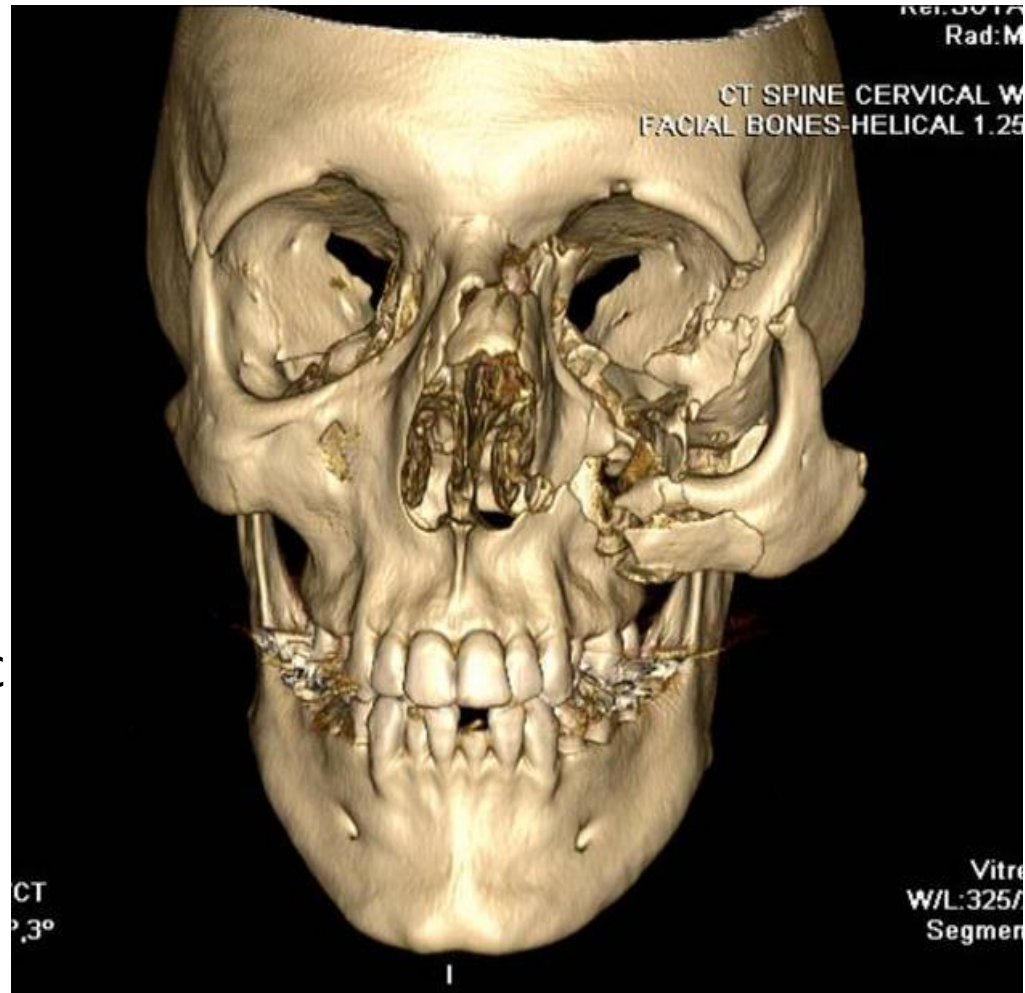
Zygoma Tripod Fractures

- Tripod fractures consist of fractures through:
 - Zygomatic arch
 - Zygomaticofrontal suture
 - Inferior orbital rim and floor
- Symptoms
 - Periorbital edema
 - Sensory disturbances along the infraorbital nerve



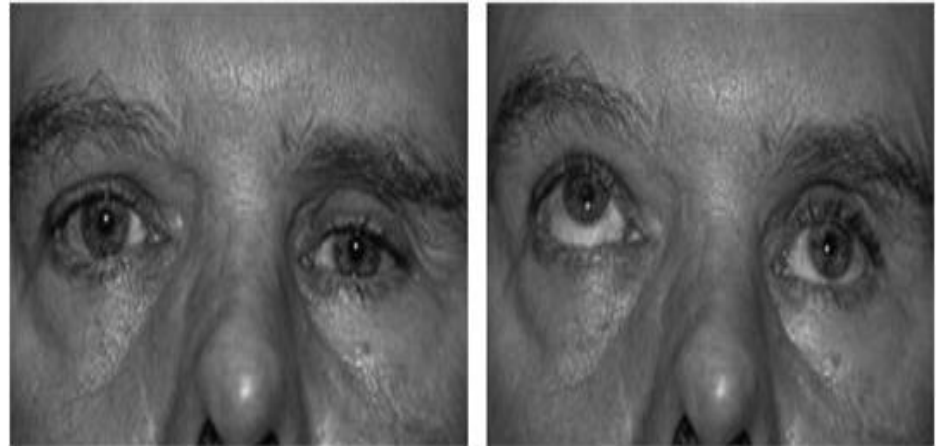
Zygoma Tripod Fractures

- Plain radiography:
 - Waters
 - Caldwell
 - Submental
- GOLD standard:
 - Computed tomographic scan



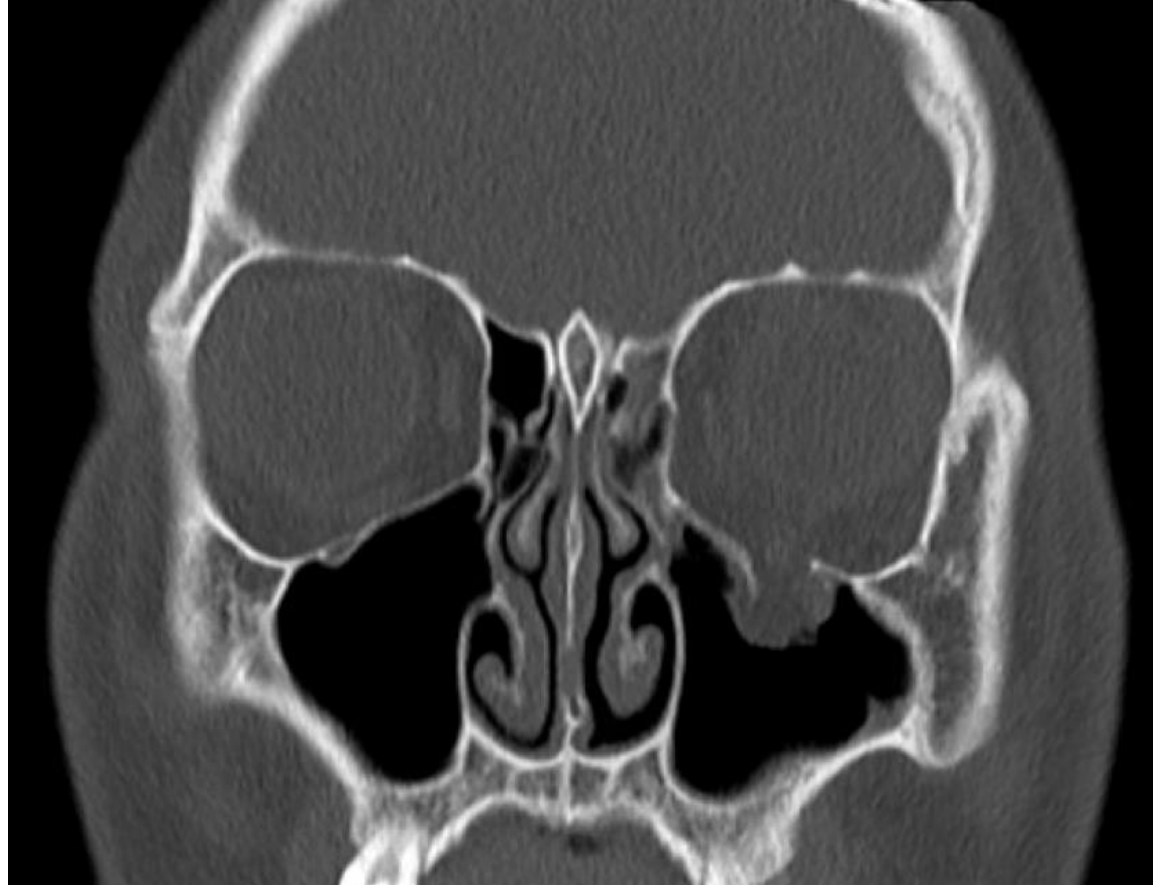
Orbital Blow Out Fractures

- Isolated fracture of the orbital floor with partial herniation of orbital contents
- Facial asymmetry
- Enophthalmos
- Diplopia on upward gaze-impingement of inf. Rectus
- Check for sensory disturbances – cheek, upper lip, lateral nasal wall



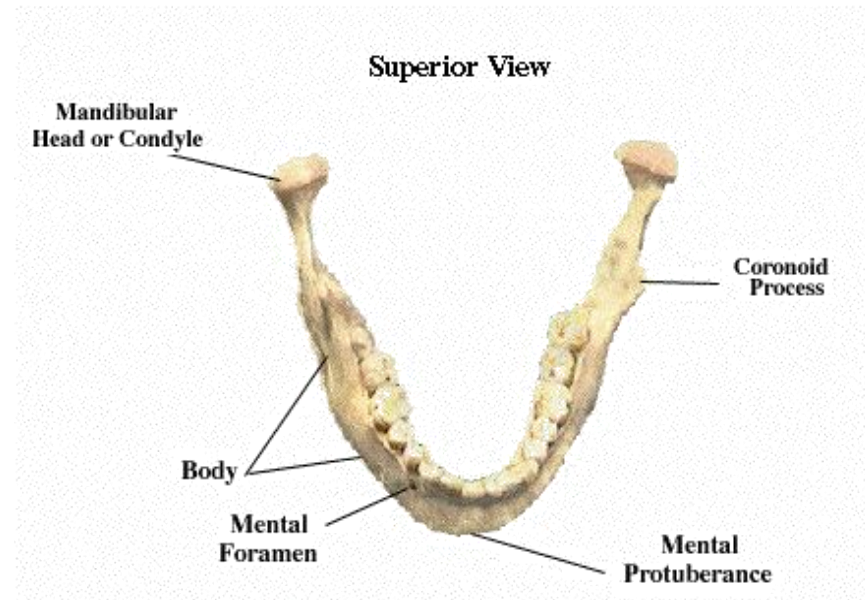
Orbital Blow Out Fractures

- CT scan



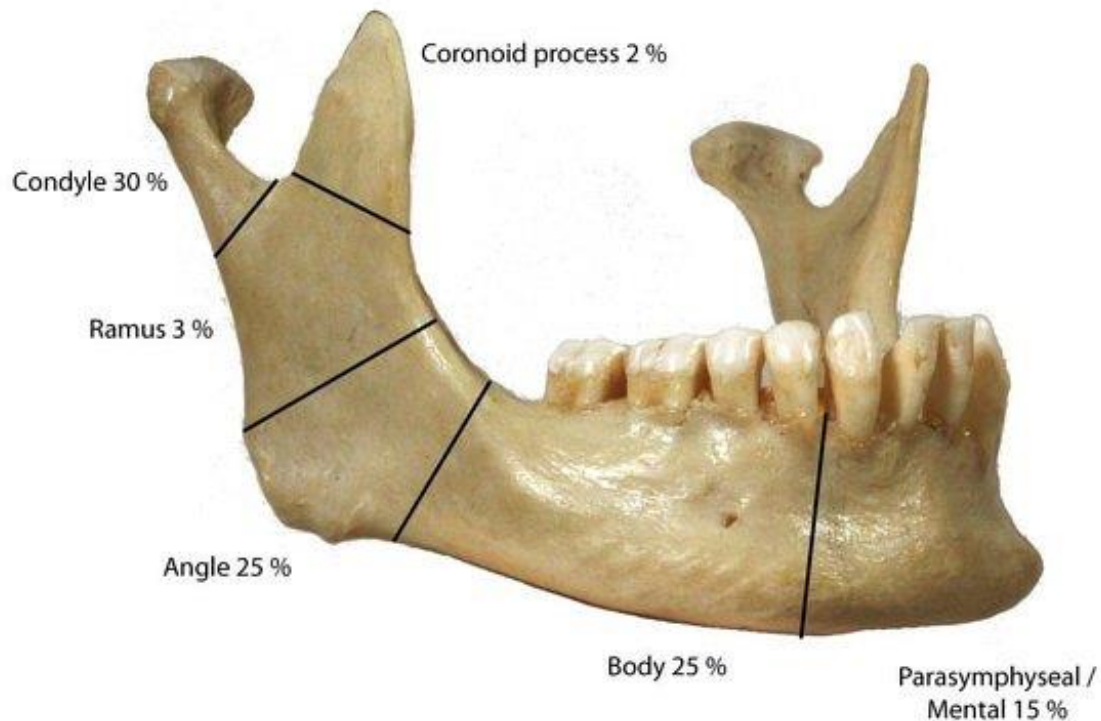
Mandibular Fractures

- 3rd most commonly fractured facial bone
- Signs and symptoms
 - Malocclusion of teeth
 - Tooth mobility
 - Intraoral lacerations
 - Pain on mastication
 - Bone deformity



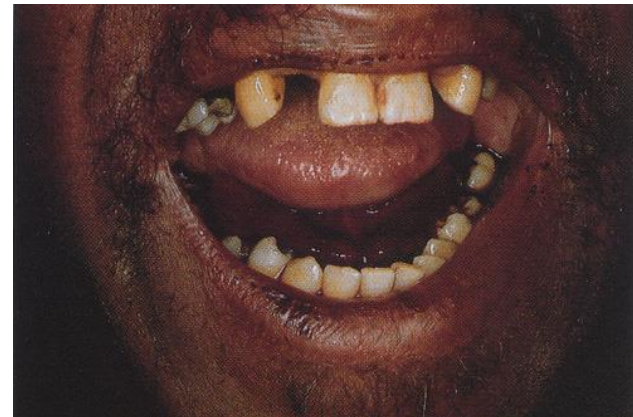
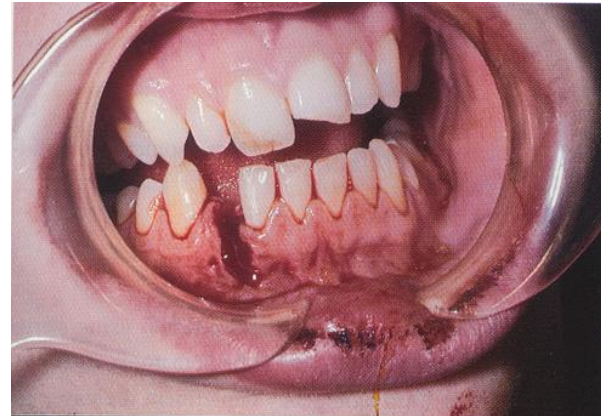
Mandibular Fractures Frequency

Mandibular fractures
Frequency by location



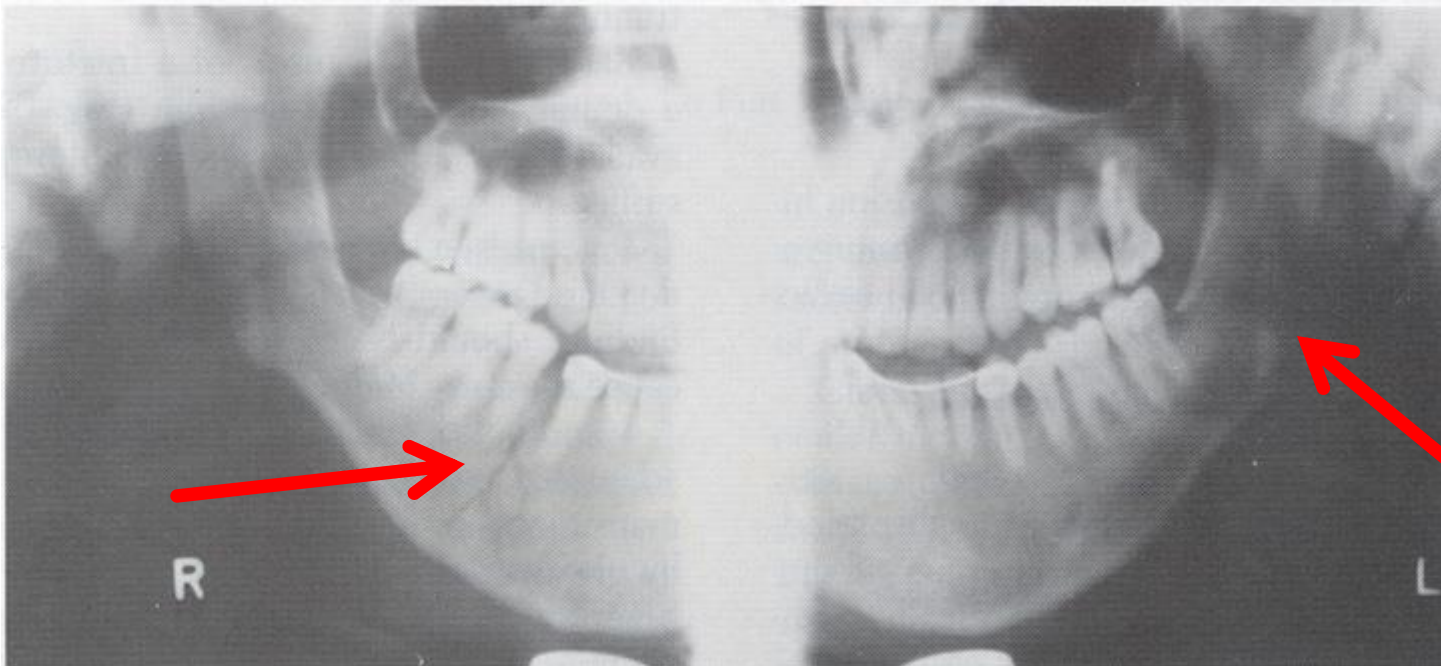
Mandibular Fractures

- 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



Mandibular Fractures

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



Mandibular Fractures



**ANY
QUESTIONS?**

