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#### **Topic : Maxillofacial Trauma**

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13,50,500 deaths a year!





- Maxillofacial injuries constitute a substantial proportion of cases of trauma
- Occur in a variety of situations like road traffic accidents, interpersonal violence, falls or as a result of contact sports

# Maxillofacial fractures

- Common in patients sustaining facial trauma during road traffic accidents, sports, or assault.
- These require urgent assessment and treatment to avoid mortality and morbidity.
- Due to the complex anatomy within this region and the proximity to vital structures, including the brain, early diagnosis and precise treatment planning are of paramount importance.
- Numerous treatment methods are well-practiced globally, and these aim to restore the patient's quality of life.

## PATHOPHYSIOLOGY

- Maxillofacial fractures result from either blunt or penetrating trauma.
- Penetrating injuries more commonly involve -
  - Midfacial and Zygomatic injuries
- Blunt injuries frequently involve -
  - Nose and Mandibular injuries.







## Etiology

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

## 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.
- Tracheostomy may be required

## 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

- Nature and mechanism of injury
- Loss of consciousness
- Vision and hearing problems
- Painfull eye movements
- Numbness or paresthesia of face
- Painful bite or jaw movement

- Inspect for -
  - Facial and nasal asymmetry
  - Telecanthus, Widening of nasal bridge
  - Septal Hematoma, CSF rhinorrhoea or nasal bleeding
  - Foreign bodies in wounds

- Palpate the entire face -
  - Supraorbital and Infraorbital rim
  - Zygomatic-frontal suture
  - Zygomatic arches
  - Nasal crepitus, subcutaneous air
  - Zygoma and it's articulations with maxilla, frontal and temporal bone
  - Mandible for tenderness, swelling

- Inspect the teeth for malocclusions, bleeding
- Intraoral examination:
  - Manipulation of each tooth.
  - Check for lacerations.
  - Stress the mandible.

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

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 (bone window)

- Frontal sinus fracture
- Orbital rim
- Nasoethmoidal fracture
- Brain injuries
- Intracranial bleeds





## Frontal Sinus/ Bone Fractures Treatment

- ENT consultation
- Neurosurgery consultation
- Admission
- IV antibiotics
- Look for CSF leaks

## Frontal Sinus/ Bone Fractures Treatment

#### Treatment

- Open reduction and Internal Fixation
- Using titanium plates
- CSF leak repair endoscopically





- Complex three dimensional facial zone:
- ✓ Nasal bones,
- ✓ Nasal septum,
- ✓ Frontal process of the maxilla,
- ✓ Lamina papyracea,
- ✓ Ethmoid bone,
- ✓ Sphenoid bone and
- Frontal bone



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

- Clinical findings
  - Flat nasal bridge
  - Saddle deformity of nose
  - Telecanthus
  - Tenderness, crepitus and mobility of nasal complex
  - CSF rhinorrhea and epistaxis







SWELLING, PAIN AND CREPITUS WITH PALPATION

#### Imaging

- Plain radiographs
- CT scan of face with 3D reconstruction

- Open Reduction and Internal Fixation
  - Best technique
  - **Three points of fixation** is done . The order of fixation is:
  - 1.Naso ethmoidal orbital/frontal bone: through coronal approach
  - 2.orbital rim: inferior lid approach
  - 3.along the piriform aperture: maxillary vestibular incision
- Closed Reduction and External Fixation



• 3 point fixation



- Low incidence of pediatric NEO fractures is due to:
  - Immature pediatric skeleton
  - Frontal, ethmoid, and maxillary sinuses do not undergo full pneumatization
  - Increased cranial to facial proportion



Fig. 4. Treatment algorithm. ORIF, open reduction and internal fixation.

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





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

- Diagnosis
  - Physical examination
  - Lateral radiographs
  - CT Non contrast of face



- Treatment
  - Control Epistaxis
  - Drain Septal Hematomas
  - Nasal splints if non displaced
  - Closed reduction with intranasal manipulation using Asch and Walsham forceps



- Third most common facial fractures
- Usually due to assault or falls
- Can be single or multiple fractures (>50%)



- Clinical Findings
  - Malocclusion of teeth
  - Separation of teeth
  - Intraoral bleeding
  - Inability to open mouth
  - Pre auricular pain

- Diagnosis
- Radiographs
  - Panaromic view
  - Plain view PA, Lateral and Towne's view



- Treatment
- Non displaced fractures
  - Analgesics
  - Soft diet
  - Reduction in 1-2 days
- Displaced fractures / open fractures
  - Urgent Surgery





RJOT SINGH(M/20) SKULL







## ZYGOMA FRACTURES

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

## ZYGOMA ARCH FRACTURES

- Clinical findings
  - Palpable bony defect over the arch
  - Depressed cheek with tenderness
  - Pain in cheek and jaw movement
  - Limited mandibular movement- as coronoid process is impacted

## **ZYGOMA ARCH FRACTURES**

- Closed Reduction
  - Gillies Temporal Approach
  - Cheek hook
  - Transbuccal
- Open Reduction
  - Bitemporal/ Bicoronal Approach

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



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

- Radiographic imaging:
  - Waters(OMV)
  - Submental vertex view and Caldwell views(PA skull)
- Coronal CT of the facial bones:
  - 3-D reconstruction(involvement and degree of displacement)

- Non displaced fractures without eye involvement –
  - Ice and analgesics
  - Delayed operative consideration 5-7 days
  - Decongestants
  - Broad spectrum antibiotics

- Displaced tripod fractures usually require admission for open reduction and internal fixation.
- Approaches:
  - Frontozygomatic- eyebrow incision
  - Bicoronal flap
  - Floor of the orbit- any of the following incisions:
    - Subciliary
    - Subtarsal
    - Subconjuctival
    - Inferior orbital





# MAXILLARY FRACTURES

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

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



- Clinical features
  - Floating maxilla
  - Impacted or telescopic fracture
  - Anterior open bite
  - Deranged occlusion
  - Palatal fracture in some cases



- Radiographic findings
  - Fracture line involves
    - Nasal aperture
    - Inferior Maxilla
    - Lateral wall of nose
  - CT of face and head
    - 3d Reconstruction







#### • Definition :

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



#### Clinical findings

- Ballooning of face
- Black eye
- Movement of upper jaw and nose
- Possible airway obstruction
- Diplopia / CSF rhinorrhoea
- Nasal Flattening
- Deranged Occlusion



#### Radiographic imaging –

- Fracture line involves
  - Nasal bones
  - Medial orbit
  - Maxillary sinus
  - Frontal process of maxilla
- CT of face and head with 3D reconstruction





#### • Definition :

- Pyramidal fracture involving:
  - Maxilla
  - Zygoma
  - Nasal bones
  - Ethmoid bones
  - Base of the skull





- Clinical Findings –
- Separation at FZ suture
- CSF rhinorrhea
- Hooding of eyes
- Anti-mongoloid slant
- Dish face deformity
- Subconjunctival echymosis









Radiographic imaging –

- Fracture line involves
  - Zygomaticofrontal suture
  - Zygoma
  - Medial orbital wall
  - Nasal bone
- CT of face and head with 3D reconstruction





#### Treatment –

- GCS score
- Maintain airway and breathing
- Neurosurgery and Ophthalmology consultation
- Open reduction and internal fixation using screws and plates via a coronal incision





#### Saving lives, Saving faces; Wear helmets, Wear seatbelts

