FRACTURE OF MIDDLE THIRD
OF
FACIAL SKELETON
Evaluation and Management
Maxillofacial Injuries

- Treatment divided into following phases
  - Emergency or initial care
  - Early care
  - Definitive care
  - Secondary care or revision
Emergency Care

• Preserve the airway
• Control of hemorrhage
• Prevent or control shock
• C-Spine stabilization
• Control of life-threatening injuries
  – head injuries, chest injuries, compound limb fractures, intra-abdominal bleeding
Emergency Care

• Evaluate the airway
  – Existence & identification of obstruction
  – Manually clear of fractured teeth, blood clots, dentures
  – Endotracheal intubation & packing of oronasal airway
Emergency Care

• Airway Management
  – Maintain an intact airway
  – Protect airway in jeopardy
  – Provide an airway
• C-Spine injury may be present
• Altered level of consciousness is the most common cause of upper airway obstruction
Airway Management

• Chin lift to open intact airway

• Intubation
  – Oral: C-spine injury absent on X-ray
  – Nasotracheal intubation: C-spine injury suspected or certain

• Surgical Airway
  – Cricothyroidotomy
  – Tracheosotomy
Emergency Care

- Extensive vascularity of head & neck may lead to massive blood loss
  - Monitor vital signs closely
  - Intravenous infusion

- Penetrating injuries need to be explored
  - Arteriogram
  - Esophagram
Treatment of Blood Loss & Shock

- Hemorrhage most common cause of shock after injury
- Multiple injury patients have hypovolemia
- Goal is to restore organ perfusion
Treatment of Blood Loss & Shock

- External bleeding controlled by direct pressure over bleeding site
- Gain prompt access to vascular system with IV catheters
- Fluid replacement
  - Ringer’s Lactate
  - Normal saline
  - Transfusion
Stabilization of associated injuries

• C-spine injury is primary concern with all maxillofacial trauma victims
  – Any patient with injury above clavicle or head injury resulting in unconscious state
  – Any injury produced by high speed
  – Signs/symptoms of C-Spine injury
    • Neurologic deficit
    • Neck pain
Head/Neck/C-Spine Stabilization
Early Care

- Emergency care has stabilized patient
- Initial stabilization of fractures
- Debridement & dressing of soft tissues
- Elective tracheostomy
- Physical exam & history
- Laboratory tests
- Complete head & neck examination
  - Diagnosis of maxillofacial injuries
Diagnosis of Maxillofacial Injuries

- Inspection
- Palpation
- Diagnostic Imaging
  - Plain films
  - CT
  - Stereolithography (where available)
Diagnosis of Maxillofacial Injuries

• INSPECTION
  – Hemorrhage
  – Otorrhea
  – Rhinorrhea
  – Contour deformity
  – Ecchymosis
  – Edema
  – Continuity defects
  – Malocclusion
Inspection

Sublingual ecchymosis

Step defects, ridge discontinuity, malocclusion
Diagnosis of Maxillofacial Injuries

• PALPATION
  – “Step” Defect
  – Crepitus
    • Bony segments
    • Subcutaneous emphysema
    • Mobility
Midface Fractures

- LeFort I Transverse Maxillary
- Lefort II Pyramidal
- Lefort III Craniofacial Dysjunction
- Zygomatic Complex
- Orbital Floor
- Nasal Fractures
- Naso-orbital/Ethmoid
Midface Fractures

- Three buttresses allow face to absorb force
  - Nasomaxillary (medial) buttress
  - Zymaticomaxillary (lateral) buttress
  - Pyterigomaxillary (posterior) buttress
Lefort Classification

- Weakest areas of midfacial complex when assaulted from a frontal direction at different levels (Rene’ Lefort, 1901)
  - Lefort I: above the level of teeth
  - Lefort II: at level of nasal bones
  - Lefort III: at orbital level
HORIZONTAL fracture line above the level of floor of the nose involving lower third of septum and the mobile fragment consists of the palate, the maxillary alveolar process and lower third of pterygoid plates and associated portion of palatine bone.
Lefort II Fracture
Pyramidal

From the nasal bridge the fracture invariable enters the medial wall of the orbit, involving the lacrimal bone and than recrosses the orbital rim at the junction of the middle third and the lateral two third, skirting medial to, or through infraorbital foreman. The fracture line runs beneath the zygomaticomaxillary suture, tranversing the lateral wall of the antrum to extend backward horizontally through the pterygoid plate.
Lefort III Fracture
Craniofacial Dysjunction

The fracture line runs parallel with the base of the skull separating midfacial skeleton from the cranial base, the fracture extends through the nasal base and continuous posteriorly through the full depth of ethmoid bone, than fracture line crosses lesser wing of sphenoid and may rarely involve optic foramen normally its slopes downward medially, passing below the optic foreman to reach pterygomaxillary fissure and sphenopalatine fossa, from the inf. Orbital fissure fracture line runs laterall and upwards separating greater wing of sphenoid bone and zygomatic bone to reach zygomatic suture, it also extends downward and backward to fracture root of pterygoid plates.
Facial Examination

- Evaluate for laceration
- Obvious depression in skull
- Asymmetry
- Discharge from nose or ear
  - Assume CSF leak
- Palpation to note bone discontinuity
  - Bimanually in systematic manner
Facial Examination

- Evaluate mandibular opening
- Palpation of buccal vestibule
  Crepitus of lateral antral wall
- Occlusion evaluated
  Absence and quality of dentition noted
- Ecchymosis common finding
- Pharynx evaluated for laceration & bleeding
Facial Examination

- Orbits evaluated
  - Periorbital edema and ecchymosis
  - Gross visual acuity determined
  - Diplopia
  - Pupillary size & shape
  - Subconjunctival hemorrhage
  - Funduscopic evaluation
Facial Examination

• Orbits evaluated
  – Lid lacerations
  – Attachment of medial canthal tendon
    • Rounding of lacrimal lake
    • Increased intercanthal distance
    • Epiphora
  – Prompt Ophthalmology consult
Facial Examination

Orbits Evaluated
Facial Examination

Palpation of Midface/bridge of nose
Radiographic Evaluation

- **Plain Films**
  - Lateral Skull
  - Waters View
  - Posteroanterior view of skull
  - Submental vertex

- **CT Scan**
  - 1.5 mm cuts
  - Axial and coronal views
Radiographic Evaluation

Lateral skull

Water’s View
Radiographic Evaluation

CT Scan

3D CT
Radiographic Evaluation

Stereolithography allows actual model of defect. A nice reconstruction tool to use if available.
Treatment of Midface Fractures

• Once patient’s condition stabilized, no need to rush to surgery
  – Address rapidly developing edema
  – Formulate treatment plan
  – Observe sequelae in the case of orbital injuries
Diagnosis of Lefort I Fractures

- Direction of force
- Maxilla displaced posteriorly and inferiorly
  - Open bite deformity
- Hypoesthesia of infraorbital nerve
- Malocclusion
- Mobility of maxilla
  - Noted by grasping maxillary incisors
Treatment of Lefort I Fractures

- Direct exposure of all involved fractures
- Reduction and anatomic realignment of the maxillary buttresses to reestablish
  - Anterior projection
  - Transverse width
  - Occlusion
- Restoration of occlusion using IMF
- Internal fixation using miniplate fixation
Direct osteosynthesis

- Transosseous wiring
- Miniplates
- Transfixation either kirschner wire or steinmann pin
Suspension wires

- Circumzygomatic
- Zygomaticomandibular
- Inferior orbital border-mandibular
- Frontomandibular
- Pyriform fossa
External fixation

- Pin fixation
- Box frame
- Halo frame
Treatment of Lefort I Fractures
Diagnosis of Lefort II and III

- Clinical evaluation provides only a rough impression since swelling hides the underlying bony structures
- Plain film radiographs and axial and coronal CT images are the basis for precise diagnosis & treatment plan
Diagnosis Lefort II and III

- Bilateral periorbital edema & ecchymosis
- Step deformity palpated infraorbital & nasofrontal area
- CSF rhinorrhea
- Epistaxis
Treatment of Lefort II and III

- Fractures should be treated as early as the general condition of the patient allows
- Team approach to treatment
  - Neurosurgery
  - Ophthalmology
  - Oral/Maxillofacial surgery
Treatment of Lefort II and III

• Intubation must not interfere with ability to use IMF
• Exposure & visualization of all fractures
  – Approaches to inferior rim
    • Infraorbital
    • Subciliary
    • Transconjunctival
    • Mid lower lid
  – Coronal approach
  – Gingivobuccal incision
Lower Eyelid Approach
Subconjunctival Approach
Upper Eyelid Approach
Coronal Approach
Maxillary Vestibular Approach
Fractures

Teeth and occlusion are the key to reconstruction and provide the foundation upon which other facial structures are built.
Treatment of Lefort II and III

- Severely comminuted fractures preliminary approximation may be performed with wire
- Establishment of the correct occlusion
- Correct reconstruction of the outer facial frame for proper facial dimensions
- Correct position for nasoethmoidal complex
Treatment of Lefort II and III

- Reestabilishment of the correct intercanthal distance
- Infraorbital rim fixated
- Orbit is reconstructed
- Occlusion unit with IMF is fixated
Lefort II & III Reconstruction
Lefort II & III Reconstruction
THANK YOU