LEC: 1 Introduction to Maxillofacial Trauma FIFTH STAGE

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Basic principles

- **Facial fractures differ fractures of other bones in the human skeleton in 3 important ways:**

1- risk of airway obstruction (directly compromised)

2- presence of teeth (assist with stabilizing fractures)

3- excellence blood supply of facial bones (rapid healing)

- **Fracture types seen in all bones**

1- simple (displaced or nondisplaced)

2- compound (exposed bone or teeth involvement)

3- comminuted (multiple fragments)

4- complicated (involve nerve, vessels…etc)

5- greenstick (bending and splintering of bone in children)

6- pathological (cyst or tumor)

- **Fracture dynamics of bones generally**

the degree of fracture displacement will depend on:

1- degree of force

2- direction of force

3- point of impact

4- type of injury – blunt or sharp

5- attached muscles- particularly important in mand. #

❑ Healing of bone

The basic sequence of events in bone healing

1. Hemorrhage
2. Inflammation
3. Hematoma - organization of blood clot and ingrowth of granulation tissue
4. Provisional callus: a- osteoid: protein matrix with initial calcification (6-7 days) b- woven bone: irregular bridging trabeculae (2-3 weeks)
5. Definitive callus : lamellar bone formation (4-5 weeks)
6. Remodeling

a- resorption / deposition

b- compact bone – haversian system

❖ Factors affecting bone healing

1) **Local**

- Infection
- Foreign bodies
- Mobility
- Poor vascularity (irradiation)

2) **Systemic**

- Increase age
- Disease (DM)
- Drugs (steroids)
- Deficiency (malnutrition)

Clinical features of Maxillofacial injuries

- **Aetiology**

1) Assault
2) Road traffic accident (RTA
3) Sports injuries
4) Falls
5) Industrial accident

- **Predisposing factors**

I. Alcohol
II. Epilepsy
III. Bone pathology (cysts –tumours)

- **Presentation**

1) Pain
2) Swelling
3) Loss of function: e.g. trismus, limited eye movement causing diplopia
4) Malocclusion
5) Altered sensation – nerve damage

- **History**

1- Time of injury 2- Mode of injury

3- Loss of consciousness 4- Treatment prior to admission

- **Medical history**

1- allergy 2- drugs (insulin, steroids, anticoagulant)

3- illness (past &present) 4- previous surgery

5- smoking and alcohol intake

Examination of Maxillofacial injuries

- **General assessment**

1) Airway
2) Shock
3) Hemorrhage
4) Level of consciousness
5) Overt infection

- **Clinical examination (regional)**

1. Laceration
2. Swelling
3. Ecchymosis
4. Visible or palpable deformity
5. Abnormal mobility & crepitus
6. Palpable tenderness
7. Impaired function (trismus- diplopia)
8. Malocclusion
9. Nerve injury

Radiographic investigation of Maxillofacial injuries

Plain x-ray must be taken in at least 2 planes at right angles to each other.

- **Standard projections**

- **Orbits & antra**

- Occipito-mental 15 & 30 degrees

- **Maxillary bones**

- Occipito-mental 15 & 30 degrees
- Lateral skull

- **Zygoma**

- Occipito-mental 15 & 30 degrees
- Submentovertix (zygomatic arch)

- **Mandible**

- Postero-anterior of mandible
- OPG
- Rt. & Lt. lateral oblique of mandible

- **Frontal bones**

- Occipito-mental 15 & 30 degrees
- Lateral skull

- **Other projections used**

- Dental intraoral films
- Tangential skull views – soft tis. For emphysema or foreign body
  -depressed fractures
- Transcranial & transpharyngeal views of TMJ
- CT scans - complex midface # (naso-ethmoidal #)
  - 3D reconstruction - coronal views for blowout fractures

- **Other important x-rays**

- Cervical spine -lateral
  –transoral view of odontoid process
- Chest: for chest injury or aspiration

  -Postero-anterior

  -Lateral

Principle of management

- **Preliminary treatment**

1. Establish & maintain AIRWAY
2. Establish the patient is BREATHING – intubate if necessary
3. Arrest HEMORRAHGE (shock rarely present if facial injury is only)
4. Examination of injury
5. Temporary immobilization of suspected fractures
6. Infection prophylaxis
7. Pain relief

- **Treatment priorities**

❖ **Immediate intervention**

- Respiratory obstruction
- Cardiac arrest
- Massive bleeding

❖ **Urgent treatment**

- Intra-abdominal bleeding
- Head injury –significant head injury -deterioration

- Chest injuries
- Compound fractures of limbs

❖ **Treatments that can wait**

- Maxillofacial trauma

➢ **Treatment of soft tissue injuries**

1. Tetanus prophylaxis
2. Antibiotics
3. Irrigation
4. Debridement – removal of severely contused tissue and foreign bodies
5. Hemostasis
6. Primary closure – accurately approximate freshened wound edges with careful suturing to minimize scarring
7. Skin loss- avoid secondary healing of facial wounds:

a. Undermine skin edges and advance

b. Skin grafts

c. Local flaps

d. Suture skin to oral mucosa – gunshot wounds

➢ **General principles of fracture treatment**

1. **Debridement**
2. **Reduction**

a. Closed reduction

b. Traction

c. Open reduction

3. **Fixation**

a. External

i. External pin fixation

ii. Halo frames

b. Internal

i. Non-rigid:

- suspention wiring
- Circum-mandibular wiring
- Transosseous wiring
- Intramedullary pins

ii. Rigid:

- Adaptational – plates or bicortical screws
- Compression – plates or lag screws

4. **Immobilization**

intermaxillary fixation

5. **Functional rehabilitation**

➢ **Specific injuries requiring specialist attention**

1. Eyes and eyelids
2. Nasolacrimal apparatus- severed ends must be realigned and splinted internally with fine sialastic tubing
3. Parotid duct – alignment and suturing
4. Facial nerve – repair in case of proximal injury

5. Bites – human bites have high infection rates and should only be loosely sutured
6. Gunpowder and grease injuries

Complications of Maxillofacial trauma

- **Adverse healing of fractures**

1. Malunion

malaligned healing of fractures due to inadequate reduction, possible osteotomy required to correct

2. Delayed union

disturbed and prolonged healing, e.g. resulting from localized and systemic factors

3. Nonunion

   No bony healing

- **Compromised airway**

- Causes

1. Trismus
2. Gross edema – esp. tongue and floor of mouth
3. Intermaxillary fixation
4. Lying on back – tongue obstruct oropharynx
5. Aspiration of loose debris and tooth segments
6. Blocked nasal or oropharyngeal tubes

- **Management of compromised airway**

1. Patient positioning

a. Conscious – sitting up and leaning forwards

b. Unconscious – recovery position with chin lift

2. Airways – oropharyngeal or nasopharyngeal tubes
3. Endotracheal tube
4. Cricothyroidotomy – for complete airway obstruction
5. Tracheostomy – esp. with chest and heal injury

❑ **Infection**

➢ Causes of fracture site infection

1. Compound injury
2. Foreign bodies
3. Devitalized teeth
4. Pre-existing oral infection- e.g. pericoronitis
5. Immunocompromised patient – e.g. D.M., steroids, anemia
6. Radiotherapy – previous treatment

❑ Antibiotic therapy in maxillofacial trauma

Antibiotic prophylaxis is often important in maxillofacial injuries

\suggested antibiotic regimen:

- Intraoral breach- penicillin and metronidazole
- Skin- flucloxacillin / cephalosporin
- Contaminated wound- penicillin and metronidazole
- CSF leak- antibiotic which cross blood brain barrier : sulphadimidine, septrin, cephalosporin.

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