FACIAL TRAUMA

Facial trauma accounts for a significant proportion of injury-related ED visits, particular associated with intentional violence (assault, attempted-suicide) & unintentional trauma (falls, sports, MVAs).

Four main specialities participate in the care of facial injuries;

1. Ophthalmology
2. Plastics
3. ENT
4. Maxillofacial surgery.

Alcohol is a huge contributor → linked to 49% of max-fax #'s

Alcohol is a huge contributor → passengers wear seat-belts less !!

- There is a significant association b/ween facial injury & brain injury in motorcycle riders.
- Children = sporting injuries. Dog bites in kids < 6 years.
- Toddlers = "falling zone" with perioral, nose & forehead injuries.
    - Always correlate child's age and behavioural ability with the reported mechanism of injury.
- Domestic violence = suspect with *left-sided facial injuries* (particularly women).

Principles of Disease.

Recall your anatomy of the face;

- *Bony skeleton* (mandible, maxilla, zygoma, nasal bone, frontal/temporal/parietal bones)
- *Nerve supply* (facial nerve, trigeminal nerve & its branches)
- *Ears*
- *Eyes & bony orbit* (superiorly by frontal bone, laterally by zygoma, medial floor & anteromedially by maxilla, medial wall by ethmoid & lacrimal bone).
- *Nose* (containing ethmoid, vomer and palatine process of maxilla).
- *Mouth* (tongue, maxillary/mandibular teeth, mandible incl. ramus/condyle/coronoid/TMJ)

Other anatomy to appreciate;

- Langer's lines (skin folds)
- High vascularity !! (external carotid branches incl. facial, superficial temporal & maxillary arteries, ophthalmic artery from internal carotid).
- Salivary glands including parotids.

Pathophysiology.

- The basic mechanism is transfer of energy, which results in injury when energy overcomes the tolerance of underlying tissue.
- Trauma is classified as either *blunt* or *penetrating* (but can be mixed), as well as *low-energy* (eg. falls) or *high-energy* (MVAs).
- There may be an association between facial injury and brain/cervical injury !
- Penetrating trauma to face (stabbings, GSW, impalement) mandates thorough searches for concomitant vascular, brain & spinal injuries.

Clinical Features.

History.

- Mechanism of injury is crucial.
    - Often limited by head-injury or intoxication
- Localisation of pain / deficits in motor or sensory function / abnormal vision, taste, smell.

Physical Examination.

- Simple inspection is easiest.
- Initial assessment focusses on *airway risk*.
    - Excessive bleeding / tongue swelling / drooling / dysphonia / avulsed teeth.
- Systematic examination of *all facial structures & functions.*
    - Bony prominences (tenderness, step off, crepitus)
    - Assessment for *Le Fort fractures* (upper incisors are grasped and pulled anteriorly).
    - Identification of complex lacerations (nose, eyelids, vermilion border, lacrimal apparatus).

Eyes & Orbits.

- Facial symmetry & appearance of zygomas
- Exophthalmos / enophthalmos.
- Anterior chamber = ?globe rupture ?hyphema
- Full eye examination
    - VA & VF
    - EOM = ?muscular entrapment
    - Facial sensation = ?nerve injury.
    - Contact lenses should be removed
    - Fluoroscein staining.

Oropharynx.

- Quality of speech / dysphonia
- Intraoral examination (palate, mandible, teeth)
- Bite-occlusion (in awake, cooperative patients)

Ears.

- Otoscopy = external canal, haemotympanum, otorrhoea.
- ?Halo sign

Nose.

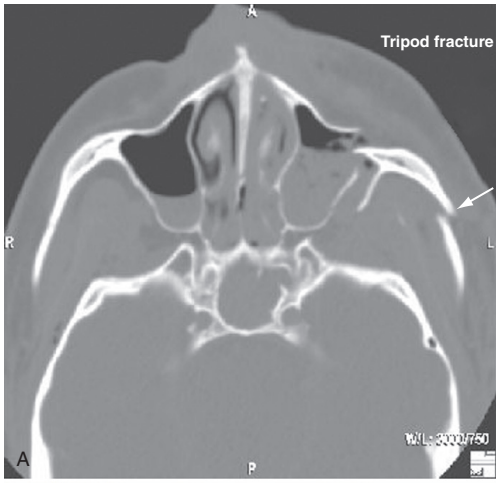
- Tenderness, crepitus, abnormal movement.
- ?septal haematoma

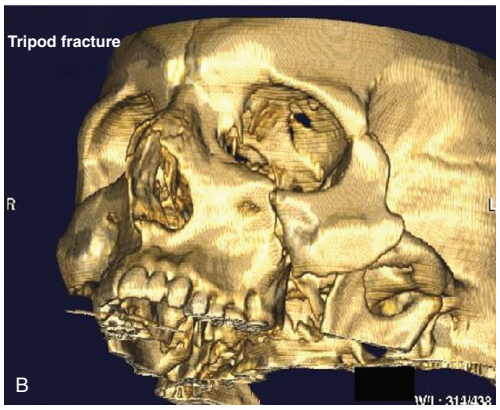
Neurological Examination.

- Full motor function and sensory exam.

Diagnostic Strategies.

Imaging.





Two main options are *plain xray* or *CT.*

CT should be first line imaging modality in all penetrating facial injuries, complex fractures and suspected midface fractures. 3D-reconstructions improve diagnosis and aid in preoperative planning.

The mandible can be imaged on panorex films (OPG).

- As a rule, if you see *one mandibular fracture* then look for a second.
- Only 42% of mandibular #'s are *unifocal.*

The Nose:

- Isolated tenderness and swelling to the bony bridge of the nose (with a straight nose), without a septal haematoma do not need imaging in the ED.

Ultrasound is becoming particularly helpful for suspected *ocular injuries.*

- Can help diagnosis of vitreous haemorrhage, retinal detachment & globe rupture.

Management.

The management of facial injuries occurs within the context of the resuscitation. Unless the airway is threatened or exsanguination is a concern, the treatment of most facial injuries can be deferred until everything else is stabilised.

Pre-Hospital Care.
The indications for intubation are the same as all other trauma patients. Facial injury may present a special dilemma with *expanding haematomas*, which can extend into the neck and down to supraclavicular region. These can greatly distort the anatomy, making both intubation and cricothyroidotomy difficult.

** Consider awake intubation if possible **

Note: GSW to lower 1/3 of face will almost likely need intubation (with a significant proportion requiring surgical airways).

Management of bleeding:

- Double suctioning.
- External compression / nasal packing.
- Oropharyngeal packing with gauze (following intubation)

Avulsed parts (ears, nose, teeth) - stored in saline-soaked gauze.
Protect suspected ruptured-globes against further compression (eye cup or shield).

General Measures.

- The initial evaluation in ED should re-address the question of *intubation*.
- Unless there is life-threatening haemorrhage, facial injuries can be left to 2* survey.

Methods of haemostasis include;

- Compression
- Ligation of relevant vessel (avoid blindly ligated; ?secondary nerve or ductal injury)
- Arterial embolisation (interventional radiology)
- *External carotid ligation* --> rarely used.

Other points to consider;

- Tetanus prophylaxis
- ABx prophylaxis
- Rabies prophylaxis

Bite wounds, gross contamination & heavy tattooing require urgent definitive treatment.

Soft Tissue Injuries.

- When cleaned; apply thin-layer of antibiotic ointment.
- Tattooing benefits from vigorous scrubbing (following adequate analgesia & local anaesthesia).
- Patients should be given expectation that swelling/haematomas with result in localised bruising (particularly around the eyes) 2-3 days after injury.
- Physician judgement & local practice dictates which lacerations are closed in ED or referred to subspecialities.
- *Wound Management.*
    - Local anaesthesia
    - Exploration for depth, FB, underlying fractures.
    - Irrigation (not necessary for wounds <6 hours old)
    - Gaping wounds (deeper than dermis) require layered closure.
- Antibiotics are generally *NOT* required for simple lacerations.

SPECIAL CONSIDERATIONS BY SITE.

Mouth Lacerations.

- Consideration required to maintain appearance of *lip edge* or *vermilion border*.
- Marking the vermilion border prior to infiltrating anaesthetic (which can distort soft tissue) facilitates better cosmetic result.
- Wounds that involve the muscular layer required layered closure.
- The lip should be closed with *absorbable suture*.
- *"Through & through"* lacerations of the mouth require layered closure (from inside, out). Require copious irrigation and antibiotic prophylaxis.
- Assess for salivary duct damage.
- Tongue lacerations
    - Small lacerations = do nothing.
    - Gaping lacerations (that will collect food) should be closed with absorbable sutures.
    - upon discharged, patient should perform gentle 'swish & spit' with mild antiseptic.

Perioral Burns.

- Always consider systemic evaluation in the setting of electrical burns.
- Initial injury may be misleadingly trivial (*delayed oedema and necrosis*).
- Severe bleeding (from labial artery) can occur 5-21 days later (eschar separation).
- Consult Burns-specialists for further detail.

Cheeks.

- Thorough cranial nerve evaluation.
- Consider underlying zygomatic or maxillary fracture.
- Consider lacerations of parotid gland or Stensen's duct.

Nose.

- Epistaxis is common (local compression, anterior packing).
- Look for septal haematoma.
    - Require drainage to avoid future necrosis.
- Nasal fractures;
    - DC home if, nose is straight / no septal haematoma / breathing through both nostrils & epistaxis is controlled. (Radiology not required).
    - Cosmetic concerns can be delayed until swelling has subsided (3-5 days later), with specialty follow-up.
- Children w/ nasal fractures may have *premature closure of sutures* and require followup regardless of initial alignment.

Ears.

- Haematomas can form in *subperichondral potential space* = cauliflower ears.
    - Drained by aspiration.
    - Re-accumulation avoided by compression bandages.
- Ear can be anaesthetised by *"field block"*. (No adrenaline)
- Cartilage repaired with absorbable sutures.
- Significant de-gloving / tissue loss = surgical referral.

Eyes.

- Simple eyelid lacerations can be closed in a single layer.
- Complex lacerations require subspeciality referral.
- Consider lacrimal apparatus injury.
- Eyebrow lacerations
    - Consider underlying fractures
    - *Do not shave the eyebrows*.
    - Closing deeper muscular layers preserves normal expressive function.

FRACTURES & DISLOCATIONS.

Many non-displaced or minimally displaced facial fractures may be handled on an outpatient basis, with definitive repair delayed by several days (usually within 7 days).

Antibiotics are indicated for *open fractures & fractures that violate sinuses.*

Avoid sneezing in patients with fractures through maxilla or floor of orbit.

- Can force air from sinus into the soft tissues.

Specific Considerations by Site.

Forehead.

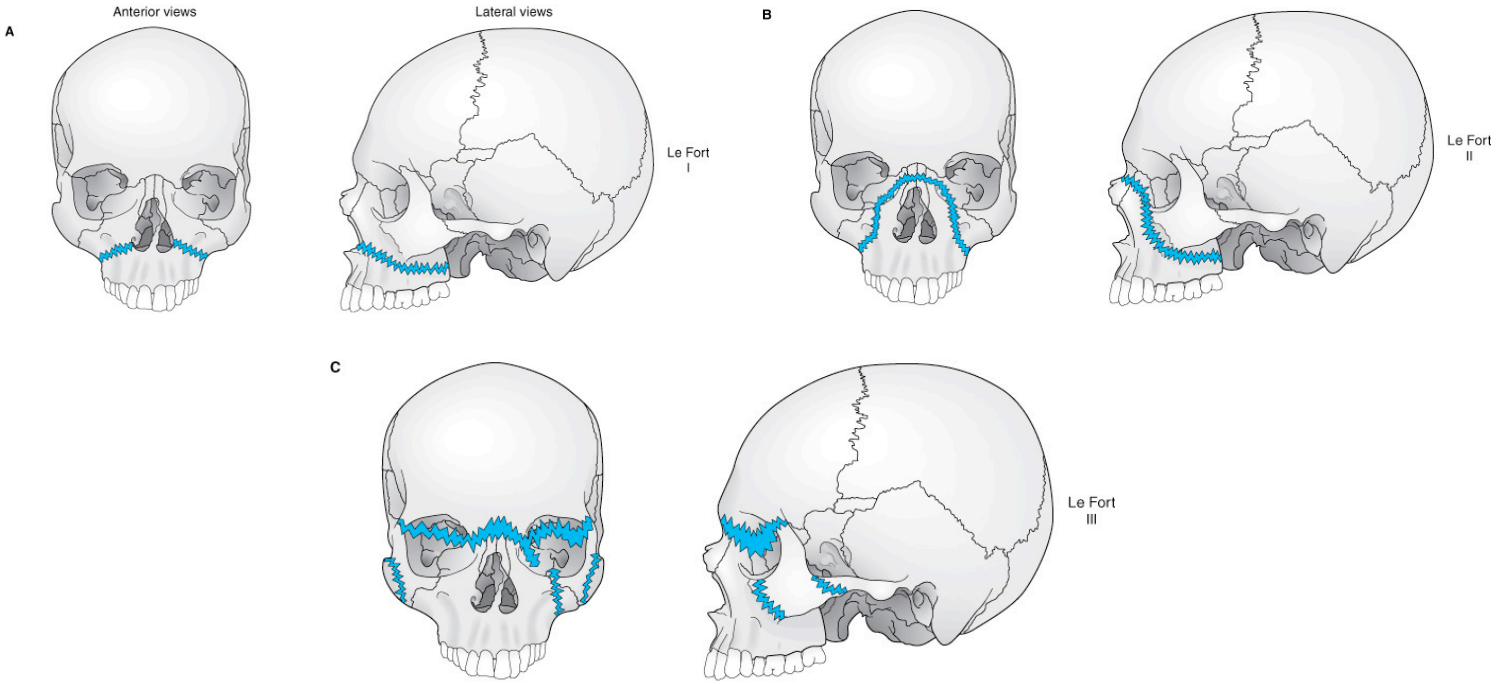
- #'s through the superior forehead (above the frontal sinus) are actually *skull not facial* fractures (often require repair for cosmetic purpose only).
- #'s through anterior frontal sinus require CT (to assess the integrity of the posterior wall)
    - Assess for CSF-leak.

Orbit.

- The most common simple fracture of the orbit is a *blow-out fracture* of the orbital floor (which can force orbital contents through the floor).
    - Bony fragments sag into the underlying maxillary sinus.
    - *Inferior rectus* can be entrapped.
    - *Infraorbital nerve* can be affected.
- Immediate repair is rarely indicated.
- Fractures of medial orbital wall (through *lamina papyracea*) are often associated with nasal or midface injuries.
    - Herniation into the ethmoids can occur.
    - More likely to have exophthalmos & diplopia.
- Fractures of the superior orbital wall can involve anterior skull & require CT scan.
- Many fractures involve more than one wall.
- Haematomas can form within the orbit, behind the globe; which can cause acute exophthalmos.
    - May stretch retinal artery (limiting flow) and lead to blindness.
    - Treatment is via a *lateral canthotomy*.

Midface.

- *Tripod fractures* are among the simplest midface fractures.
    - Include: *lateral orbit, zygoma & maxilla.*
    - Require operative fixation/stabilisation.
- Fractures through the anterior wall of maxillary sinus may denervate teeth.
- Le Fort fractures define more complex midface fractures.



- Le Fort I:
    - Involves a transverse fracture through the maxilla, above the roots of the teeth.
    - Malocclusion can occur. Maxilla may be mobile.
- Le Fort II:
    - Typically bilateral & pyramidal in shape.
    - Includes the nasal bridge, maxilla, lacrimal bones, orbital floor & rim.
    - The nasal complex moves as a unit.
- Le Fort III:
    - Rare.
    - Involve fracturing of the connections between elements of the face & skull.
    - Bridge of nose, extend posteriorly along medial orbital wall (ethmoids), floor of the orbit (maxilla) & through lateral orbital wall & break through the zygomatic arch.
    - Craniofacial disjunction.
    - CSF leak is very common (due to involvement of cribriform plate).

- Fractures of deeper structures of the midface can result in significant bleeding.
    - Nasal packing
    - Immediate reduction of fracture

Zygoma.
- Isolated fractures are relatively rare.

Mandible.
- Multiple fractures generally result from a single blow.
- Signs include trismus, dental malocclusion, swelling & tenderness.
- Fractures usually require early operative splinting.
- Open fractures require antibiotics & hospital admission.
- Children can have resultant facial growth disturbances.

Dental & Alveolar Trauma.
- Ellis Classification of Fractures.
    - Class I: Enamel only. Not painful. No ED intervention required.
    - Class II: yellow *dentin* exposed. Can be painful. Exposed surface can be covered.
    - Class III: Dental pulp exposed (red line or dot visible). Very painful.
- Avulsed teeth can pose an airway risk in supine or intoxicated patients.
    - Unaccounted teeth should be searched for with CXR. ?aspiration.
- Re-implantation can occur in the ED.
    - Avoid socket disruption as much as possible.
    - Do not wipe the tooth root. Gentle rinse only.
    - Place tooth back into socket until it ‘clicks’.
- Do not manipulate intruded teeth.
- Partially avulsed, extruded or laterally luxed teeth can be re-implanted / relocated.
- Manipulated teeth require splinting / stabilisation.
- All require follow-up with dentist / orthodontist.

Temporomandibular Joint.
- Complex joint.
- Ligamentous injury or meniscus tear may present with ‘clicking’ or ‘popping’.
- Acute pain without fracture = soft diet, no yawning & oral surgeon referral.
- Anterior dislocations can occur spontaneously / atraumatically.