

Maxillofacial Injury



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EMERGENCY ASSESSMENT AND TREATMENT

- The management of a patient with facial trauma must begin with an immediate assessment of the airway, breathing and circulation in keeping with the advanced trauma life support (ATLS) principles.
- Airway, breathing, circulation with cervical spine control is the starting point.
- Do not let dramatic facial injuries distract from other potentially life-threatening injuries.



- If the patient has facial or midface bleeding they may sit forward or be placed on their side to minimize the risk of blood and/or dental fragments obstructing the airway.
- The use of good light and high volume suction is often helpful.
- Intubation is indicated when there is a risk of airway compromise due to the fracture.



CLASSIFICATION OF FACIAL INJURIES

- Divide the face into thirds.
- Assess orbit independently.
- Assess bony and soft tissue injuries.



Bony injuries and fractures

- The facial skeleton can be divided into thirds vertically:
 1. upper face (from level of canthi upwards)
 2. midface (from maxillary teeth to canthi)
 3. lower face (mandible and mandibular teeth)
- In addition, the midface can be divided into central and lateral portions.
- The central midface is the naso-orbital–ethmoidal complex and the lateral portion comprises the cheekbones.
- The eye socket can be considered as a separate entity, because orbital fractures can occur in isolation or as part of a constellation of multiple fractures.



- Where skull fractures occur in combination with facial fractures or the fractures extend into the frontal or ethmoidal sinuses, they are classified as craniofacial, and a joint neurosurgical and maxillofacial approach is necessary.
- If fractures occur at all levels of the face the term panfacial is utilised.
- it does imply a significant degree of force and one must be suspicious of other injuries, especially head injuries.
- As with all trauma patients, associated injuries, including chest and abdominal trauma, must be actively excluded.



Soft tissue injuries and lacerations

- Lacerations are crushing injuries where the soft tissues are compressed between the underlying bone and some form of blunt object.
- Incised wounds are caused by a cutting implement, such as a knife or glass.
- Often the injuries are a combination of the two.
- Either type of wound can occur with or without tissue loss.
- Where the injury results in a communication between the skin and the mucosa of the oral cavity the wound is termed 'through and through'.



CLINICAL ASSESSMENT

History

- As much information as possible should be obtained about the mechanism of injury, the past medical history and the post injury course.
- This will be directly from the patient, friends, family, witnesses and emergency services.
- Knowledge of the mechanism of injury will often help to identify the potential occult injuries that are not obvious on first inspection.



Examination

- Initially, **the primary survey** is aimed at the airway: controlling bleeding, restoring and maintaining the circulation and assessing for neurological deficits, with cervical spine control.
- The face, head and neck should be inspected and wounds cleaned and assessed for tissue loss, and then dressed to control any bleeding not addressed in the primary survey.
- Their size, location and depth should be carefully recorded in the case notes.
- Large and obvious foreign bodies should be removed but care should be exercised with penetrating wounds involving large fragments or blades which potentially penetrate deep structures.
- These should be removed in the operating theatre, in more controlled conditions, after imaging.



- On occasions it is helpful to administer local anaesthetic for the examination and (temporary) repair of facial lacerations, particularly if a single vessel continues to bleed.
- In these circumstances it is very helpful to perform a thorough examination of the key sensory and motor nerves that may have been injured, before the local anaesthetic makes this assessment meaningless.
- This principle also applies to the management of those patients for whom intubation is imminent.
- While this may be difficult, a brief assessment of Glasgow Coma Scale (GCS) score, eye function (motility and acuity), facial and trigeminal nerves and cervical spine pain and function prior to the induction of anaesthesia can be very helpful in ongoing management.



- **The secondary survey** examination should be systematic because it is easy to be distracted and miss potentially important injuries that leave only a small external sign.
- At this time it is helpful to perform a formal cranial nerve examination; of particular importance are cranial nerves II, III, IV, VI, V and VII.
- **Examination of the eyes** should then take place to exclude globe or retinal injury, as well as to assess acuity, test for diplopia and assess motility.
- The position of the globe – whether there is proptosis or enophthalmos – and visual acuity (utilising a Snellin chart) in each eye, and whether there is diplopia in all nine positions of gaze, should be recorded.



- **The intraoral examination** is facilitated by the use of good light (a headlight is helpful) and suction to allow removal of blood and saliva.
- The teeth should be examined and their presence or absence noted.
- Dental injuries should be classified.
- **Palpation of the bony contours of the facial bones** should identify sites of tenderness, steps and asymmetry.
- This can start at the supraorbital margins, move around the infraorbital margins and then along the zygomatic arches, moving onto the condylar heads of the mandible and then running along the lower border of the mandible.



Investigations

- The investigations required fall into two major categories: first, those required to confirm the provisional and specific clinical diagnosis with regard to the facial injuries and, second, those to assess and manage the systemic condition of the patient.
- Systemic investigations will be governed by the general state of the patient and the past medical history.
- Typically, they will include routine laboratory (haematological and biochemical) investigations and radiological (for example the cervical spine) and other imaging.
- Specific head and neck investigations are utilized and the general trend is away from plain radiology towards computed tomography (CT) scanning.



SPECIFIC INJURIES

Mandibular fractures

- Typically occur at specific sites,
 - (1) The neck of the condyle is the most common site.
 - (2) The angle of the mandible through the last tooth.
 - (3) The third point of weakness is in the region of the canine tooth.
- Diagnosed clinically, often because of deranged dental occlusion.
- As with all fractures the principles of reduction, fixation, immobilisation and then rehabilitation apply to facial fractures.



- Treatment is primarily with open reduction and internal fixation.
- In general, the facial bones heal well and undisplaced fractures or those treated with ORIF heal after about 4 weeks.
- If the patient has had IMF a liquid diet is required and those who have had an ORIF procedure must also remain on a very soft sloppy diet for the same period.
- The timing of the definitive treatment of mandibular fractures is dependent on the general state of the patient; however, optimal timing is for treatment within 24–48 hours post injury.



Fractures of the zygomatico-orbito complex (ZMC)

- The commonest facial fractures.
- All ZMC fractures (with the exception of isolated zygomatic arch and isolated infraorbital rim fractures) involve the bony orbit, and careful assessment of ocular position and function is necessary.
- As with mandibular fractures, the role of plain radiography is diminishing and cross-sectional imaging utilising CT scanning is the standard investigation except for the simplest fractures.
- In terms of management, the mainstay of treatment is ORIF with fixation.
- Uncomplicated ZMC fractures are generally treated within 10 days of injury.



Maxillary fractures

- Maxillary fractures indicate significant force transfer – other associated injuries should be excluded.
- Bleeding from the pterygoid venous plexus may be occult.
- The treatment of maxillary fractures, in all but the entirely undisplaced fractures, involves ORIF techniques utilising a variety of miniplates (1.5/1.7 mm diameter screws) and/or microplates.



Orbital fractures

- The bones that comprise the orbit can be fractured and, in order of frequency, the floor, medial wall, lateral wall and roof may be disrupted either in combination or as isolated injuries.
- In any orbital injury the eye must be examined carefully, even if there is significant swelling.
- Pupillary response, visual acuity (utilizing a pinhole to correct for missing glasses), ocular motility and the results of careful ophthalmoscopy (including the anterior chamber, lens and fundus) should be documented.



- Investigation of orbital injuries requires CT scanning but if a retrobulbar haemorrhage is suspected treatment should be given prior to scanning.
- With the exception of retrobulbar haemorrhages and paediatric orbital fractures, the definitive treatment can be delayed for 7–10 days.
- This allows oedema to settle and globe motility and position to be assessed more accurately.
- Reconstruction of the orbital rim is usually accomplished with ORIF techniques and the orbital walls repaired with autologous materials such as cranial bone or rib grafts, but proving more popular are preformed titanium implants or patient-specific custom-made implants.



Naso-orbito ethmoidal fractures

- Typically caused by a blow to the bridge of the nose.
- Investigation is necessary with CT scanning for all but the simplest nasal bone fractures.
- Treatment is usually delayed for 7–10 days post injury and generally necessitates ORIF and repositioning of the fragments with the medial canthi attached.
- If a formal canthopexy is required, this can be achieved with stainless steel wires or specialized canthopexy wires.



Craniofacial fractures

- These are fractures that involve the cranial cavity and the facial bones in continuity.
- In many cases they involve the frontal and ethmoidal sinuses, creating a communication between the cranial cavity and the nasal air sinuses.
- If this is combined with a dural tear, CSF will leak into the nose and is detected as CSF rhinorrhoea with or without a salty taste.
- Usually managed by a multispecialty team involving neurosurgery, ear, nose & throat (ENT) and oral & maxillofacial surgery.



Panfacial fractures

- In cases where there are fractures at all levels of the facial skeleton (upper, mid and lower face) the term panfacial fracture is used, and these fractures can present particular management challenges.
- Each component of the panfacial fracture is treated in the same way as an isolated fracture would be, but sequencing the repair is challenging.



Dental injuries

- It is important to account for all missing teeth and/or dental fragments – a chest radiograph may be indicated.
- Exposed dentine and pulp can be exquisitely painful and referral for emergency dental treatment can be very helpful.
- Avulsed teeth should be reimplanted as soon as possible.



Soft tissue injuries

- Examination of both motor and sensory nerve function should be conducted prior to the administration of local anaesthetic.
- Tissue loss can occur and usually warrants specialist referral.
- Careful cleaning (debridement) with removal of all dirt minimises the chances of wound tattooing.

