



Chapter 42 – Facial Trauma

Episode Overview:

- 1) Describe the anatomy of the bones, glands, and ducts of the face. At what ages do the sinuses appear?
- 2) List 5 types of facial fractures.
- 3) Describe the clinical presentation and associated radiographic findings of an orbital blowout fracture.
- 4) Describe an orbital tripod fracture and its management.
- 5) List the indications for antibiotics in a patient with facial trauma?
- 6) What is the importance of perioral electrical burns?
- 7) What are the indications for specialist repair of an eyelid laceration?
- 8) Describe the classification and management of dental fractures.
 - a. What is the management of an avulsed tooth?
 - b. What is a luxated tooth? How is it managed?
 - c. What is an alveolar ridge fracture?
- 9) Describe the method for reducing a jaw dislocation? What is the usual direction of the dislocation?

Rosen's in Perspective

- mechanism of facial trauma varies significantly age
- highly associated with alcohol use
 - 49% of maxillofacial trauma was ETOH related in one study
 - Of these, 78% were related to violence and assaults, and 13% to motor vehicle collisions.
- other common mechanisms include falls, animal bites, sports, and flying debris.
- much more common in unprotected vehicle users such as ATVs and motorcycles
 - 32% of injured ATV riders will have facial injuries.
 - facial injury in these patients correlates with injury severity score
- children < 17 years old, sports injuries are the largest source of facial injuries (20%)
- children < 6 years old most commonly suffer facial injuries from family pets such as dogs
- in young children the face is the most common location of trauma associated with abuse.
 - lacerations to the lips or frenulum can be a sign of 'bottle jamming'.
**However, toddlers will not uncommonly suffer trauma to the perioral, nasal, or frontal bone areas from falling while learning to walk

1) Describe the anatomy of the bones, glands, and ducts of the face. At what ages do the sinuses appear?

The posterior bones of the face form the anterior calvaria (brain-containing part of the cranium).

- must think about intracranial injury whenever we think of facial trauma

The anterior face is primarily formed by the large **frontal bone** making up the forehead, the **maxilla** and **zygoma** that form the cheeks, and the **mandible** which forms the lower mouth and chin. There are also two paired and symmetric **nasal bones**, the **vomer** which forms the inferior septum of the nose, and the **nasal concha**. The ethmoid bone forms the superior septum of the nose and the cribriform plate, while the **palatine process of the maxilla** forms most of the hard palate, and the **palatine bone** forms the rest.

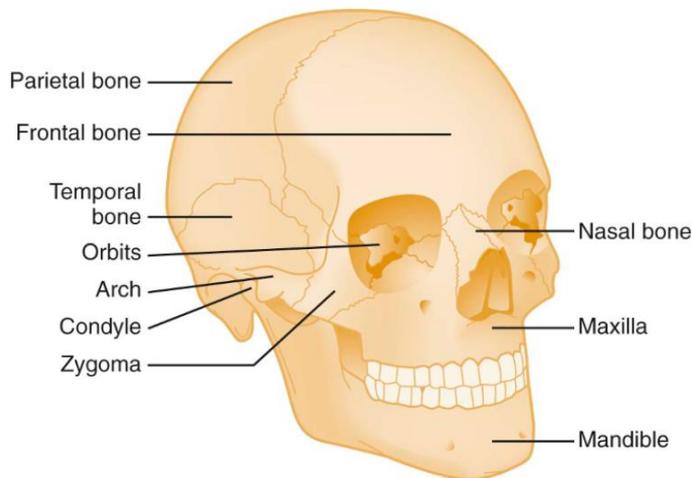


Figure 42-1

The orbits of the eye are the most complex part, being formed with 7 separate bones:

- Frontal bone - yellow
- Zygoma - blue
- Maxilla - purple
- Palatine - aqua
- Lacrimal bone - green
- Sphenoid - pink
- Ethmoid – brown

The last two are important as they form the skull base. We'll touch on this again in Episode 71.



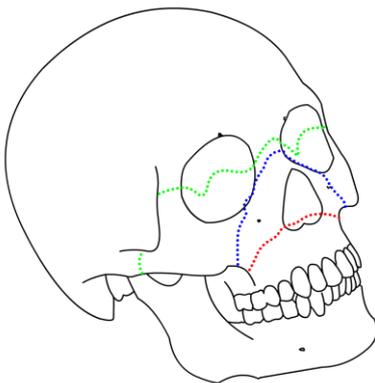
Wikipedia "Orbit" article

The majority of glands in the face are related to salivation and mastication, the exception being the lacrimal glands that lie in the superior and lateral aspect of the orbits. These produce tears than flow medially and drain through the puncta into the lacrimal sac and into the nasopharynx.

The salivary glands are the parotid, sublingual, and submandibular. The parotid gland lies just anterior to the ear, while the sublingual gland is within the floor of the mouth, and the submandibular glands live under the mandible. The parotid gland drains through Stensen's duct which runs from the gland along the edge of the masseter and empties into the mount opposite by the second upper molar - this duct can often be disrupted by trauma. The submandibular glands are emptied by Wharton's duct, exiting by the frenulum of the tongue.

2) List 5 types of facial fractures

- Orbital (blowout most common, beware retrobulbar hematoma)
- Midface fracture (Le Fort fractures, tripod fracture)
- Mandibular fracture
- Dental/alveolar
 - Ellis system for dental fractures
 - Alveolar ridge fracture
- TMJ fractures



Wikipedia - LeFort fractures of skull (red - I, blue - II, green, III)

*Something to consider early in these patients is the need for intubation. Don't be afraid to ask for specialist backup as anatomy can be severely distorted. A double setup, or at least having a cric tray available is normally a good idea.

3) Describe the clinical presentation and associated radiographic findings of an orbital blowout fracture.

- think of a blowout # with a direct blow to the globe of the eye
 - results in a fracture of the inferior wall of the orbit and allowing herniation of orbital contents (especially the inferior rectus muscle).



- can have diplopia with up-gaze resulting from entrapment of the inferior rectus, and may have a visible paresis of their up-gaze.
- are also at high risk for retrobulbar hematoma and may present with exophthalmos.
- can also manifest paresthesias or anesthesia of the medial cheek and upper lip from stretching or compression of the V2 branch of cranial nerve five.
- on CT they have a visible orbital floor fracture with orbital contents visibly protruding into the maxillary sinus.

4) Describe an orbital tripod fracture and its management.

- orbital tripod fracture = fracture of the zygoma, maxilla, and lateral orbital wall, creating a mobile bony segment that is often depressed, causing facial asymmetry.
- often a large overlying contusion potentially causing enophthalmos.
- most often caused by a direct blow
- management is surgical as they are often displaced and cause poor cosmesis.
- any indication of damage to the eye warrants urgent ophtho evaluation.

5) List the indications for antibiotics in a patient with facial trauma?

- Bite wounds
- Evidence of devascularization
- Through-and-through the buccal mucosa
- Involvement of cartilage of ear or nose
- Highly contaminated wounds

6) What is the importance of perioral electrical burns?

- pediatric injury from biting or licking electrical cords. Often result in full thickness burns as oral secretions provide very low electrical impedance and results in high currents that penetrate deeply into tissue.
- can result in poor cosmesis and microstomia.
- concern is that eschar separates after 5 to 21 days and overlies the labial artery. This can result in severe and sometimes life-threatening bleeding
- can be discharged with close observation and reliable guardians
- plastic surgery and/or ENT follow-up.

7) What are the indications for specialist repair of an eyelid laceration?

- Involvement of deep structures (e.g. tarsal plate)
- Avulsion or loss of tissue
- Involvement of lid margin
- Violation of any lacrimal apparatus (check by instilling fluorescein in eye and assessing for uptake in the wound)



8) Describe the classification and management of dental fractures

- Ellis classification:
 - Ellis I - enamel only, can have outpatient follow-up
 - Ellis II - enamel and dentin visible (yellow substance of tooth), can have outpatient follow-up but can benefit from covering/protection of dentin
 - Ellis III - enamel, dentin, and pulp visible (small red line or dot), need early referral to dentist or endodontist

a. What is the management of an avulsed tooth?

- The tooth should be placed in saline or ToothSaver solution. The tooth can be gently rinsed but should not be wiped as this can remove the periodontal ligament and cause failure of reimplantation.
- Tooth is reimplanted in the socket with firm pressure until it “clicks” into place - this may often require rotation or angling of the tooth to follow the course of the root, and local anesthesia is generally required for the patient. The reimplanted tooth should be secured with a splint and the patient referred to a dentist for followup.
- Optimum reimplantation time is less than one hour (66% success), and viability falls off rapidly after 3 hours (20% success).
- Beware aspirated teeth, and consider radiographic investigation for aspirated teeth.

b. What is a luxated tooth? How is it managed?

- Luxation of a tooth is loosening of or displacement of the tooth in the socket, without avulsion
- Four major types:
 - **Subluxation** - loosened tooth
 - **Extrusive** - partial displacement of the tooth out of the socket, along the axis of the tooth
 - **Lateral** - displacement of the tooth eccentrically (not along the axis of the tooth), often accompanied by alveolar socket fracture
 - **Intrusive** - displacement of the tooth deeper into the socket, along the axis of the tooth.
- Management is repositioning and splinting of the tooth and referral to a dentist for follow-up.

c. What is an alveolar ridge fracture?

- Fracture through the ridge of bone that forms the sockets for the teeth (the dental alveoli).
- Can result in a group of teeth being dislodged or displaced.
- Requires reduction and splinting of teeth, and follow-up with a dental or maxillofacial surgeon.



9) Describe the method for reducing a jaw dislocation? What is the usual direction of the dislocation?

- jaw dislocation is normally anterior (mandibular condyle is displaced anteriorly from the mandibular fossa of the temporal bone). This is because the joint allows some degree of translation, and the anteromedial capsule is formed of loose, weak synovial tissue.
- dislocation can be unilateral or bilateral.
- spasm of the muscles of mastication prevents reduction of the TMJ
- reduction is accomplished by providing sedation and analgesia (helps relieve spasm), placing the thumbs in the buccal sulcus bilaterally, and providing downward traction on the mandible while rotating the chin upwards and backwards (video here: <https://www.youtube.com/watch?v=-Zm7ev8LUAA>)
- also extra-oral technique - less risk of being bitten
 - <https://m.youtube.com/watch?v=N3edJvp5DoA>
- Gorchynski et al. recently published a technique for auto-reduction of jaw dislocations where the patient rolls a syringe between their molars:
 - Gorchynski J, Karabidian E, Sanchez M. The "syringe" technique: a hands-free approach for the reduction of acute nontraumatic temporomandibular dislocations in the emergency department. *The Journal of emergency medicine*. 47(6):676-81. 2014. (<http://www.ncbi.nlm.nih.gov/pubmed/25278137>)