

**McHenry Western Lake County EMS System  
Paramedic, EMT-B and PHRN  
Optional Continuing Education  
2019 #1  
Facial Trauma**

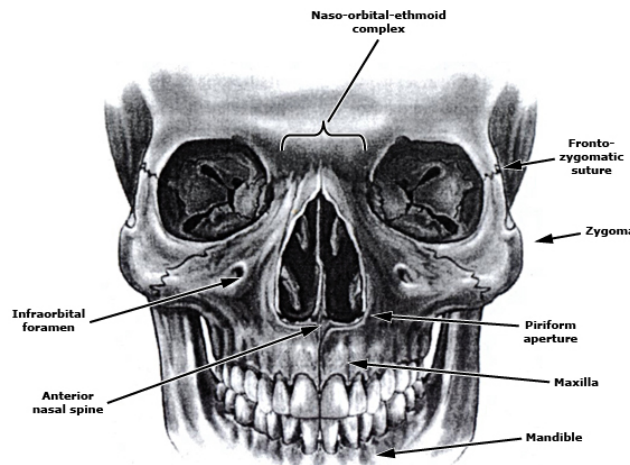
The face is vital to human appearance and function. Facial injuries can impair a patient's ability to eat, speak, interact with others, and perform other important functions. Disfiguring facial injuries can have severe psychological and social consequences.

Sports like football, baseball, and hockey account for a high percentage of facial injuries among young adults. Severe injuries often occur as a result of motor vehicle collisions, including those involving motorcycles and all-terrain vehicles, as well as interpersonal and domestic violence. Other mechanisms include falls, animal bites and recreational activities. Among combatants, facial injuries occur from gunshot wounds and other explosive or incendiary devices.

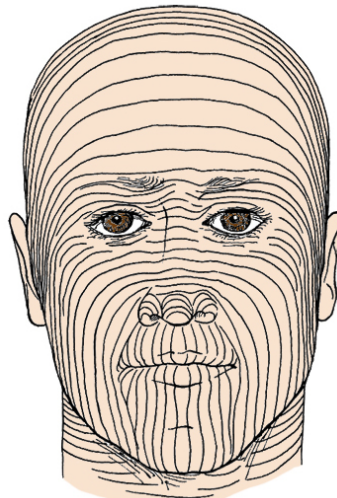
### **Anatomy, Physiology**

The face is anatomically complex. It includes skin, muscles responsible for both gross motor function (e.g. mastication) and subtle facial expression, complex bony structure, and vital sensory organs. Injuries to the face may compromise the patient's ability to breathe, see, speak, hear and eat, and may involve damage to the central nervous system.

- **Bones** – the posterior portions of the face form the anterior wall of the skull. Thus, the face lies in close proximity to the central nervous system. The anterior facial skeleton is composed of the frontal bone, nasal bones, zygomas, maxillary bones, and mandible. The sphenoid, ethmoid, lacrimal, vomer, and temporal bones lie deeper within the facial structure, providing support and sites for muscular attachment, including the muscles of mastication, speech and deglutition. The temporomandibular joint (TMJ) is the only joint of the face and it engages in complex motions.



- Nerves – Cranial nerve V supplies sensation to the face. Cranial nerve VII innervates the muscles of facial expression. The muscles of mastication are innervated by cranial nerves V and IX and X.
- Vasculature – The face is highly vascular. Soft tissue injuries and fractures that involve vessels can cause large hematomas or heavy bleeding, or even exsanguination in severe cases.
- Muscles – Facial musculature is complex. Important muscles that may be injured with facial trauma include the extraocular muscles and those surrounding the mouth. The inferior rectus, primarily responsible for rotating the eye downward, can become entrapped in fractures of the orbital floor. The orbicularis oris, which encircles the mouth, frequently requires repair with complete perioral lacerations.
- Skin – The skin of the face is among the thinnest of the body. Facial skin develops predictable creases with age, following Langer's lines. Lacerations that do not run parallel to Langer's lines develop more prominent scarring than those that do.



*Langer's lines of least skin tension. Lacerations parallel to these lines will have less evident scarring.*

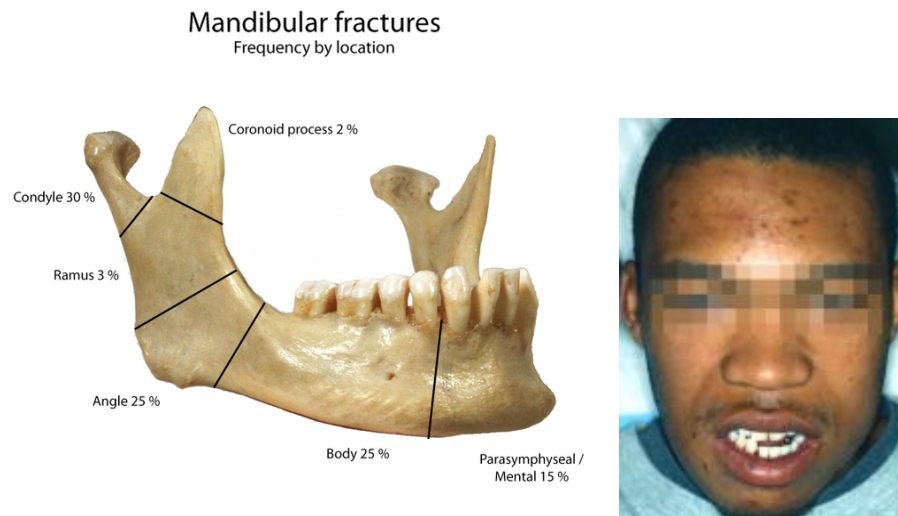
### **Pathophysiology of Injury**

Injuries occur when energy (most often kinetic) transferred to the body exceeds the tolerance of the tissue. The likelihood of injury is related to the amount of energy transferred and the condition of the underlying tissue. Traditionally, trauma has been classified as blunt or penetrating, but in many cases the effect is a combination. As an example, the forehead injury sustained when someone falls against the sharp corner of a coffee table involves both a contusion (blunt injury) and a laceration (penetrating injury).

## Specific Injuries

### Mandible

The mandible is the single facial bone in the lower third of the face. Because of its prominence, fractures to this bone rank second in frequency after nasal fractures. It may break in multiple locations, often distant from the point of impact. Signs and symptoms include malocclusion (patients may complain that their teeth do not “feel right” when their mouth is closed), numbness in the chin and inability to open the mouth. The patient may also have difficulty swallowing and may have excessive salivation.

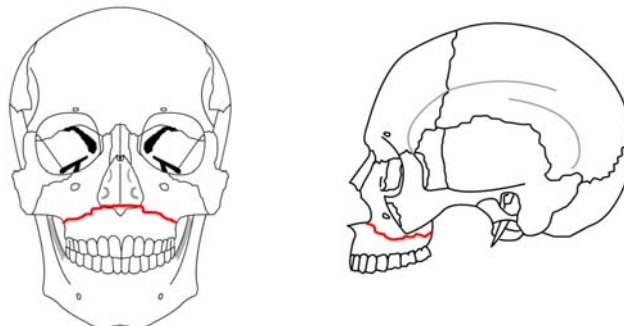


### Midface

Fractures to this region result from direct or transmitted force. (for example, fractures may result from blunt trauma to the mandible with the energy transmitted to produce fractures to the maxilla.) These injuries often are associated with central nervous system injury and spinal trauma.

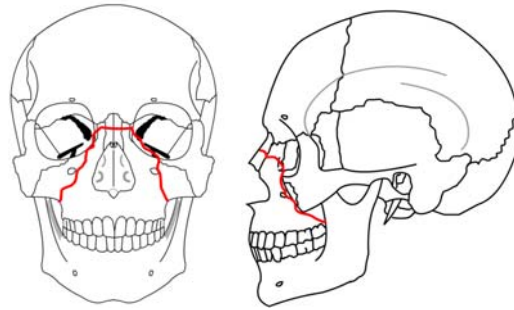
In 1901 a cadaver study done by LeFort described three patterns of injuries:

LeFort I injuries involve a transverse fracture through the maxilla above the roots of the teeth. The injury may be unilateral or bilateral. Patient may complain of malocclusion. You may detect motion in the maxilla when the upper teeth are grasped and rocked, while the forehead is held stationary with the other hand.

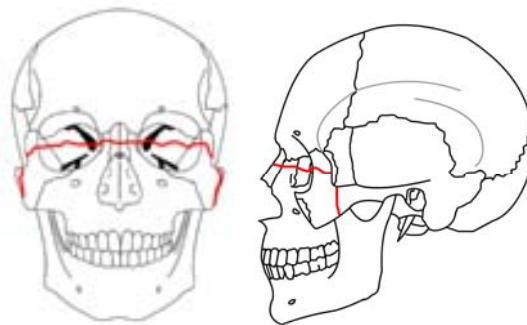


LeFort II injuries are typically bilateral and involve fractures that extend superiorly in the midface to include the nasal bridge, maxilla, lacrimal bones, orbital floor and rim.

The fracture lines are shaped like a pyramid. When examined, the nasal complex moves as a unit with the maxilla when the teeth are grasped and rocked, while the forehead is held stationary.



LeFort III injuries involve fractures that result in discontinuity between the skull and the face. The fractures begin at the bridge of the nose and extend posteriorly along the medial wall of the orbit and the floor of the orbit, and then through the lateral orbital wall and the zygomatic arch. Intranasally, they extend through all the lesser bones to the base of the sphenoid and are frequently associated with a cerebrospinal fluid leak. According to the results of CT imaging studies that show the full extent of fracture communication, true LeFort III injuries are rare.



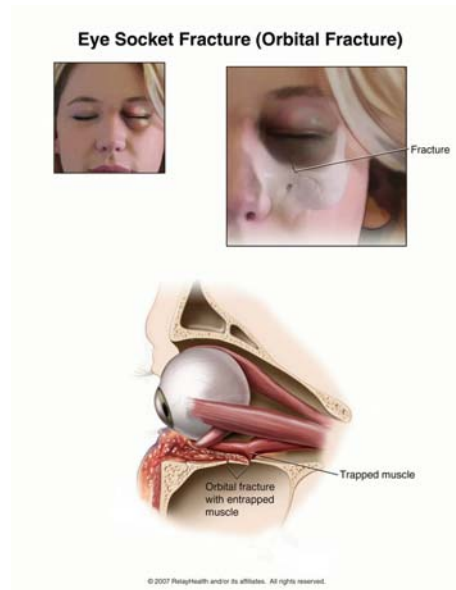
### Zygoma

The zygoma (cheek bone) articulates with the frontal, maxillary and temporal bones. It is fractured during severe facial trauma because of its prominence and superficial location. Displacement can be significant. Signs and symptoms include flatness of a usually rounded cheek area; numbness of the cheek, nose and upper lip; epistaxis; and altered vision.



### Orbit

The orbital contents are protected by a bony ring. The ring resembles a pyramid with the apex pointed toward the back of the head. The bones of the walls, floor and roof of the orbit are thin and are fractured easily by direct blows and transmitted forces. A blowout fracture to the orbit can occur when an object of greater diameter than that of the bony orbital rim strikes the globe of the eye and surrounding soft tissue. This impact pushes the globe into the orbit and in turn presses the orbital contents. The sudden increase in intraocular pressure is transmitted to the orbital floor. If the orbital floor fractures, the orbital contents may be forced into the maxillary sinus, where soft tissue and extraocular muscles may be trapped in the defect. Signs and symptoms include periorbital edema, subconjunctival ecchymosis, double vision, recessed globe, epistaxis, and impaired extraocular movements.



### **Management of Facial Fractures**

Facial fractures are associated with a high percentage of related cervical spine injuries, therefore spinal precautions must be taken with all suspected facial fractures.

Airway should be assessed for obstruction caused by blood, vomitus, bone fragments, broken teeth, dentures and damage to the anterior neck. Suction as needed to clear airway. The airway may need to be maintained using an oral or nasal adjunct. **DO NOT** use a nasal airway when there is a suspected midface or basal skull fracture. Oral intubation may be needed to maintain and protect the airway. Ventilations should be assisted as needed.

Bleeding can usually be controlled by direct pressure or pressure bandages. Epistaxis may be severe and should be controlled by applying external pressure to the anterior nares. If bleeding is severe, evaluate and treat for hemorrhagic shock if needed.

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**Post Test**

**Name:** \_\_\_\_\_

**Department:** \_\_\_\_\_

**Date:** \_\_\_\_\_

1. List 5 mechanisms of injury that can cause facial trauma.
  - A. \_\_\_\_\_
  - B. \_\_\_\_\_
  - C. \_\_\_\_\_
  - D. \_\_\_\_\_
  - E. \_\_\_\_\_
  
2. The temporomandibular joint is the only joint of the face.
  - A. True
  - B. False
  
3. Cranial nerve V innervates the muscles of facial expression.
  - A. True
  - B. False
  
4. The face is not a very vascular area, therefore excessive bleeding is never a worry.
  - A. True
  - B. False
  
5. Facial trauma is often a mix of blunt and penetrating trauma.
  - A. True
  - B. False
  
6. List three signs and symptoms of a mandible fracture
  - A. \_\_\_\_\_
  - B. \_\_\_\_\_
  - C. \_\_\_\_\_

7 – 10 match the LeFort fracture with its description

____ LeFort I	A. Involve fractures that extend superiorly in the midface to include the nasal bridge, maxilla, lacrimal bones, orbital floor and rim. The fracture lines are shaped like a pyramid.
____ LeFort II	B. Injuries involve fractures that result in discontinuity between the skull and the face. The fractures begin at the bridge of the nose and extend posteriorly along the medial wall of the orbit and the floor of the orbit, and then through the lateral orbital wall and the zygomatic arch. Intranasally, they extend through all the lesser bones to the base of the sphenoid and are frequently associated with a cerebrospinal fluid leak.
____ LeFort III	C. Involve a transverse fracture through the maxilla above the roots of the teeth.

11. List 4 signs and symptoms you may see with a zygoma fracture

- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_
- D. \_\_\_\_\_

12. Explain why extraocular movements are impaired with a blow out fracture..

13. List 3 signs and symptoms you may see with a orbit fracture

- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_

14. It is important to always suspect a c-spine injury with patients who have facial fractures.

- A. True                      B. False

15. Nasal airways and nasal suctioning may be used on a patient with a suspected midface fracture or basal skull fracture.

- A. True                      B. False

IF YOU ARE NOT A MEMBER OF THE MCHENRY WESTERN LAKE COUNTY EMS SYSTEM, PLEASE INCLUDE YOUR ADDRESS ON EACH OPTIONAL QUIZ TURNED INTO OUR OFFICE. OUR ADDRESS IS: NORTHWESTERN MEDICINE - MCHENRY HOSPITAL EMS, 4201 MEDICAL CENTER DRIVE, MCHENRY, IL 60050. WE WILL FORWARD TO YOUR HOME ADDRESS VERIFICATION OF YOUR CONTINUING EDUCATION HOURS.

IF YOU ARE A MEMBER OF OUR EMS SYSTEM, YOUR CREDIT WILL BE ADDED TO YOUR IMAGE TREND RECORD. PLEASE REFER TO IMAGE TREND TO SEE YOUR LIST OF CONTINUING EDUCATION CREDITS. ANY QUESTIONS REGARDING THIS CAN BE ADDRESSED TO CINDY TABERT AT 224-654-0160. PLEASE FAX YOUR QUIZ TO CINDY TABERT AT 224-654-0165.