EM CASE OF THE WEEK.

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DEPARTMENT OF EMERGENCY MEDICINE

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Maxillofacial Trauma: Le Fort Fractures

A 45-year-old male with a past medical history of grand mal seizures and type 2 diabetes presents to the ED via EMS after falling off a 20-foot ladder and landing face first into the ground below. The patient is witnessed by coworkers to be seizing for a total of 10 minutes until EMS arrived. He arrives as a level 2 trauma, postictal, with several facial lacerations and several missing teeth. Upon completion of the primary survey the patient is stable. On physical exam, patient has bilateral facial swelling including facial instability of the midface, crepitus upon palpation of the nasal bridge, crepitus along the mandible bilaterally, and periorbital ecchymosis without proptosis. There is no penetration of the globe bilaterally and no deficits noted on visual examination. Sensation remains intact over the face bilaterally. The remainder of the neuro exam is within normal limits. **Which of the following examination findings in a patient with nasal bone fracture should prompt immediate intervention?**

A. Clear rhinorrhea

B. Subcutaneous emphysema along the nasal bone

C. Limited extraocular movement

D. Mental status changes

E. All the above

Dish face deformity with dropped upper jaw

Enopthalmos occurs due to volume changes of the bony orbit relative to the globe and soft tissues. The globe can become displaced posteriorly.

EM Case of the Week is a weekly "pop quiz" for ED staff.

The goal is to educate all ED personnel by sharing common pearls and pitfalls involving the care of ED patients. We intend on providing better patient care through better education for our nurses and staff.

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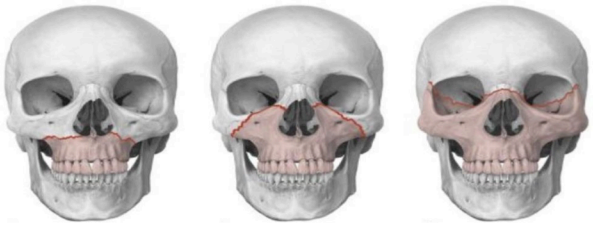
The correct answer is E. Clear rhinorrhea, subcutaneous emphysema, limited EOM and mental status changes are all concerns for immediate surgical intervention when a nasal bone fracture is suspected.

The maxilla represents the bridge between the cranial base superiorly and the dental occlusal plane inferiorly. It's intimate association with the oral cavity, nasal cavity, and orbits and the multitude of structures contained within and adjacent to it make the maxilla a functionally and cosmetically important structure. Fracture of these bones is potentially life-threatening as well as disfiguring. Timely and systematic repair of these fractures provides the best chance to correct deformity and prevent unfavorable sequelae.



Le Fort I Le Fort II Le Fort III

Le Fort fractures are fractures of the midface, which collectively involve separation of all or a portion of the midface from the skull base. **In order to be separated from the skull base, the pterygoid plates of the sphenoid bone need to be involved as these connect the midface to the sphenoid bone dorsally**. The Le Fort classification system attempts to distinguish according to the plane of injury.

Le Fort type 1 is a horizontal maxillary fracture, separating the teeth from the upper face. The fracture line passes through the alveolar ridge, lateral nose and inferior wall of maxillary sinus. **Le Fort type 2** is a pyramidal fracture, with the teeth at the pyramid base, and nasofrontal suture at its apex. The fracture arch passes through posterior alveolar ridge, lateral walls of maxillary sinuses, inferior orbital rim and nasal bones. **Le Fort type 3** is a craniofacial disjunction, the fracture line passes through nasofrontal suture, maxillo-frontal suture, orbital wall, and zygomatic arch / zygomaticofrontal suture.

Discussion

The maxilla is a vital bone of the midface that forms the roof of the mouth and upper teeth, part of the orbits, and the floor and wall of the nasal antrum. Maxillary fractures often result from high-energy blunt force injury to the facial skeleton. Typical mechanisms of trauma include motor vehicle accidents, altercations, and falls. With increased legislation requiring seat belt use, injuries from driver impact with the steering wheel have shifted from chest trauma to facial trauma with maxillary fractures accounting for approximately 6-25% of all facial fractures. The anatomy of the midface is oriented to provide strength and support against injury. The vertical and horizontal bony bolstering in the face absorbs the energy of traumatic force which serves to protect the more vital intracranial contents from damage during trauma. Characteristics provided by the patient's H&P guide practitioners in evaluation of patients with facial trauma. Physical exam includes a full ENT exam, dental evaluation, palpation for bony crepitus, step offs and a mobile palate. Furthermore, a full neuro exam and ophthalmic exam including full EOM, pupillary reflex, visual acuity is required. It is best to recognize that dysphonia or edema of the oropharynx suggests the presence of a significant hematoma or fracture, and each is associated with an increased risk of airway compromise. It is best to secure the airway early with endotracheal intubation if it is felt to be at risk of obstruction. Occlusion is best evaluated by asking the alert and cooperative patient to close their mouth and describe whether the motion and positioning feel normal. Malocclusion suggests the presence of a mandibular fracture. Lacerations or a gap or step-off in the palate suggests a maxillary fracture. A laceration or step-off at the upper alveolar ridge suggests a mid-face fracture, while such injuries at the lower alveolar ridge suggest a mandibular fracture. CT is utilized to determine the extent of injuries showing bilateral pterygoid process fractures, bilateral zygomatic arch fractures and several fractures to the mandible. These fractures eventually lead to a radiologic diagnosis of bilateral Le Fort 3 fractures in addition to mandibular fractures. Oral Maxillofacial (OMF) were consulted to operate on the patient.

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Treatment

includes urgent stabilization of the patient and treatment of any serious insults to the airway, neurologic system, cervical spine, chest, and abdomen prior to definitive treatment of the maxillofacial bones. Emergencies related to maxillofacial trauma include airway compromise and excessive bleeding. The midface complex may be impacted posteroinferiorly, causing airway obstruction. If the airway is compromised and orotracheal intubation cannot be established disimpaction may be attempted manually or with large disimpaction forceps around the alveolar arch and premaxilla. If the segments do not move readily and the airway is obstructed, an emergent tracheotomy or cricothyrotomy may be necessary. Severe bleeding may occur from soft tissue lacerations or intranasal structures. A combination of pressure, packing, cauterization, and suturing may be useful in such situations. For most cases maxillomandibular fixation (MMF) is required. Risks and possible complications of the procedure, include temporary or permanent paresthesia, cerebrospinal fluid leak, meningitis, sinus infection or mucocele, anosmia, malocclusion, infection of implants, osteomyelitis, malunion or nonunion, external deformity, plate exposure, tooth injury, and the possible need for additional surgery. Fixation of unstable fracture segments to stable structures is the objective of definitive surgical treatment of maxillary fractures. This principle, while seemingly simple, becomes more complex in patients with extensive or panfacial fractures. In isolated maxillary fractures, the stable cranium above and occlusal plate below provide sources of stable fixation. One goal of treatment is to restore proper anatomic relationships. In particular, attempt to normalize the integrity of the support bolsters of the facial skeleton, the midfacial height and projection, and dental occlusion and masticatory function.

Prognosis

Currently there is a lack of prospective studies on trauma patients which makes assessment of outcome measures for patients treated for maxillary fractures difficult. Repair of simple maxillary fractures typically restores bony aesthetic contour and function; however, complex fractures often leave the patient with some long-term cosmetic and functional deficits. Early and meticulous surgery is most likely to produce results that restore the patient to the pre-trauma state.

Take Home Points

- A memory aid 1) Le Fort 1 is a floating palate 2) Le Fort 2 is a floating maxilla 3) Le Fort 3 is a “floating face”
- If the anterolateral margins of the nasal fossa are attached it excludes a type 1 fracture
- If the infraorbital rims are attached it excludes a type 2 fracture
- If the zygomatic arch is attached it excludes a type 3 fracture
- Surgery is the definitive treatment if there is significant enopthalmos > 2mm, EOM entrapment, persistent diplopia, large orbital wall defect or large orbital floor defect.

ABOUT THE AUTHOR

This month’s case was written by Hassan Iqbal. Hassan is a 4th year medical student from NSU-COM. He did his emergency medicine rotation at BHMC in October 2017. Hassan plans on pursuing a career in Pulmonary/Critical Care after graduation.

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