

# The EM Educator Series

## Trauma to the Face, Challenging Airway, and Other Considerations

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### Case #1:

A 42-year-old male comes in with severe facial trauma after a motorcycle crash. When we comes in to your resuscitation bay, his VS are HR 128, BP 82/49, RR 28, Sats 82% on blow-by. He is in distress.

### Case #2:

A 19-year-old male presents after assault. He reports being hit repeatedly with fists followed by a baseball to the face. He has severe swelling and ecchymoses to his face. His VS are otherwise normal.

### Questions for Learners:

- 1) How do you evaluate and manage the airway in the patient with severe facial trauma?
- 2) When should you consider other potential injuries: Head / C-spine / Chest / Abdomen?
- 3) How do you evaluate and manage the following eye injuries:
  - a. muscle entrapment +/- nerve
  - b. retrobulbar hematoma and/or significant emphysema
  - c. globe rupture
  - d. hyphema
  - e. lens dislocation
  - f. retinal detachment
  - g. vitreous hemorrhage
  - h. corneal abrasion?
- 4) And what about these other injuries?
  - a. Mandible
  - b. Dental trauma
  - c. Zygoma fractures
  - d. Le Fort fractures
  - e. Basilar skull fracture
  - f. Nasal fracture / nasal septal hematoma
  - g. Auricular hematoma
- 5) Are antibiotics required for facial fractures?
- 6) When should you consider intimate partner violence and elder abuse?

## Suggested Resources:

- ✓ Articles:
  - [emDOCs – The Sphincter Series: A Scary Airway Review](#)
  - [emDOCs – Mandibular Fracture: Pearls and Pitfalls](#)
  - [emDOCs – Managing Dental Trauma in the Emergency Department](#)
  - [emDOCs – HEENT: Tips for Addressing Your Next Procedure](#)
  - [LITFL – Airway in Maxillofacial Trauma](#)
  - [LITFL – Facial Trauma](#)
  - [LITFL – Blown out](#)
  - [LITFL – Blunt Trauma to the Eye](#)
  - [LITFL – Base of Skull Fracture](#)
  - [LITFL – Elder abuse](#)
  - [WikEM – Zygomatic arch fracture](#)
  - [WikEM – Zygomaticomaxillary \(tripod\) fracture](#)
  - [WikEM – Le Fort Fractures](#)
  - [Radiopaedia – Mandibular fracture](#)
  - [EM Blog Mayo Clinic – Save face: Managing facial trauma in the emergency department](#)
  - [Taming the SRU: Antibiotics for Facial Fractures](#)
- ✓ Podcasts/Video:
  - [CORE EM – Tongue Blade Test](#)
  - [EM Cases – BCE 65 Intimate Partner Violence – A Silent Epidemic](#)

## Answers for Learners: Based on original posts mentioned in suggested resources

### 1) How do you evaluate and manage the airway in the patient with severe facial trauma?

If you can access the oropharynx, and the issue is blood or foreign bodies that can be easily removed, then use suction aggressively and proceed with standard oral intubation techniques using RSI.

You may have to use other measures to control upper airway bleeding such as packing the nose or direct pressure. If the bleed is brisk, consider that the maxillary artery end branches at the pterygopalatine fossa may be involved or even the common carotid at the skull base. You can use **anterior and posterior packing** methods in an attempt to tamponade this while you obtain your airway, but do so with care.

**As a rule of thumb, typically you should not do a naso-tracheal intubation in the patient with significant facial injuries**, as it is often more difficult, anatomy can be disrupted resulting in secondary injury such as airway damage, disruption of hematoma, precipitation of swelling, or potential to disrupt the cribriform plate. You run the risk of worsening the airway by going in blind.

So, when do you use nasotracheal intubation, you may ask? When there is no contraindication and the patient is a perceived difficult airway whom RSI may be less than desirable. For a patient to be a candidate for a trial of nasotracheal intubation, the practitioner must feel that they have adequate access to the nose, nasopharynx, and oropharynx. Also, they should consider if the patient may tolerate awake intubation techniques.

Cricothyrotomy, or tracheostomy, prior to cervical spine clearance, may be required if the entire crumple zone and laryngeal inlet is damaged and is obscuring the airway.

### 2) When should you consider other potential injuries: Head / C-spine / Chest / Abdomen?

The interesting thing about even isolated facial fractures, is that they often accompany other badness, such as cervical spine injuries in up to 8% of patients, with this estimate rising to up to 10% with more serious injury, and also translating to intracranial involvement in 65-89%.

There are some areas of the face that have predictable associated injury patterns.

- Unilateral mandibular fractures are associated with upper C-spine injuries.
- Unilateral midface fractures are associated with basilar skull fracture and severe ICH.
- Upper face injuries are associated with mid/lower C-spine injuries, increased mortality rates, and severe ICH. Bilateral midface fractures are associated with basilar skull injuries, and death.
- As an airway technician, you have to be acutely aware of the “crumple zone”.
  - The Crumple Zone of the face is essentially the midface (i.e. nose/orbits/cheeks/upper mandible). It’s a lot weaker than the rest of the tougher/thicker bones of the front of the face, and prone to breakage; however, it provides a buffer between the site of injury and brain matter. If the crumple zone is trashed and/or completely obscuring access to the airway, you may have to just go ahead and cric the patient. This is one of the scenarios that a “cric first, ask questions later” approach is reasonable.

### 3) How do you evaluate and manage the following eye injuries:

- a. muscle entrapment +/- nerve
  - i. nasal decongestants for 1 week

- ii. prophylactic antibiotics, e.g. cephalexin 500mg qid po
  - iii. instruct the patient to avoid nose blowing and valsalva maneuvers; and to avoid driving until diplopia resolves.
  - iv. apply an ice pack to the orbit for 1-2 days
  - v. Ophthalmology referral is required for suspected orbital floor fractures (Maxillofacial surgeons manage these cases in some centres).
  - vi. Follow up in 1 week post-trauma to check for persistent diplopia or enophthalmos. Entrapment may resolve with the resolution of edema.
  - vii. Surgical repair is usually performed 1-2 weeks after the injury if required.
- b. retrobulbar hematoma and/or significant emphysema**
- i. An result in ocular compartment syndrome with optic nerve ischemia.
  - ii. Medical treatment can decrease IOP and includes:
    1. Mannitol
    2. Acetazolamide
    3. Dexamethasone
  - iii. However, if surgical decompression (lateral canthotomy) is delayed greater than two hours, blindness results.
- c. globe rupture**
- i. Shield the eye.
  - ii. Stat ophthalmology consult with repair within 24 hours.
  - iii. Avoid succinylcholine and ketamine if RSI is necessary:
    1. High dose ketamine >5mg/kg IV may increase IOP (Drayna, 2012).
    2. Etomidate and Rocuronium do not increase IOP.
  - iv. Don't take objects out; Don't measure IOP; Don't dilate!
  - v. Elevate the head if you can, sedate, and treat nausea/pain aggressively to lower IOP. Medical treatment as described for retro-orbital hematoma may also help.
  - vi. Start antibiotic therapy.
- d. Hyphema**
- i. Oral analgesia and topical cycloplegics for comfort. Consider antiemetics.
  - ii. The patient should remain upright (helps RBCs settle so that they do not plug the trabecular meshwork which may lead to high intraocular pressures (IOPs))
  - iii. Apply an eye shield — not a patch, which may prevent recognition of sudden visual loss from a rebleed
  - iv. Avoid agents that may contribute to a bleeding diathesis.
  - v. Treat secondary glaucoma
  - vi. Surgical evacuation may be required if the hyphema fails to resolve, there is a rebleed or secondary glaucoma occurs.
  - vii. Associated injuries need to be identified and treated.
  - viii. Consider admission for following individuals:
    1. noncompliant patients
    2. children (especially if suspected NAI or <age 8 years due to risk of amblyopia)
    3. increased IOPs
    4. sickle cell disease
    5. bleeding diathesis or blood dyscrasia
- e. lens dislocation**
- i. Immediate ophthalmology consultation

- ii. Treatment options vary from observation to surgical removal and replacement depending on the location of the dislocated lens and associated eye injury.
- f. retinal detachment**
  - i. Urgent ophthalmologist opinion.
  - ii. minimise activity — bed rest with toilet privileges.
  - iii. Treatment of underlying cause (especially if exudative).
  - iv. Surgical options include laser photocoagulation, cryotherapy, pneumatic retinopexy, vitrectomy, and scleral buckle.
  - v. Close follow up is required.
- g. vitreous hemorrhage**
  - i. ophthalmology referral
  - ii. bed rest with head elevation for ~3 days
  - iii. avoid drugs that contribute to bleeding (e.g. anticoagulants, antiplatelet drugs)
  - iv. screen for and treat underlying causes
  - v. retinal breaks are treated with cryotherapy or photocoagulation
  - vi. vitrectomy may be required (e.g. retinal detachment, or persistent hemorrhage)
- h. corneal abrasion**
  - i. oral analgesia and topical cycloplegics
  - ii. topical antibiotic —
    1. There is little evidence of efficacy
    2. The Australian Therapeutic Guidelines (2010) suggests chloramphenicol drops
    3. The Will's Eye Manual suggests covering injuries due to fingernail scratches and vegetable matter with fluoroquinolones
  - iii. contact lens wearers need anti-pseudomonal coverage (among other nasty bugs) and are best discussed with an ophthalmologist.
  - iv. consider removal of loose or hanging epithelium that may impair healing.
  - v. tetanus prophylaxis if indicated.

Red flag exam findings:	Notes
<b>Teardrop pupil</b> , flat anterior chamber	<b>Ruptured globe</b>
<b>Hyphema</b> , blood in the anterior chamber	Should raise suspicion for open globe. Beware if the patient has <b>sickle cell</b> trait or is anticoagulated.
<b>Proptosis</b> with increased intraocular pressure (IOP)>21	<b>Ocular compartment syndrome</b>
Extraocular movement limitation, upward gaze in particular	<b>Orbital blowout fracture</b> , particularly worrisome in children who are at increased risk of muscle necrosis from entrapment.

4) **And what about these other injuries?**

- a. Mandible** – The goal of emergency department care is to stabilize the patient until they are able to follow-up with a specialist. Most patients with mandibular fractures do not require follow-up for 2-3 days. However, do not minimize your role: prompt and appropriate treatment can prevent debilitating long-term consequences, such as infection and

permanent deformity. There are a few basic concerns to address before deciding whether to discharge or admit your patients:

i. **Constantly assess airway stability**

Reassess the airway multiple times during a patient's ED visit. The patient will need to be admitted if they display signs of impeding airway compromise, such as drooling, inability to tolerate oral intake, stridor, subjective difficulty breathing, or significant intraoral swelling.

ii. **Look for missing teeth**

If you cannot account for all missing teeth, obtain a chest x-ray to evaluate for aspiration.

iii. **Manage pain**

Like any other fracture, mandibular fractures are very painful. If attempts to obtain adequate analgesia fail, the patient will need to be admitted for pain control. Patients will also require pain control for home if discharged.

iv. **Consider antibiotics**

Use of prophylactic antibiotics for mandibular fractures is a controversial topic. Several studies demonstrate a marked reduction in the rate of post-operative infection for patients who are given prophylactic antibiotics before open fixation of mandibular fractures. In one study, the rate of infection was decreased from 62% (for patients without antibiotics) to 29% (for patients with antibiotics). However, because the quality of literature is poor and the results are inconsistent, there is a wide range of practice patterns. Some specialists consider all mandibular fractures to be "open" due to the mandible's proximity to oral flora. Others only offer antibiotics to patients with truly open fractures, compound fractures, or fractures of the dentoalveolar ridge. Most sources agree that antibiotics are not needed for condylar fractures.

Because the topic is so controversial, strongly consider prophylactic antibiotics in any patient with a mandibular fracture. All open fractures require antibiotics. Gingival lacerations should always be treated as open fractures, if they are located near the vicinity of a mandibular fracture.

Penicillins, cephalosporins, and clindamycin are all reasonable antibiotic choices, because they are effective against strep and other oral flora. There are no formal recommendations to guide this decision. Two of the best-studied antibiotics are Penicillin VK (500 mg twice daily for seven days), Amoxicillin/clavulanic acid (875/125 mg twice daily for seven days), or clindamycin (600 mg four times day for seven days) for patients who are penicillin-allergic [24].

v. **Update tetanus**

It is recommended to offer a tetanus vaccination if the patient has not received immunization within the last five years.

vi. **Splint and bandage**

Tooth avulsions: If the patient has an avulsed tooth, it is well within the scope of an emergency provider's practice to replace and temporarily splint the tooth. Store the tooth in milk or Hank's solution. Cleanse the tooth with warm water, but do not scrub the root or use antibacterial solution, as the nerves and soft tissues should remain as intact as possible [21]. Replace the tooth into the alveolar socket. Use a wire, prepackaged periodontal dressing, or calcium hydroxide paste to place the teeth in proper alignment [21, 27]. Patients with avulsed teeth need to follow-up with a specialist within 24 hours for more definitive care. These patients require urgent evaluation but can be discharged if you are confident they can access a maxillofacial specialist within 24 hours.

Displaced fractures: Grossly displaced fractures that cause airway obstruction require immediate attention by a specialist, but the others can be splinted in the ED prior to outpatient follow-up (use the same techniques as for tooth avulsions). If there are actively mobile segments, splinting is of utmost importance, as these fractures can lead to airway compromise and permanent deformities if not rapidly addressed.

Minimally-displaced and nondisplaced fractures: These patients may be placed in a "Barton's bandage" for comfort (see picture) for comfort, but do not require formal splinting.

vii. **Speak with the appropriate consultant**

All patients with mandibular fractures will ultimately require evaluation by a maxillofacial specialist. Which specialty evaluates facial trauma varies depending on where you work. Follow the protocol for your hospital to contact the appropriate specialist, who will help you make the appropriate disposition for the patient. Important pieces of information to convey to the consultant include: location, displacement (including amount and direction), number of fragments, and whether the fracture is open.

**b. Dental trauma**

- i. Ellis class III fracture and pulp exposure is a dental emergency: seek dental consultation in the ED.
- ii. Primary teeth do not require reimplantation.
- iii. Beware that orofacial injuries in children may be due to non-accidental trauma.
- iv. Always evaluate for pre-auricular tenderness for a possible condylar fracture.

**c. Zygoma fractures**

- i. Most can be discharged with outpatient ENT/OMFS follow-up. However, Zygomaticomaxillary (tripod) fracture are tricky.
  1. OMFS/ENT consult
  2. Optho consult if ocular signs/symptoms
  3. Analgesia
  4. Antibiotic prophylaxis if extends into paranasal sinuses (amoxicillin, fluoroquinolone, doxycycline, or clindamycin)
  5. Usually requires admission and surgical repair

**d. LeFort fractures**

- i. Consider discharge in isolated LeFort I or stable LeFort II fractures without concerning features (in coordination with appropriate specialist consult - OMFS, ENT, or PRS)
- ii. All others should be admitted

**e. Basilar skull fracture**

- i. Specific therapy
  1. TBI management (including ICP control)
  2. seek and treat complications
  3. elevation of depressed skull fractures
  4. CSF leak management
- ii. CSF leak
  1. risk of meningitis from direct contact of CSF to sinus, nasopharynx or middle ear
  2. few RCTs exist
  3. no role for prophylactic antibiotics (doesn't reduce the risk of meningitis)
  4. frequent cultures of leaking or draining CSF should be taken (send for B2 transferin) and infections treated specifically
  5. can prescribe antibiotics to cover insertion of ICP monitor
  6. most CSF leaks are conservatively managed
  7. persistent leaks >7 days have heightened risk of meningitis and are often surgically repaired

**f. Nasal fracture / nasal septal hematoma**

i. Fractures

This is generally not the emergency physician's domain. The majority of fractures are not reduced until patient follow-up 3-7 days after initial injury to allow for swelling improvement. If imaging reveals complicated fractures or fractures involving the nasal septum, the patient should be referred to the appropriate specialist. If the patient has a simple nasal bridge fracture (unilateral fracture of the nasal pyramid), and has no concern about cosmetic outcome, despite discussion regarding poor outcome for impacted or greenstick fractures:

- a. Document and obtain written consent.
- b. Take a "before" photo for the medical record.
- c. Decide on a procedural sedation agent/sedate the patient.
- d. Elevate the depressed nasal bone using a scalpel handle.
- e. Use your opposite hand to manually displace the pyramid to midline.
- f. Take an "after" photo for the medical record.

ii. Septal Hematoma

Nasal septal hematomas occur due to trauma to the anterior portion of the nasal septum, and may be seen in the setting of nasal bridge fracture.<sup>1</sup> Patients with septal hematomas present with pain, rhinorrhea, or difficulty breathing through the affected nares. Patients



with subacute septal hematomas often present with fever and signs/symptoms consistent with infection (the retained blood serves as a medium for Staph and Strep species propagation). On visual inspection, septal hematomas may be detectable due to septal asymmetry.

In addressing a septal hematoma:

- a. Incise the mucosa horizontally over the mucosa after anesthesia is achieved.
- b. Excise a small amount of mucosa to avoid premature closure of the incision.
- c. Place a section of a sterile rubber band to act as a drain.
- d. Pack the nostril to re-approximate the perichondrium to the cartilage.

**g. Auricular hematoma**

Auricular hematomas may occur as a result of blunt trauma to the external ear, or as a complication of an auricular laceration repair. Two techniques are commonly utilized to drain auricular hematomas: needle aspiration (a 20G needle is placed at the point of maximal hematoma fluctuance, blood is aspirated, and the ear is “milked” to express additional blood), or an open technique employing a scalpel and irrigation. Both drainage procedures require compressive auricular dressings so as to avoid hematoma re-accumulation and again the cauliflower deformity. Similar to auricular laceration repairs, topical or regional anesthesia should be utilized.

In “bolstering and compressing,” Roberts & Hedges recommend: utilizing vaseline gauze or saline-soaked packing gauze/cotton to support the ear, placing layers of gauze behind the ear as a posterior pack, covering the ear with multiple layers of gauze, and securing the gauze to the head with kerlix or an elastic wrap.

Experts recommend that anti-Staphylococcal antibiotics be given, and that patients with auricular hematomas be re-evaluated in 24 hours to search for blood re-accumulation. All patients with hematomas lasting >7 days should be referred to a specialist for debridement and repair.

**5) Are antibiotics required for facial fractures?**

Given the relative lack of evidence, it should come as no surprise that there are no current guidelines (either in the plastic surgery, otolaryngology, trauma, or EM literature) regarding the use of antibiotics in facial fractures. Guidelines are often institution-specific, but even then, vary from surgeon to surgeon. Not surprisingly, almost every paper on this topic states that further research is needed.

Though the literature is mixed, we would suggest the following, but are happy to talk about things on a case-by-case basis, as every patient is different:

Give antibiotics for:

- Facial fractures communicating with open wounds of the skin
- Mandibular fractures that extend into the oral cavity (including the dentoalveolar ridge)

Strongly consider antibiotics for:

- Orbital wall fractures with extension into the maxillary, ethmoid, or frontal sinus

Consider antibiotics for:

- Frontal sinus fractures
- Nasal bone fractures with mucosal disruption (leading to epistaxis)
- Orbital wall fractures that do not extend into the sinuses (lateral)

No need for antibiotics in isolated:

- Closed nasal fractures without septal mucosal disruption
- Closed zygomatic arch fractures
- Closed mandibular condyle fractures (since these typically do not communicate with the oral cavity)

Antibiotic of choice: Augmentin BID x 1 week, or Clindamycin for one week in those with penicillin allergies.

## 6) When should you consider intimate partner violence and elder abuse?

### Universal Screening for Intimate Partner Violence

#### Start with a normalizing statement

“Because violence is so common in many women’s lives and because there’s help available for women being abused, I now ask every patient about domestic violence.”

While there are multiple screening tools for intimate partner violence in the literature and there is no evidence that one is better than the other, *The Partner Violence Screen* has been shown to have 94% specificity for intimate partner violence.

#### The Partner Violence Screen

1. Have you been hit, kicked, slapped, punched or otherwise hurt by someone in the past year?
2. Do you feel safe in your current relationship?
3. Is there a partner from a previous relationship who is making you feel unsafe now?

This could be done at triage or in the ED by a nurse and if the patient screens positive, a useful thing to do is to then place a small colored paper on top of the chart that should alert the ED physician. The ED doc can also administer the screen.

Both the CDC and the American College of Obstetrics and Gynecology recommend *universal screening* for intimate partner violence. So if your ED doesn’t already have a screening protocol, you might want to consider speaking with your administration team and get a protocol up and running.

### Elder Abuse

Under recognized and usually occurs in someone in close relationship to the elderly person.

Take a history from the suspected victim privately using tailored questions such as:

- Do you feel safe where you live?
- Who prepares your meals?
- Who pays your bills? If you want money to buy something, how do you get it? Who does your banking?
- How do you get on with your husband / wife / son / daughter?

- Do you ever have disagreements? Tell me about what happens when you have a disagreement.
- Does your husband / wife / son / daughter ever get angry or upset with you? What happens when they get angry? Are you ever frightened when your husband / wife / son / daughter gets angry? Do they ever hurt you?

Look for features on history and examination of the different forms of abuse below:

- Physical
- Neglect, including abandonment
- Financial or material
- Psychological or emotional
- Sexual (rare)