Citation Key

for more information see: http://open.umich.edu/wiki/CitationPolicy

Use + Share + Adapt

{ Content the copyright holder, author, or law permits you to use, share and adapt. }

Public Domain – Government: Works that are produced by the U.S. Government. (USC 17 § 105)

Public Domain – Expired: Works that are no longer protected due to an expired copyright term.

Public Domain – Self Dedicated: Works that a copyright holder has dedicated to the public domain.

Creative Commons – Zero Waiver

Creative Commons – Attribution License

Creative Commons – Attribution Share Alike License

Creative Commons – Attribution Noncommercial License

Creative Commons – Attribution Noncommercial Share Alike License

GNU – Free Documentation License

Make Your Own Assessment

{ Content Open.Michigan believes can be used, shared, and adapted because it is ineligible for copyright. }

Public Domain – Ineligible: Works that are ineligible for copyright protection in the U.S. (USC 17 § 102(b)) *laws in your jurisdiction may differ

{ Content Open.Michigan has used under a Fair Use determination. }

Fair Use: Use of works that is determined to be Fair consistent with the U.S. Copyright Act. (USC 17 § 107) *laws in your jurisdiction may differ

Our determination **DOES NOT** mean that all uses of this 3rd-party content are Fair Uses and we **DO NOT** guarantee that your use of the content is Fair.

To use this content you should **do your own independent analysis** to determine whether or not your use will be Fair.

Advanced Emergency Trauma Course

Facial Trauma

Presenter: Carl Seger, MD
Written By: Andre Crouch, MD

Ghana Emergency Medicine Collaborative
Patrick Carter, MD • Daniel Wachter, MD • Rockefeller Oteng, MD • Carl Seger, MD

Facial Trauma

PD-EXP

George A. Otis (Wikipedia)

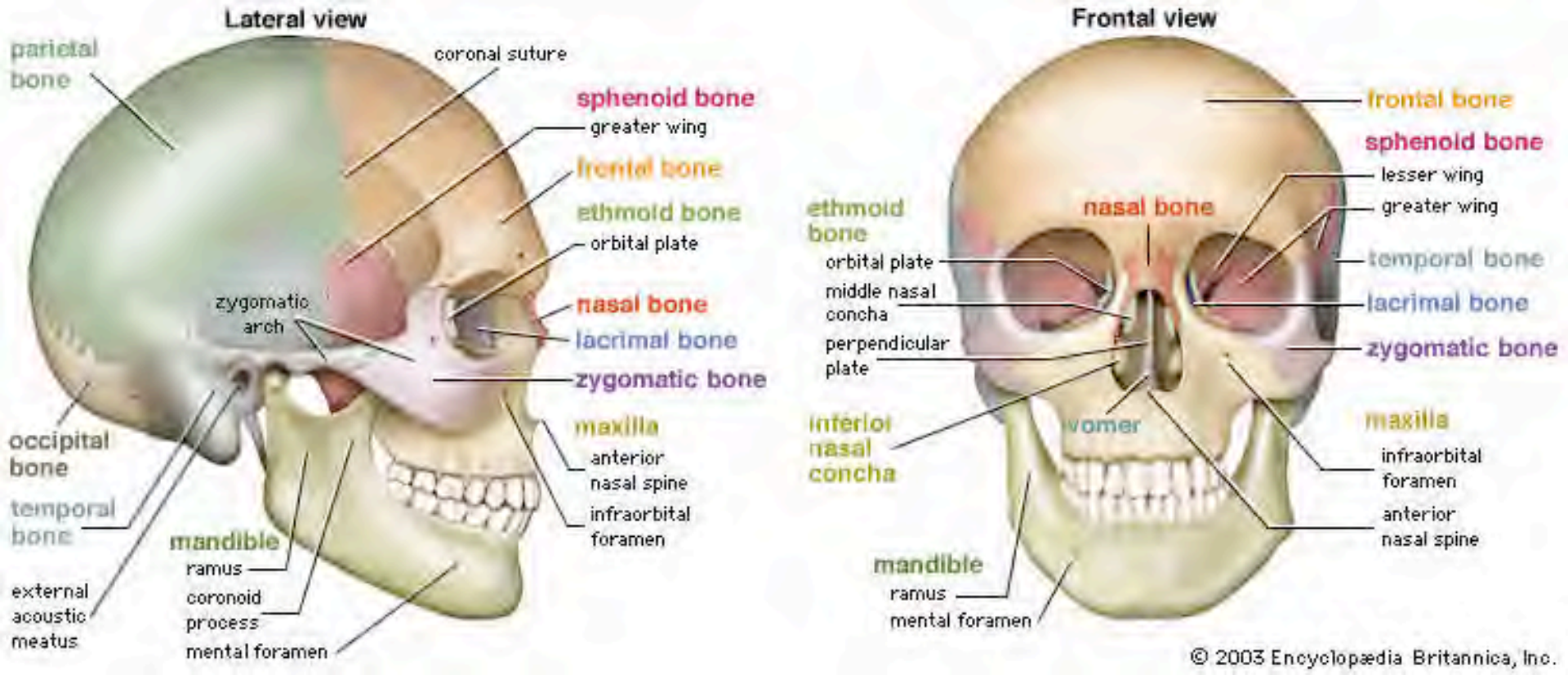
Ghana Emergency Medicine Collaborative
Advanced Emergency Trauma Course

Facial Trauma - Introduction

- Population at risk
  - Blunt trauma
  - Assault
  - Gun shot wound
  - Domestic violence
- 60% of pts with severe facial injuries have multisystem trauma
  - 20-50% have concurrent brain injury
  - Facial injuries may distract from C-spine injury or other major injury
- Often not life threatening, but has psychological sequelae - 25% may develop PTSD

Facial Trauma - Anatomy

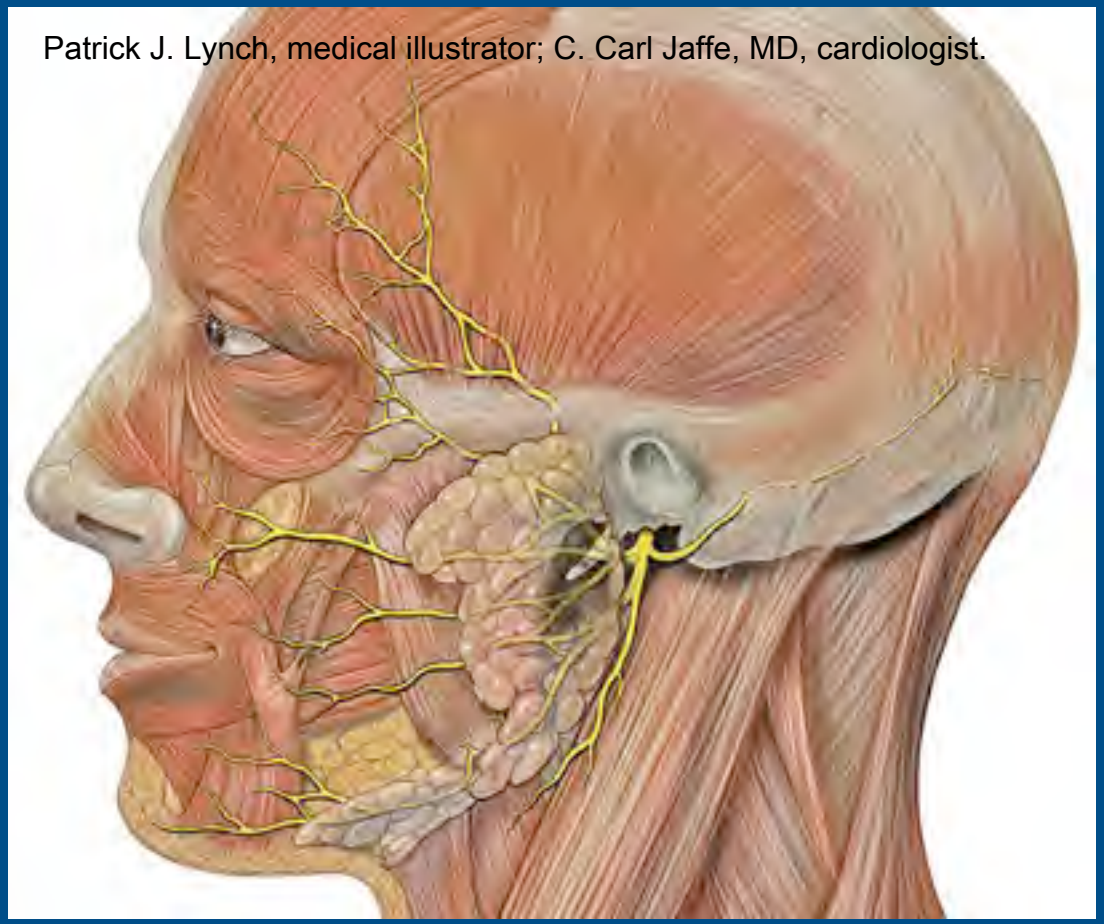
- Facial Bones



PD-INEL Encyclopedia Britannica

Facial Trauma - Anatomy

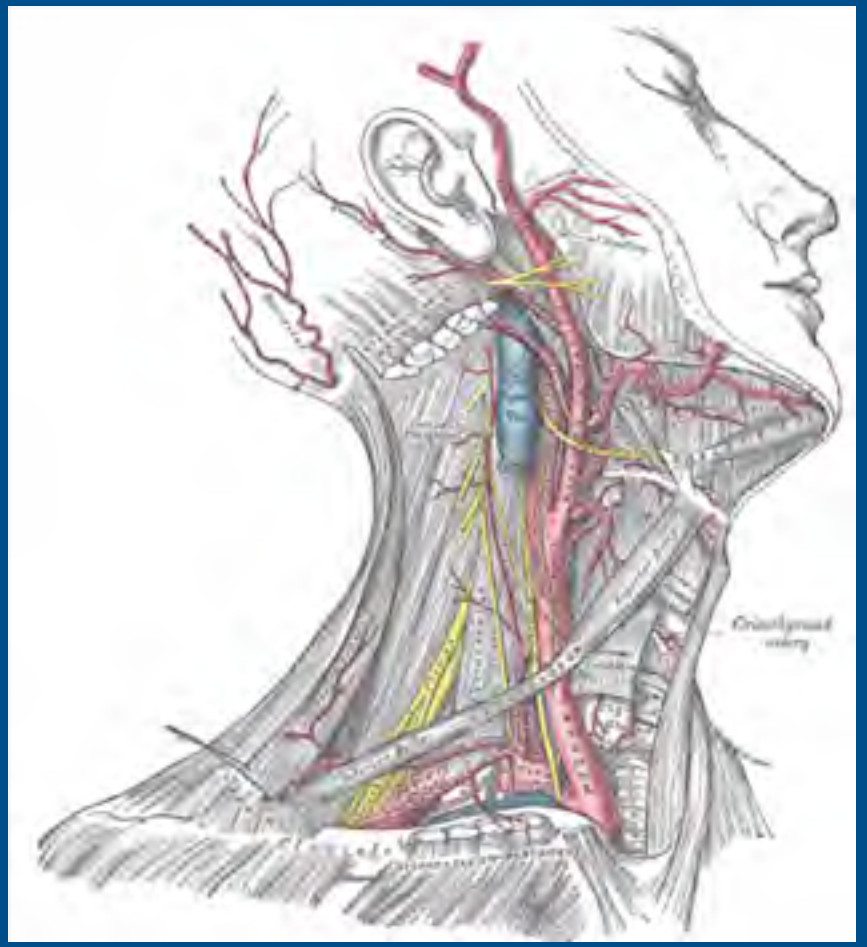
- Facial nerves
- Parotid gland



Patrick J. Lynch, (Wikipedia)

Facial Trauma - Anatomy

- Vascular



PD-EXP

Gray's Anatomy
(Wikipedia)

Facial Trauma - Evaluation

- ABC's - emphasis on A and C
- Airway
  - Special considerations:
    - Anatomy distortion - limits devices such as the LMA
    - "Flail" mandible
      - Mandible broken in two locations ==> obstruction
    - TMJ dislocation or fracture - will limit mouth opening
    - Cribriform plate disruption
      - Caution with NG tube placement or nasal intubation
    - Hemorrhage
      - Can obstruct view, may need double suction set up

Facial Trauma - Evaluation

- Airway
  - Approach:
    - Sometimes the injury makes intubation easier
    - Emergent/crash vs. Urgent airway - If it is going to be a challenging airway, take the time to fully prepare.
    - RSI vs. The awake look
      - Often tone is the only thing keeping the airway patent
      - Ketamine and nebulized lidocaine for the awake look
    - Hemorrhage:
      - Double suction
      - Control posterior nasopharyngeal bleeding with foley

Facial Trauma - Evaluation

- Airway
  - Approach:
    - LMA? Can be a nice back up
      - Anatomy distortion is an issue
      - Mouth opening can also be an issue
    - Nasotracheal intubation? Controversial
      - Some authors do not recommend this route because of risk of nasocranial intubation or nasal hemorrhage
    - Consider the double prep:
      - Plan A: Endotracheal intubation
      - Plan B: Crash Cricothyroidotomy with the tray opened and neck prepped

Facial Trauma - Evaluation

- Breathing
- Circulation
  - Often the cause of hypotension is elsewhere
    - Don’t let the obvious facial injury distract you from other injuries
  - Severe hemorrhage from maxillofacial injuries is rare
    - Be aware of scalp laceration
    - Nasopharyngeal bleed
      - Control anterior or posterior bleeding
      - May manually reduce unstable Le Forte fractures

Facial Trauma - Evaluation

- History: Three key questions
  - Vision changes?
    - Monocular double vision
      - Lens disruption, or corneal or retinal injury
    - Binocular double vision
      - Dysfunction of extraocular muscles or nerves
    - Pain w/ movement = injury to orbit or globe
  - Facial numbness
    - Trigeminal branch nerve injury
  - Malocclusion
    - Fracture or dislocation

Facial Trauma - Evaluation

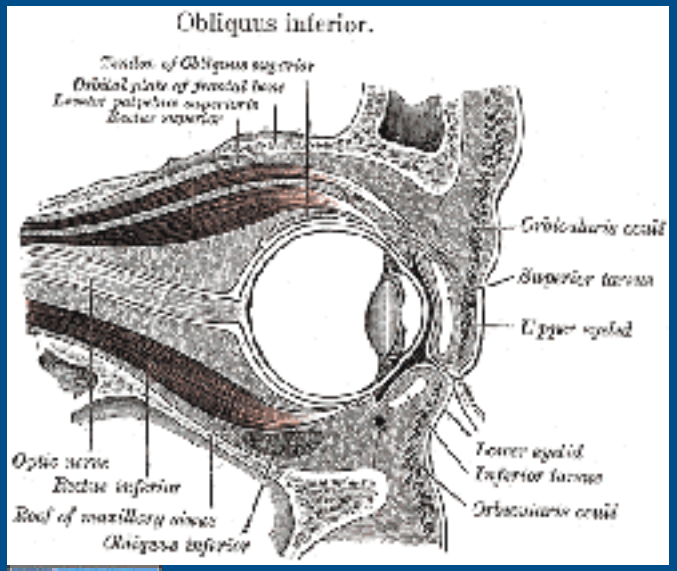
- Physical Exam
  - Inspection
    - Facial elongation (“Donkey Face”) associated with high grade Le Forte fractures
    - Facial asymmetry - neural involvement
    - Ecchymosis - Raccoon’s eyes or Battle’s sign
  - Palpation
    - Assess for tenderness, crepitus or subcutaneous air
    - Intraoral exam for zygomatic arch injury and maxillary stability

Facial Trauma - Evaluation

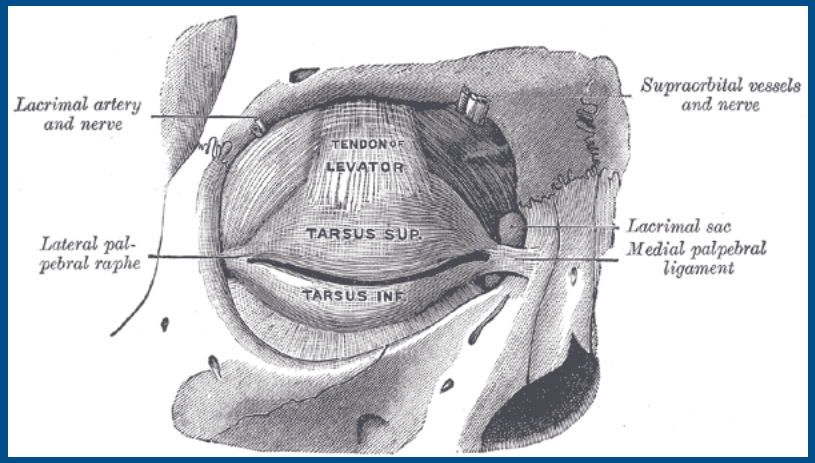
- Physical Exam
  - Orbital examination
    - Done early before swelling
    - Pupil reactivity
      - Tear drop pupil associated with globe rupture
      - Marcus Gunn pupil
    - Hyphema
    - Visual acuity
    - EOM
      - Ocular muscle entrapment
      - Ocular nerve injury
      - Pain can be a clue to associated orbit fractures
    - Proptosis - consider retrobulbar hematoma

Facial Trauma - Evaluation

- Physical Exam - Orbital Examination
  - Lid Lacerations
    - Medial third of lower eyelid
      - High risk for lacrimal duct involvement
    - Upper and Lower Eyelid
      - Disruption of tarsal plate or cartilaginous plate
    - Eyelid Droop
      - Disruption of levator palpebral muscle



PD-EXP Gray's Anatomy (Wikipedia)



PD-EXP Gray's Anatomy (Wikipedia)

Facial Trauma - Evaluation

- Physical Exam
  - Nose
    - Septal hematoma
      - Requires immediate evacuation to prevent pressure necrosis of the nasal septum
    - CSF Rhinorrhea
      - Indicates cribriform plate disruption
    - Deformity
      - Indicates nasal bone fracture
  - Ears
    - CSF leak
    - Hemotympanum
    - Battle's sign - indicates basilar skull fracture

Facial Trauma - Evaluation

- Physical Exam
  - Mandible/Dentition
    - Malocclusion
    - Flail mandible - two separate fracture site
    - TMJ dislocation - typically anterior
    - Tongue blade test
      - Patient bites down on tongue blade and it is twisted until it breaks:
        - Unable to break tongue blade indicates mandibular fracture
      - 95% sensitive; 65% specific for mandibular fracture
    - Loose/chipped teeth

Facial Trauma - Imaging

- Plain films
  - Challenging to read
  - Approach
    - Asymmetry
    - Bony integrity
    - Subcutaneous air
    - Sinus opacity
    - Teardrop sign - orbital fat herniation

Facial Trauma - Imaging

- Plain films
  - Waters or occipital-mental view
    - As sensitive a entire facial series
    - Examines orbital rims and air/fluid levels
  - PA or Caldwell view
    - Best for upper facial bones
  - Cross table or upright lateral view
    - Not helpful
  - Submental-vertex ("jug handle") view
    - Best to evaluate for zygomatic arch fractures
  - Towne view
    - Evaluation of mandibular ramus

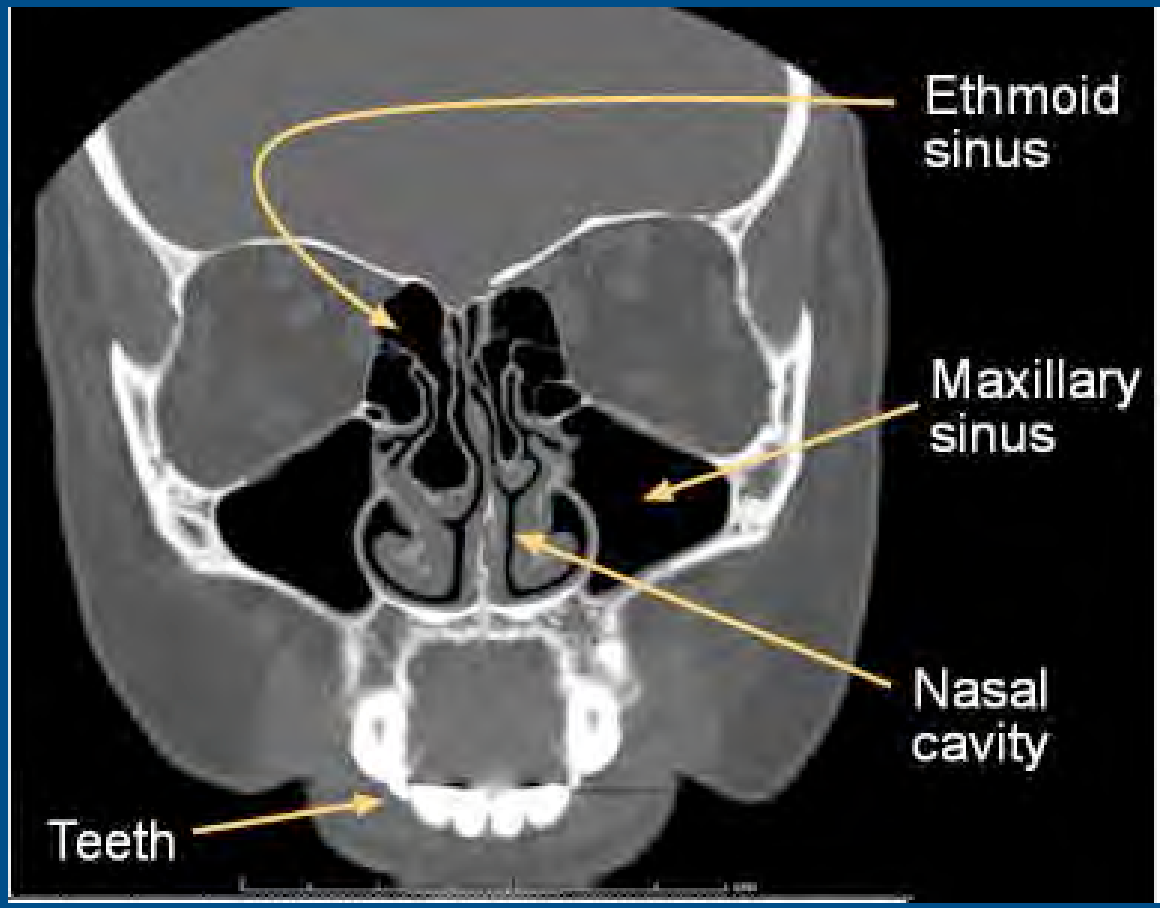
Facial Trauma - Waters view

- Structures to identify
  - Frontal sinus
  - Maxillary sinus
  - Ethmoid sinus
  - Nasal septum
  - Orbital rim
  - Zygoma
  - Zygomatic arch

PD-INEL Net Medicine

Facial Trauma - Imaging

- CT
  - Considered by some to be one of the two most important advancements in the last 20 years.
  - Helps guide surgical management



PD-INEL RadiologyInfo.org

Facial Trauma - Specific Injuries

- Frontal skull injuries
  - Thick part of skull - if injured here likely has injury elsewhere
  - Anterior aspect of sinus
    - Pain control
    - Surgery if depressed defect
    - Outpatient treatment if isolated
  - Posterior aspect of sinus
    - Concern for CSF leak/risk of meningitis
    - Neurosurgical consultation and admission
    - IV antibiotics - benefit questionable
      - Consider 1st gen cephalosporin or other coverage for sinus pathogens

Facial Trauma -Specific Injuries

- Orbital injuries
  - Blowout fractures
    - Physical Exam
      - Enophthalmos or sunken globe - indication for surgery
      - Infraorbital anesthesia - infraorbital nerve contusion or injury
      - Diplopia of upward gaze - inferior rectus entrapment
      - Step off deformity or subcutaneous emphysema
      - Visual impairment - compromise of optic nerve
    - Imaging
      - CT or plain films
    - Treatment
      - Surgery
        - Indicated w/ enophthalmos or diplopia
        - Severity of fracture seen on CT scan - varies with different surgeons
      - IV antibiotics - 1st or 2nd gen cephalosporin
      - Don’t blow your nose

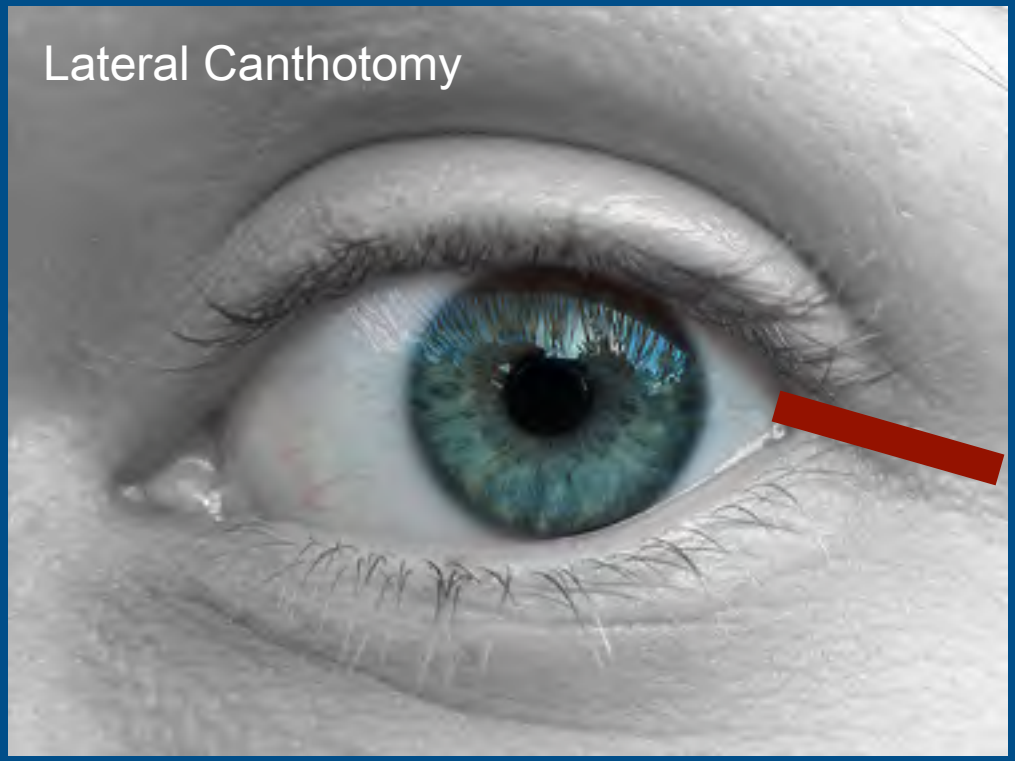
Facial Trauma - Specific Injuries

- Procedures: Lateral Canthotomy
  - Indications
    - Retrobulbar hemorrhage
    - Acute vision loss, proptosis, elevated IOP >40 mmHg
      - Irreversible vision loss in 90-120 minutes
  - Contraindications
    - Suspected globe rupture
    - Irregular pupil shape
    - Hyphema

Facial Trauma - Specific Injuries

- Lateral cantholysis:
  - Inject 1 mL of 1% lidocaine w/ epinephrine into the lateral canthus
  - Use a straight hemostat to crimp the skin of the lateral corner down to orbital rim
  - Use scissor to make 1-2 cm incision extending laterally
  - If pressure still elevated retract inferior lid downward to visualize lateral canthus tendon
  - Dissect the inferior crux of the lateral canthus tendon and cut it

Facial Trauma -Specific Injuries



 Thauran (Flickr)

Facial Trauma -Specific Injuries

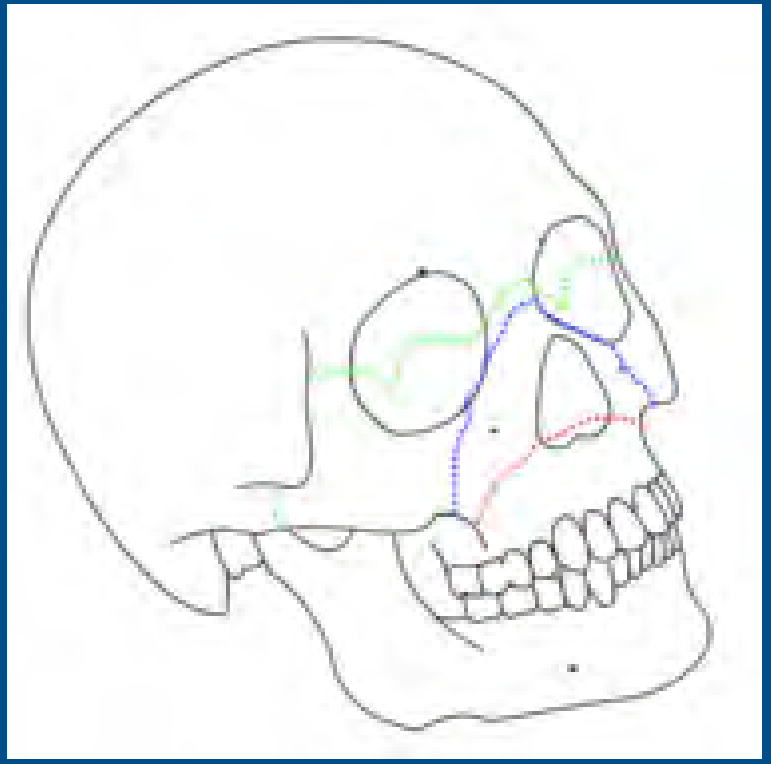
- Zygoma injuries
  - 2 fracture patterns
    - Arch - most common
    - Tripod - most severe
      - Involves: Zygomatic arch, maxillary sinus, and lateral orbital wall
      - Be aware of entrapment and vision changes
  - Treatment:
    - Arch - pain control as an out patient
    - Tripod - Admission for ORIF and antibiotics

Facial Trauma -Specific Injuries

PD-INEL MedScape

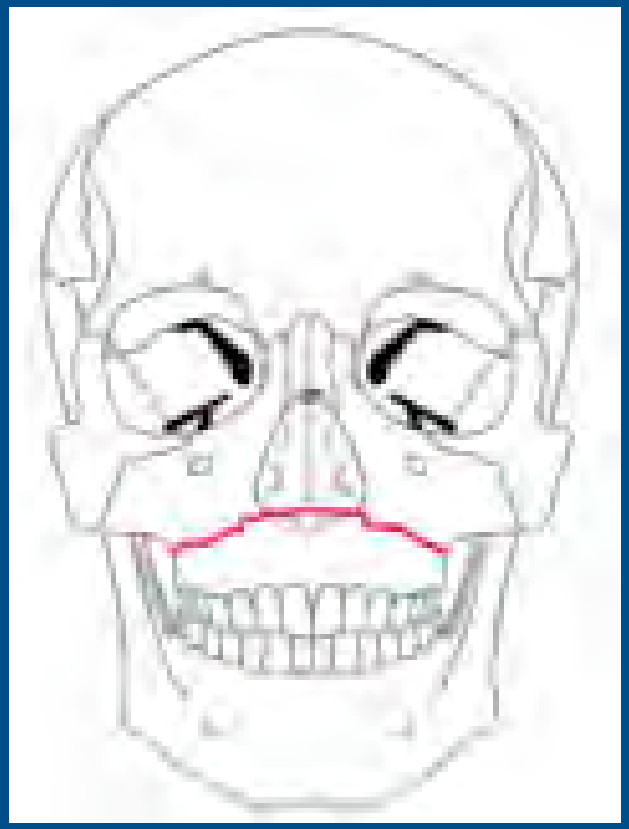
Facial Trauma - Specific Injuries

- Maxillary fractures
  - High energy
    - Usually associated with other injuries
  - Le Forte I - Transverse
  - Le Forte II - Pyramidal
  - Le Forte III - Craniofacial dislocation

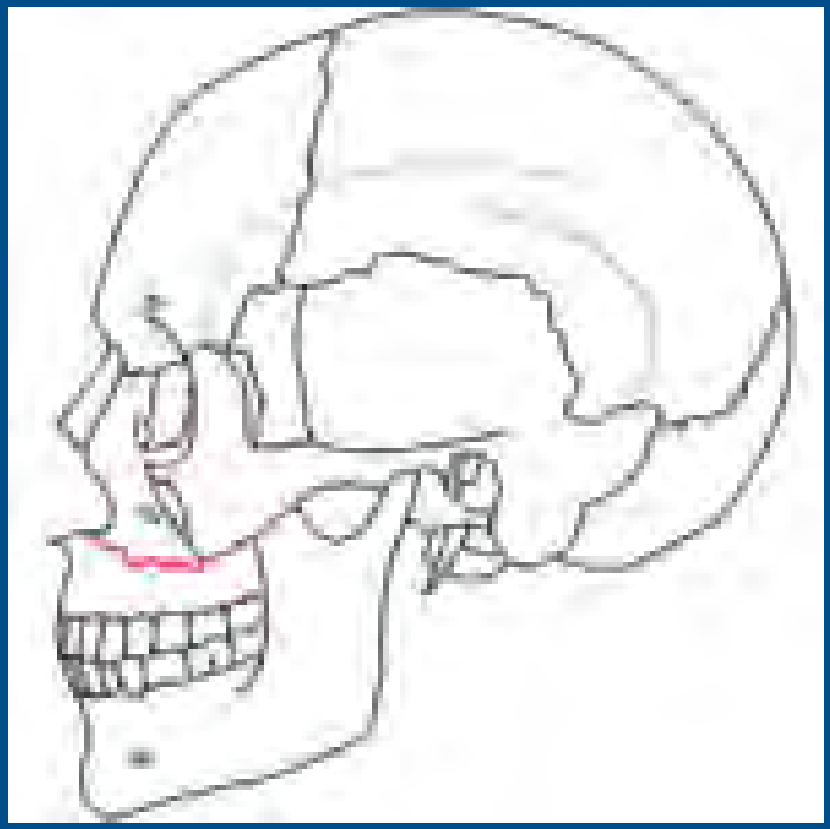


PD-INEL Le Fort fracture of skull (Wikipedia)

Facial Trauma - Specific Injuries

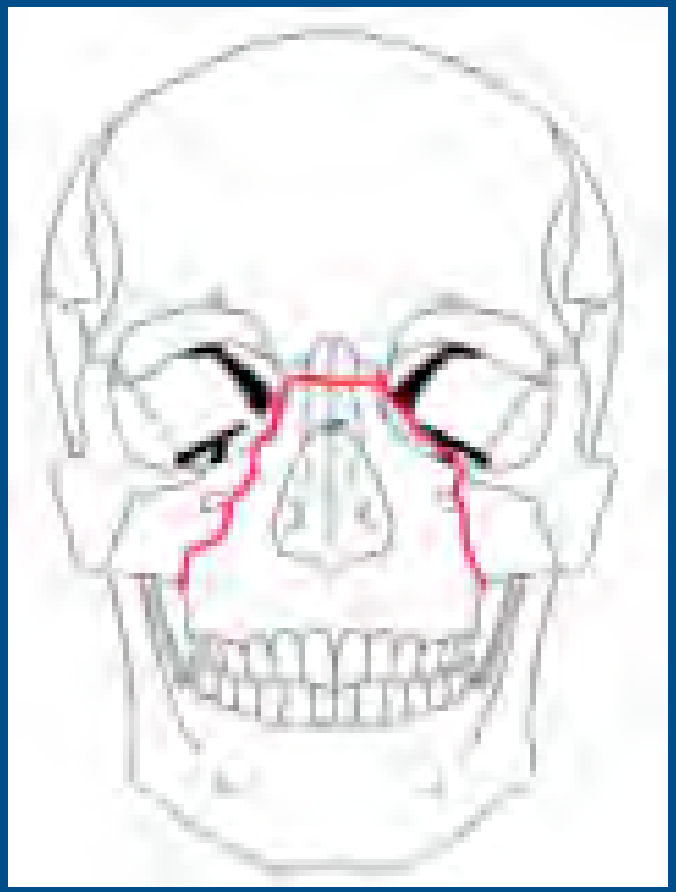


PD-INEL Le Fort fracture of skull (Wikipedia)

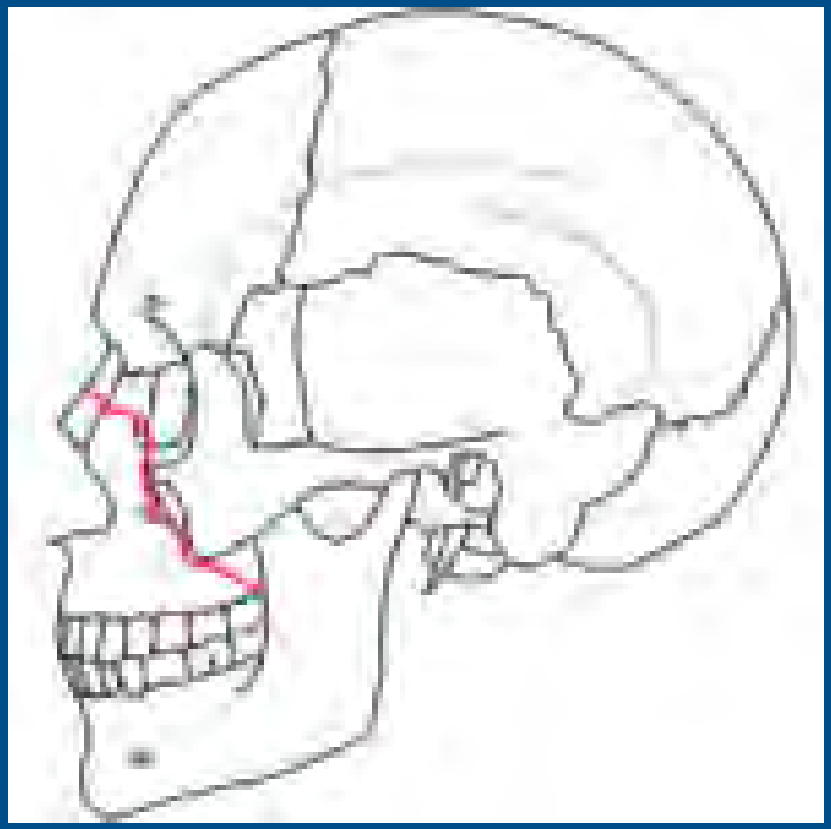


PD-INEL Le Fort fracture of skull (Wikipedia)

Facial Trauma -Specific Injuries

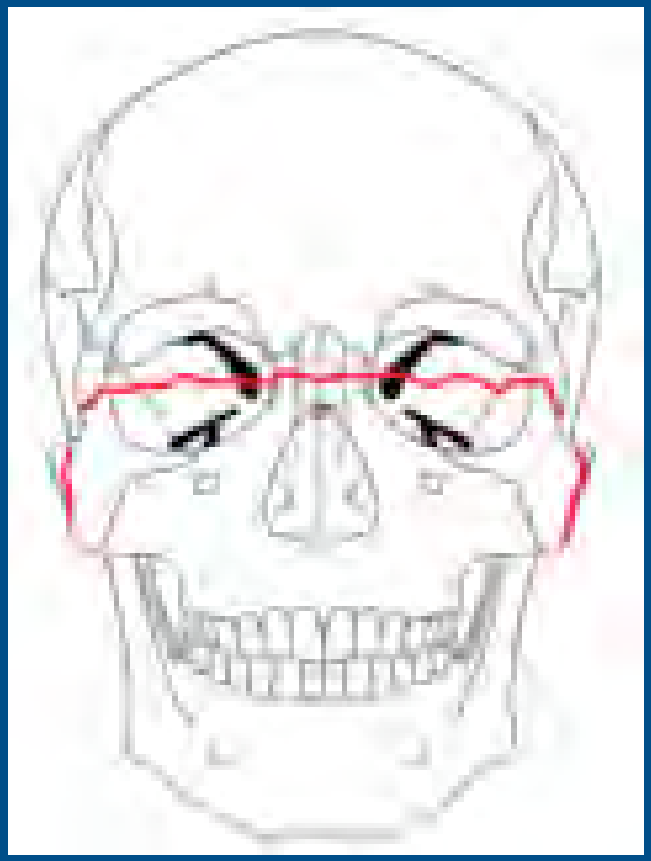


PD-INEL Le Fort fracture of skull (Wikipedia)

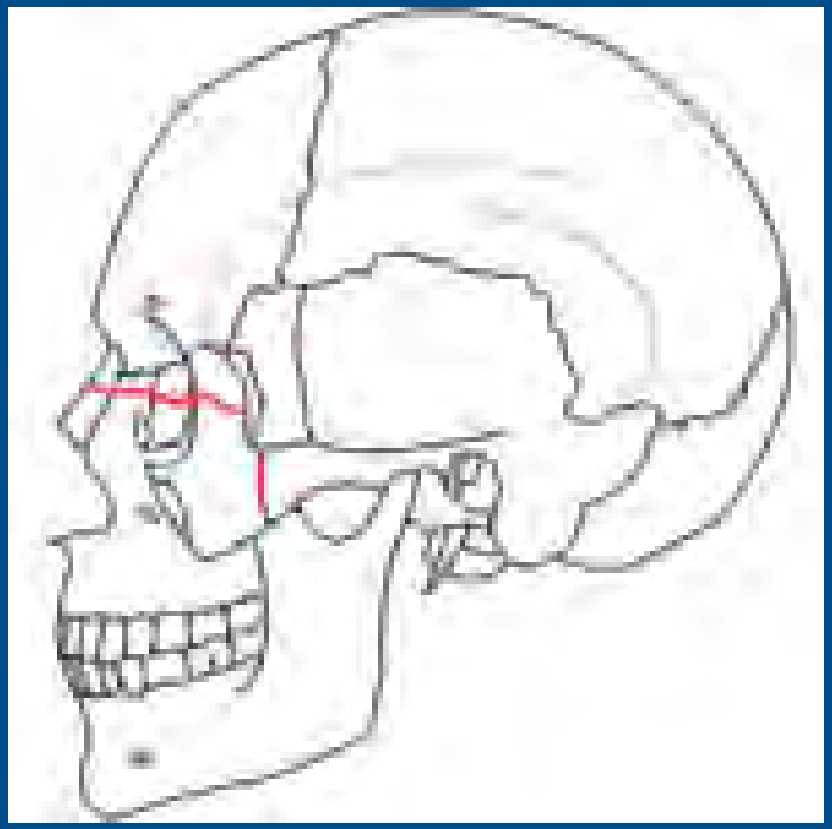


PD-INEL Le Fort fracture of skull (Wikipedia)

Facial Trauma - Specific Injuries



PD-INEL Le Fort fracture of skull (Wikipedia)



PD-INEL Le Fort fracture of skull (Wikipedia)

Facial Trauma - Specific Injuries

- Maxillary fractures
  - Treatment
    - Le Forte II and III - admission for stabilization and management
    - Antibiotics commonly given even though efficacy has not been proven
    - Be aware of visual deficits

Facial Trauma - Specific Injuries

- Mandibular fractures
  - Common mechanism is assault or fall onto chin
  - Often fracture in multiple locations
  - Intraoral laceration indicates open fracture
  - Ecchymosis under tongue is sensitive for mandibular fracture

Facial Trauma - Specific Injuries

- Mandibular fractures
  - Treatment
    - If open - admission and IV antibiotics
      - 1st gen cephalosporin, PCN, or clindamycin
    - If closed
      - May consider out patient care with consultation
    - Surgical intervention depending on the degree of displacement.
    - Barton bandage

Facial Trauma -Specific Injuries

- TMJ dislocation
  - Anterior dislocation most common
    - Can occur with impact as little as a yawn
    - Posterior, lateral, and superior also possible
      - Usually associated with other injuries
  - Present with acute pain, tragus pain, malocclusion, and palpable defect

Facial Trauma -Specific Injuries

- TMJ dislocation
  - Treatment
    - Anesthesia
      - Conscious sedation
      - Local: 2 mL of 2% lidocaine in the preauricular depression anterior to the tragus
    - Protect the thumbs - tongue depressor or gauze
    - Thumbs apply downward and backward pressure to the occlusal surface of the mandibular molars
    - Post reduction care:
      - Soft diet
      - Don’t open mouth wider than 2 cm for 2 weeks

Facial Trauma - Specific Injuries

- Nasal fractures
  - Most common facial fracture
  - Always asses for septal hematoma
  - Treatment:
    - Hemostasis
    - Drain septal hematoma if present
    - Surgical intervention only if cosmetic defect exists after swelling subsides.

Facial Trauma - Specific Injuries

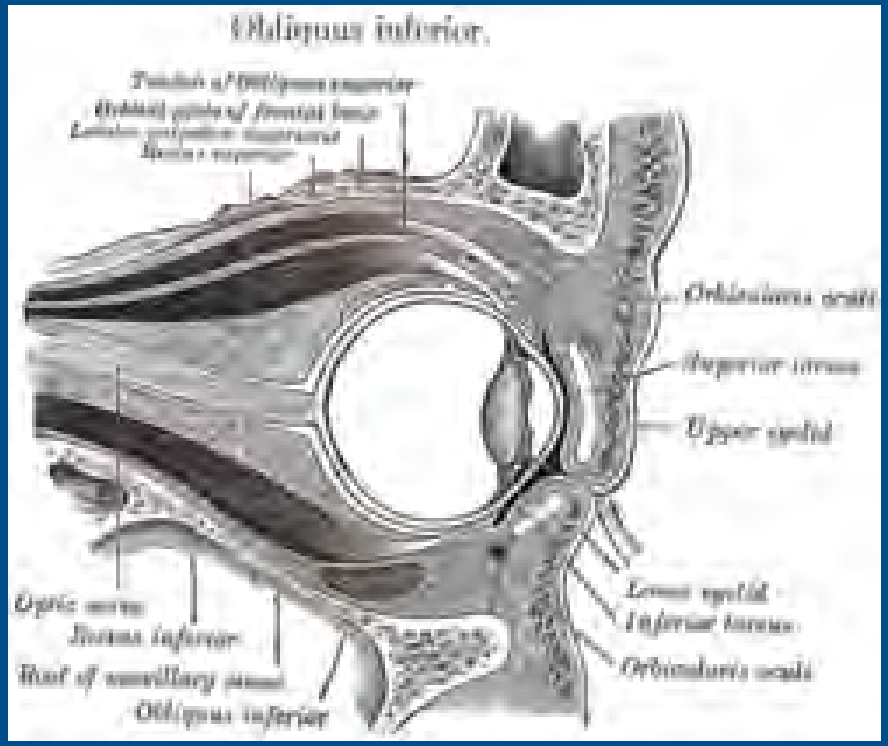
- Scalp Lacerations
  - Close the galea w/ 4-0 nylon
  - Close the muscle w/ 4-0 braided absorbable suture
  - Close the skin w/ staples or 4-0 nylon
  - Hemostasis is key - can have life threatening blood loss from scalp hematoma
  - Do not shave head
  - Remove staples in 7-10 days

Facial Trauma - Specific Injuries

- Forehead and eyebrow lacerations
  - Extra caution to align the eyebrows and skin tension lines for cosmetic repair
  - Use 6-0 nylon for the skin, or
  - 6-0 fast absorbing gut in children
  - 6-0 absorbable braided suture such as vicryl can be used for a deep layer to wounds under tension
  - Do not shave eyebrows
  - Remove sutures in 5 days

Facial Trauma - Specific Injuries

- Eyelid lacerations
  - Be especially aware of following injuries
    - Inner surface of lid
    - Lid margins
    - Lacrimal duct
    - Ptosis
    - Extension into the tarsal plate
  - Any of the above specialty assistance recommended



PD-EXP Gray's Anatomy (Wikipedia)

Facial Trauma - Specific Injuries

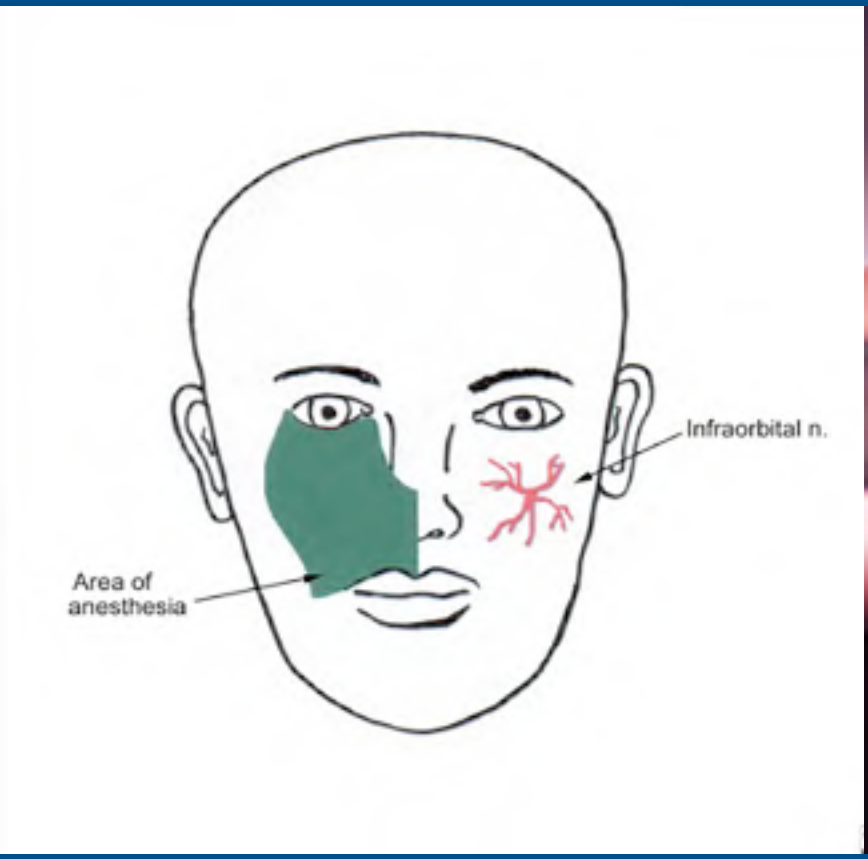
- Lips and oral mucosa
  - Line up the vermillion border!
  - 6-0 nylon for the skin
  - 5-0 plain gut for the mucosa
  - 4-0 braided absorbable (vicryl) for the muscle
  - Remove sutures from skin in 5 days
  - Only repair oral mucosa if it is gaping - at risk of food getting caught
  - Be aware of potential damage to parotid duct or facial nerve

Facial Trauma - Specific Injuries

- Regional anesthesia: Infraorbital Block
  - Locate the infraorbital foramen
    - Approx 1 cm below the orbital rim
    - In line with the pupil
  - Insert the needle via the superior labial sulcus at the apex of the canine fossa
  - Inject approx 2 cm of anesthetic near, but not within, the foramen

Facial Trauma - Specific Injuries

- Regional anesthesia: Infraorbital Block



PD-INEL Medscape

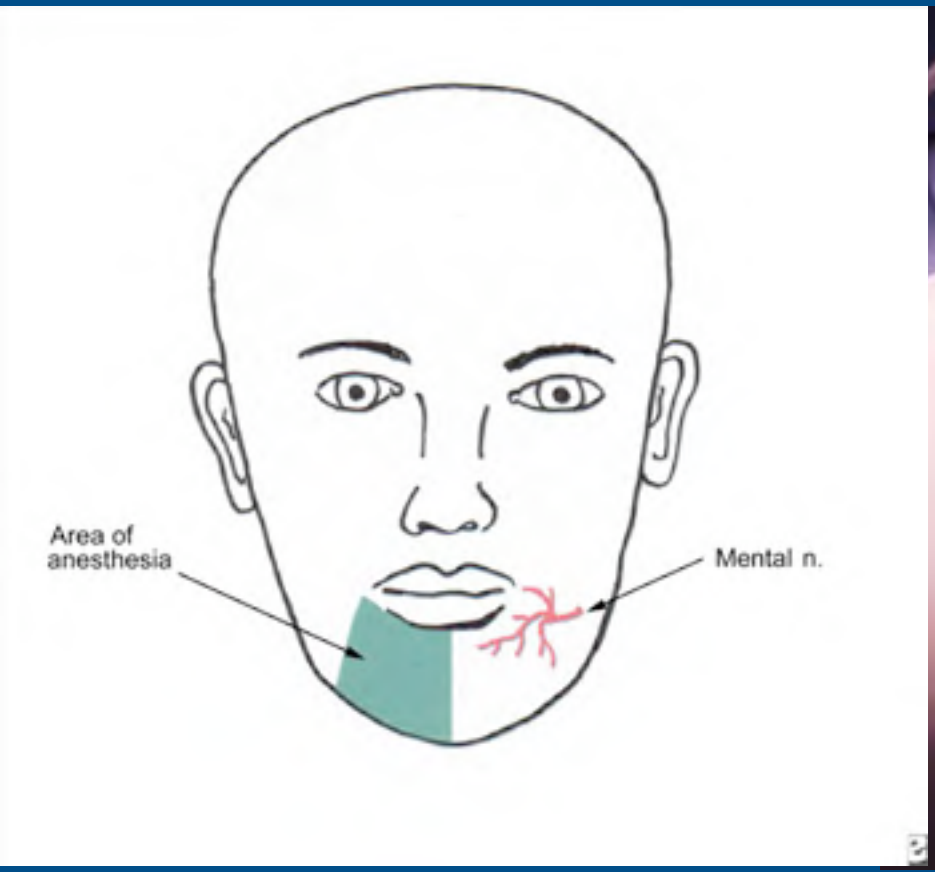
PD-INEL Medscape

Facial Trauma - Specific Injuries

- Regional anesthesia: Mental Block
  - Locate the mental foramen - in line with the pupil
  - Insert the needle via the inferior labial sulcus at the apex of the first bicuspid
  - Inject approx 2 mL of anesthetic
  - Note: topical anesthetic can be used prior to insertion of needle

Facial Trauma -Specific Injuries

- Regional anesthesia: Mental Block



PD-INEL Medscape

PD-INEL Medscape

Questions?

References

- Hasan N, Colucciello SA. Maxillofacial Trauma. *In*Tintinalli JE, *et al*, editor. Emergency Medcine: A Comprehensive Study Guide, sixth ed. 2004. The McGraw-Hill Compaines Inc, New York. 1583-1589.
- Burton JH, Armellina N. *In* Adams JG, *et al*, Emergency Medicine, first ed. 2008. Saunders, Philadelphia. 783-796.