Face and Neck Trauma
PFN: SOMEML0A

Hours: 1.0

Terminal Learning Objective

- **Action:** Communicate knowledge of face and neck trauma
- **Condition:** Given a lecture in a classroom environment
- **Standard:** Received a minimum score of 75% on the written exam IAW course standards

References

- Tactical Emergency Medical Protocols (TMEPS) 9th Edition
- Principles of Advanced Trauma Care 2002
- Tintinalli’s Emergency Medicine 7th Edition
Reason(s)

- Facial injuries can be potentially life-threatening as well as disfiguring
- Ocular trauma can lead to a loss of eyesight
- Neck trauma is a daunting challenge as a multitude of systems are channeled into a compact passage

Agenda

- Identify the common types of injury in face and neck trauma
- Identify the clinical presentation and management of face trauma
- Identify the clinical presentation and management of neck trauma
- Identify the clinical presentation and management of ocular trauma

Agenda

- Identify the clinical presentation and management of nasal trauma
- Identify the clinical presentation and management of oral trauma
- Identify the clinical presentation and management of ear trauma
- Identify key factors in assessing and managing face and neck trauma
Identify the Common Types of Injury in Face and Neck Trauma

Introduction to Face and Neck Trauma
- Accounts for 15% to 20% of all trauma death
- A focal point of multiple extremely vascular and innervated structures
- Potential for airway complications and compromise
- We need to concentrate on massive bleeds, and airway first
- Home to vulnerable sensory organs

Introduction to Face and Neck Trauma
- May require several interventions immediately to keep patient alive: arterial bleed(s)/cricothyrotomy
- May communicate w/both thorax/head/C-spine
- Damage to underlying bone structures
- Understand that the cranium and face are distinct anatomic structures and CAN separate
Introduction to Face and Neck Trauma
- Sitting or prone positioning may be indicated
- Nasotracheal interventions may be contraindicated
- Often require significant resources to manage
- Psychological concerns - Sensory loss/disfigurement
- Urgent transport potential - Life and eyesight!!

Blunt Trauma of the Face and Neck
- Common causes
  - Assaults, falls, and sports
- Contusions, abrasions, and hematomas should alert the provider that blunt forces were involved
- Common underlying injuries include fractures and internal hemorrhage
- Up to 10% of blunt face and neck trauma have a C-spine injury

Blunt Trauma of the Face and Neck
- Shearing, torsional, frictional, and compressive forces can lacerate soft tissue
- Injury to anatomical airway structures can lead to:
  - Fatal airway complication
  - Loss of voice/difficulty swallowing
  - Subcutaneous emphysema
- Vascular injuries are potentially devastating, but not as common as in penetrating neck trauma
- Immobilize facial fx/C-spine. Be mindful of airway
Penetrating Trauma of the Face and Neck

- Common causes
  - GSW, knife, and fragmentation
- Massive hemorrhage is our primary concern, and can lead to rapid exsanguination
- Higher incidence of airway compromise than blunt force trauma

Penetrating Trauma of the Face and Neck

- Lacerations of large vessels can entrain an air embolism - APPLY OCCLUSIVE DRESSINGS!!!
- Stop gap facial bleeds, and complete blood sweeps to ID other more emergent injuries, then bandage
- Be prepared to initiate fluid volume resuscitation for hemorrhagic shock, and Tranexamic acid

Blunt and Penetrating Trauma of Face and Neck Trauma

- MVC and Blast subject present with the potential for multi-system trauma w/multiple MOIs
- MVC by far the most common
  - High energy impacts involving vehicle, other objects, and mobile passengers
  - Most common DNBi in mature theaters
  - Rear ends have higher incidence of c-spine injuries
Blunt and Penetrating Trauma of Face and Neck Trauma

- Blast = Mass casualty potential
  - Pressure wave effects on body/organs
  - Blast wave effects magnified indoors
  - Energized debris/shrapnel
  - Light energy causing blindness
  - Acoustic energy causing hearing loss
  - Thermal energy causing burns
  - Release of toxic gases
  - Blast wave(s) can cause occult injuries

Identify Clinical Presentation and Management of Face Trauma

- Lacerations/bleeding
- Mid-facial edema
- Ecchymosis
- Telecanthus
- Enophthalmos
- Lengthening of the face (‘Donkey Face’)
- Visual disturbances
Face Trauma Signs and Sx

- Ophthalmoplegia
- CSF rhinorrhea
- Epistaxis
- Displaced nasal septum
- Nasal flattening
- Hypoesthesia

Face Trauma Signs and Sx

- Dental malocclusion
- Cheekbone and/or orbital asymmetry
- Unstable Maxilla
- Limited mandible movement (Trismus)
- Crepitus
- Pain/swelling

Fractures

- 21-30 years of age 29% - Males to females 3.98 to 1
- Assessment priority is still MARCH!!
- Immobilize as able (Airway!), pain meds, and EVAC

Complications

- Emergent
  - Airway/vascular compromise
  - Basilar skull fracture
  - Sensory organ compromise

- Long term
  - Hypoesthesia 68.4%
  - Diplopia 25.6%
  - Infection/palsy 2.3%
  - Hematoma 0.8%
  - TMJ anklosis 0.8%
Fractures
- Isolated 82.6%
  - Nasal bone 37.7%
  - Mandible 30.0%
  - Orbit 7.6%
  - Zygoma 5.7%
  - Maxilla 1.3%
  - Frontal bone 0.3%
- Complex 17.4%
  - Most common bone combinations involved
    - Zygoma, maxilla, orbital floor, and nasal
  - Type - Tripod 6.2%
  - Region - Inferior (blue)

Le Fort Fractures
- Le Fort 1 - Low A-P force
  - Edema, mobility of hard palate, ecchymosis, gross blood, anterior open bite, and hematoma
- Le Fort 2 - Directed superior or A-P
  - Hypoesthesia, telecanthus, raccoon eyes, mobility of the maxilla and CSF
- Le Fort 3 - High velocity
  - Donkey face, visual disturbances, ophthalmoplegia, enophthalmos, and globe rupture

Assessment and Treatment
- Treat life threats: Stopgap bleeds, position and manage airway, then bandage massive hemorrhage
- Inspect and palpate head and face
- Dress venous bleeding/burns and immobilize facial fractures.
Identify the Clinical Presentation and Management of Neck Trauma

Neck Trauma Concerns

- Zones of the neck
  - **ZONE I** – Confined between Clavicle and Cricoid Cartilage
  - **ZONE II** – Between Cricoid and Angle of Mandible
  - **ZONE III** – Between Angle of Mandible and Base of Skull
- Our key concerns are always:
  - Life-threatening hemorrhage
  - Airway (obstruction, destruction, aspiration)

Hemorrhage Control for Neck Wounds

- Impaled object in neck
  - Control hemorrhage
  - Asses suck and blow
  - Dry area then occlusive dressing
  - Reassess
  - ‘Bandage, stabilize, minimize’
- Don’t remove unless:
  - Obstructs the airway
  - Impedes lifesaving resuscitation or to facilitate evacuation
Hemorrhage Control for Neck Wounds

- Blunt trauma can rupture vessels great and small causing hemorrhage beneath the tissue
- Expose wound/control massive hemorrhage
  - Simple wound compression
  - Bulky dressing
  - Wound packing/hemostatic gauze
  - Vessel clamping/ligation
  - Foley catheter balloon tamponade

Hemorrhage Control for Neck Wounds

- Control hemorrhage
- Rapidly clean/dry off area
- Apply occlusive material and secure with 3” tape on all sides, and assess...or use a chest seal
- Apply bulky dressing material over occlusive
- Apply C-collar to hold dressing(s) in place, or bandage
- Log roll/sit patient up to assess for downside wounds, reassess

Foley Balloon Tamponade

- Foley catheter balloon tamponade
  - All other methods failing
  - Not an exact science
  - If evacuation to surgical facility delayed
  - Will need to be removed in the OR
- Steps
  - Slide Foley catheter into wound
  - Inflate with 5cc of water/untiil resistance felt
  - Clamp Foley or tie it on itself
  - Suture into place/refer to surgery ASAP
Identify the Clinical Presentation and Management of Ocular Trauma

Corneal Abrasion
• Causes:
  ➢ Trauma to the eye, foreign body getting caught under the eyelid, chemical burns, aggressively rubbing eye, ill fitting/dirty contact lenses, some eye infections, desiccation (surgery)
• Signs and Sx:
  ➢ Pain, photophobia, foreign, body sensation, squinting, lacrimation, conjunctival injection, swollen eyelids

Foreign Body
• Signs and Sx:
  ➢ FB can produce irritation - conjunctivitis, lacrimation
  ➢ May or may not be visible. If pt complains of a sudden eye pain or "something in my eye", believe them
  ➢ FB can be in the interior eyelid. Invert lid(s) during exam
  ➢ Leaving a FB in the eye can cause a series of abrasions known as "ice rink sign"
Anterior to posterior blunt/penetrating eye trauma
- Usually occurs where sclera is the thinnest (limbus, extra-ocular muscles point of attachment)
- Seidel Test: A “waterfall” like effect seen after fluorescein staining is a positive Seidel test, and indicates Aqueous humor leakage/globe rupture

A negative Seidel test does not rule out intermittent Aqueous humor leakage/globe rupture.
- Eyeball may appear visibly deflated or anterior chamber excessively deep
- Depolarizing NMB/pressure “tonometers are contraindicated. May worse intraocular content herniation.

Caused by disrupted vasculature in the anterior chamber
- Blood pools by gravity forming a visible meniscus
- Signs/sx - Pain, photophobia, blurred vision, N/V may=IIOP
- “Eight-Ball” Hyphema”. This hyphema completely fills the anterior chamber.
Ocular Trauma Treatment Guidelines

- **Eye Injury**
  - Calm and reassure patient

- **General Injury**
  - Cover injured eye with eye shield, no gauze under eye shield
  - Cover uninjured eye to reduce movement
  - Conduct gross vision check if possible

  1gm Ertapenem (Invanz)

Ocular Trauma Treatment Guidelines

- **Eye Injury**
  - Corneal Abrasion
    - Invert eyelid and examine eye for foreign body (FB)
    - Remove any FB with moistened gauze or sterile cotton applicator swab
    - Topical (ophthalmic) NSAID PRN for pain
    - PO pain Rx PRN

- **Avulsed or Impaled Eye**
  - Cover and Protect from further injury
  - 400 mg Moxifloxacin (Avelox) or 1gm Ertapenem (Invanz)

Ocular Trauma Treatment Guidelines

- **Enucleation**
  - Cover both eyes w/rigid eye shield and Evacuate!!

- **Burns**
  - Irrigate and dress w/ophthalmic antibiotic (Erythromycin or Gentamycin)
  - Chemical
  - Thermal

- **Retrobulbar Hemorrhage**
  - Evac and/or lateral canthotomy
**Eye Shield**

- Do not use pressure to dress eye wounds
  - If there was a globe rupture, you could be literally squeezing aqueous/vitreous humor from the eye globe by applying pressure
- Use eye shield. Don’t have one? Improvise one

**Orbital Compartment Syndrome**

- Often secondary to periorbital trauma
- Blood pools behind the eye globe
- Resulting pressure pushes the eye forward in its socket, with increasing pressure
- Can result in Orbital Compartment Syndrome that can be vision-threatening

**Retrobulbar Hematoma and Orbital Compartment Syndrome Treatment**

- Primary Indications
  - Decreased visual acuity
  - Proptosis
  - IOP > 40 mm Hg
- Secondary indications
  - Afferent pupillary defect
  - Cherry red macula
  - Ophthalmoplegia
  - Eye pain (increasing)
Lateral Canthotomy and Cantholysis

- Lateral canthotomy
  - Can be a vision-saving procedure
  - Reduces pressure of retrobulbar hematoma by severing the inferior lateral canthal tendon
  - Best left to most experienced medical operator on site
  - Once done, patient still needs to be evacuated to definitive care

Lateral Canthotomy and Cantholysis: Pitfalls

- Tonometry and globe palpation contraindicated in patients with open globe injury
- Do not perform canthotomy if you suspect globe rupture
- Exercise caution using instruments near eye globe

Identify the Clinical Presentation and Management of Nasal Trauma
Nasal Trauma Concerns

- Common due to its prominent position
- Underlying skeletal injury
- Control Massive Hemorrhage
  - Severe nasal bleeding
  - Concomitant bleeds
- Airway Complications
  - Soft tissue swelling and edema
  - Posterior-inferior maxilla fracture block the nasopharyngeal airway
- Epistaxis vs CSF, Septal hematoma and avulsions

Nasal Trauma Concerns

- Epistaxis
  - Posterior bleeds more difficult to control
  - Can obstruct airway
  - Aspiration risk
  - Rarely massive unless associated with concurrent Fx
  - Usually associated with Kiesselbach’s plexus in the anterior nose, Sphenopalatine artery in the Posterior
  - Bleeding is posterior as well, so be conscious of airway/aspiration risks

Epistaxis

- Treatment
  - Clear clots/contaminants from airway
  - Oxymetazoline (Afrin) 2 squirts in each nostril
    - pinch anterior nose 10 minutes
  - Insert Afrin-soaked nasal sponge or nasal tampon bilaterally
    - pinch anterior nose 10 minutes
  - Chemical cautery - Silver Nitrate
  - Foley catheter or tonsil sponges
Epistaxis Foley Catheter

- Prepare 14 French Foley catheter (tip is cut to minimize distal irritation)
- Advance catheter until visible in mouth
- Fill balloon with 5cc of normal saline
- Seat catheter posterior nasopharynx
- Add an additional 5cc of normal saline
- Clamp in place.
- Ertapenem (Invanz) 1 gm IV/IM or Moxifloxacin (Avelox) 400mg PO qd
- LEAVE BALLOON AND PACKING IN PLACE FOR 72 HOURS

Nasal Trauma Concerns

- Septal hematoma
  - Bruise/bleed within the nasal septum
  - Caused by nasal fx/blunt force MOI
  - Disruption of vessels in area allows blood/fluids to collect under septal lining
  - Symptoms include: blockage in breathing (nose), nasal congestion, painful swelling of the nasal septum
  - Untreated septal hematomas may result in Saddle Nose deformity

Identify the Clinical Presentation and Management of Oral Trauma
Oral Trauma Concerns

- Control Hemorrhage and secure the AIRWAY!!
- Be prepared to deal with FBAO and suction. If that fails, cricothyrotomy
- Examine for more serious injury
- Don’t overlook ‘SAMPLE’
- Clean face, rinse mouth, examine and treat exterior and interior oropharynx for soft tissue injury

Oral Trauma Concerns

- Examine/immobilize mandibular and maxillary fractures
- Tooth/upper palate mobility?
- Dental trauma
  - Check for dental malocclusion
  - Check for avulsed teeth
  - Check for fractured teeth
  - Check for fracture of alveolar process

Airway

- Position airway
  - Remove obstructions (Magills/suction)
  - Airway adjunct (OPA vs NPA)
  - ETI/Cricothyrotomy
- Obstruction sites:
  - Head/neck trauma to the base of tongue and upper pharynx - Stertor
  - Blunt and penetrating neck injuries may cause laryngeal trauma - Stridor
Airway Complications

- Obstruction causes:
  - Blood or secretions
  - Soft tissue edema
  - Fractured, free-floating mandible may cause tongue base retro-displacement
  - Collapse of the tongue base against the posterior pharynx
  - Displaced tooth fragments
- “Teeth and tongue intact, no blood? No mucous?”

Surgical Cricothyrotomy

- Indications
  - Can’t maintain airway due to massive maxillofacial trauma
  - Edema of the glottis or epiglottis
  - Severe oropharyngeal hemorrhage obstructing the airway
  - FBAO in the larynx
  - Laryngospasm (near drowning)
  - Inability to ETI (at least 2 attempts)

- Contraindications
  - ETI can be accomplished
  - Inability to identify anatomical landmarks
  - Underlying anatomical abnormality (e.g. tumor, subglottic stenosis)
  - Tracheal trans-section
  - Acute laryngeal pathology caused by trauma or infection
  - Children <10 years old (needle jet insufflation)
Surgical Cricothyrotomy

- Complications
  - Inadequate ventilations leading to hypoxia and death
  - Aspiration of blood
  - Esophageal laceration
  - Posterior tracheal wall perforation / laceration
  - Subcutaneous and or mediastinal emphysema
  - Injury to adjacent structures

- Thyroid perforation
- Creation of a false passage into the tissues
- Subglottic stenosis / edema
- Laryngeal stenosis
- Hemorrhage or hematoma formation
- Vocal cord paralysis, hoarseness

Avulsed Teeth

- Fx teeth – Find/save any pieces
- Avulsed tooth
  - Time-critical – 30-60 minute window for best chance at re-implantation.
  - Handle by crown only. DO NOT SCRUB IT! LEAVE THE ROOT/ PDL ALONE!
  - Flush socket if time allows
  - Attempt to re-implant

Re-implantation

- Rinse tooth and flush socket
- Gently yet firmly insert to level of ‘contour line’
- Instruct patient to bite down on a gauze for at least 20 minutes

Unable to replace?

- Transport!
  - Cushioned (gauze) container
  - Physiologically balanced solution
  - LR or 0.9% NS
  - Milk/water
  - Underneath pt’s tongue
Fractured Teeth

- Alveolar Fracture
  - Fractured bone entirely around tooth
  - Can see two or more teeth move together when checking mobility
  - Can attempt to reduce and/or splint
  - Without local anesthetic, and/or the proper equipment, an option is no Tx
  - Refer to dental officer and/or oromaxillofacial surgeon ASAP

Identify Clinical Presentation and Management of Ear Trauma

- Internal Ear:
  - Tympanum Rupture
    - Definitive way to Dx is by otoscopic exam
    - May or may not present with accompanying injuries
    - Signs/sx - Decreased hearing, pain, and audible whistling sounds
  - Otorrhea - Blood or CSF
    - Halo test
    - Glucometer
    - String test

Ear Trauma Concerns
Ear Trauma Concerns

- **External Ear:**
  - Pinna has a poor blood supply
    - Tends to heal poorly
    - Healing is often complicated by infection.
  - Control bleeding by:
    - Direct Pressure, dressing between ear and scalp, roller bandage, ice pack
  - If partially avulsed realign into position of function, bandage w/moistened gauze. Full Avulsion=moist gauze in ice
  - Burns - Be sure to wrap ears to keep them from adhering to head

Auricular and Subperichondrial Hematoma

- **Auricular Hematoma** - Separation of anterior auricular perichondrium from underlying cartilage
- **Subperichondrial Hematoma** - Tearing of the blood vessels at the level of the perichondrium
  - Blunt trauma leads to hematoma formation
  - Compromises avascular cartilage viability
  - Signs/sx - Otalgia, otorrhea, vertigo, and TM Rupture
  - Tx - I&D, digital pressure 5-10 min, petroleum gauze, and bulky dressing

Identify Key Factors in Assessing and Managing of Face and Neck Trauma
Scene Survey

- What is the MOI, and what structures are involved. Both face/neck and associated
- Be prepared to ask for assistance
- C-spine precautions if indicated.

Initial Assessment

- AVPU
  - Concomitant head injury is a real possibility
- ADDRESS LIFE THREATS FIRST
  - "Hold pressure here, while I inspect the airway"
- Elicit a history/SAMPLE/allergies while casualty is still conscious

Airway

- Assess airway constantly w/face-neck injuries
  - Slow (< 12) – Assisted or total ventilation with BVM
  - Fast (20-30) – Consider assisting if tidal volume is low
  - Abnormally fast (> 30) – Assist ventilation
- May need to be upright to ensure an open airway
- Airway compromise may require surgical cric ASAP!
Breathing

- Inspect for communication between neck and thoracic cavities, as well as penetration of sinuses.
- Manage injuries that could complicate breathing:
  - Occlusive on wounds from the angle of the mandible to the umbilicus. Watch for blood in the interior oropharynx.
- Bandage impaled objects (petroleum gauze/Halo).

Circulation

- Inspect for entrance/exit/downside wounds.
- Control injuries/improve bleeding stopgaps:
  - Once airway is secure, dress/clamp/occlusive/bandage.
  - Be mindful of closed hemorrhage from blunt trauma.
- Trend indicators of hypotension/shock. Periodically the only finding - Pulse, CCT, BP/PaD.

Security Halt

- Reassess LOC, ABC, and treatments (cric, NPA, hemcon).
- IAPP.
- Pain management as appropriate:
  - Don't exacerbate hypotension.
  - Ensure adequate tidal volume.
Rapid Exam

- Reassess LOC, ABC, and treatments (cric, NPA, hemcon)
- Inspect and palpate head/face, PERRLA
- C-Spine - Palpate C2-C7
- Briefly assess neck for JVD, and tracheal deviation

<table>
<thead>
<tr>
<th>Step</th>
<th>Result/mode/adjacent measure/placement (PNB)</th>
<th>Result/mode/adjacent measure/placement (PNB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inspect/abnormal head</td>
<td>Reassess/adjacent head</td>
</tr>
<tr>
<td>2</td>
<td>Inspect (rare PERRLA)</td>
<td>Right reaction (left head and tilted)</td>
</tr>
<tr>
<td>3</td>
<td>Inspect naso/nasal deviation</td>
<td>All normal</td>
</tr>
<tr>
<td>4</td>
<td>Palpate/maneuver C-spine (TOD)</td>
<td>C-spine should be in place from initial</td>
</tr>
<tr>
<td>5</td>
<td>Start all therapies</td>
<td></td>
</tr>
</tbody>
</table>

Rapid Exam (Inspect)

- Common findings
  - PERRLA/Rapid visual acuity check
  - Raccoon eyes
  - Otorrhea
  - Battle sign
  - Rhinorrhea
  - No blood, mucous, or dip. Teeth, tongue intact
  - No JVD or tracheal deviation

Rapid Exam (Inspect)

- Globe – Is the globe itself ruptured? Collapsed? Misshapen?
- Lid laceration – Best left to an ophthalmologist to close, (potential lacrimal system involvement)
- Start looking for telltale signs of orbital compartment syndrome
- When in doubt protect the eye and transport!!
Palpate

- **DCAP-BTLS**: Deformity & Discolorations, Crepitus & Contusion, Abrasion & Avulsion, Puncture/Penetrating Injury, Burns, Tenderness, Laceration, Swelling & Symmetry
  - Palpate skull and then facial bones
  - Le Fort 1-3 - Mandible intact
  - Have assistant stabilize c-spine, and disconnect C-collar. Palpate C2-7 for step offs and deviations. Reapply collar

Rapid Exam

- Plug all holes prior to baseline vitals
- Splinting prior to final set of vitals
  - C-collars, Barton's, Modified Barton's, and Four Tailed bandages are good for both securing face/neck dressings, as well as immobilizing facial fractures

Detailed Exam

- Conduct another complete head to toe
- Trend current and previous findings
  - Face - Irrigate, and suture facial wounds
  - Eye - Assess/tx orbital compartment syndrome, Snellin Chart, fluorescein staining, irrigation, FB removal
  - Ear - halo/glucometer test, otoscope, I&D auricular subperichondral hematoma
  - Nose - Reassess epistaxis tx's, I&D Septal Hematoma
  - Oral - Re-implant/splint fx/avulsed teeth
Slide 79

Questions?

Slide 80

JSOMTC, SWMG(A)

Agenda
- Identify the common types of injury in face and neck trauma
- Identify the clinical presentation and management of face trauma
- Identify the clinical presentation and management of neck trauma
- Identify the clinical presentation and management of ocular trauma

Slide 81

JSOMTC, SWMG(A)

Agenda
- Identify the clinical presentation and management of nasal trauma
- Identify the clinical presentation and management of oral trauma
- Identify the clinical presentation and management of ear trauma
- Identify key factors in assessing and managing face and neck trauma
Reason(s)

- Facial injuries can be potentially life-threatening as well as disfiguring
- Ocular trauma can lead to a loss of eyesight
- Neck trauma is a daunting challenge as a multitude of systems are channeled into a compact passage

References

- Tactical Emergency Medical Protocols (TMEPS) 9th Edition
- Principles of Advanced Trauma Care 2002
- Tintinalli’s Emergency Medicine 7th Edition

Terminal Learning Objective

- Action: Communicate knowledge of face and neck trauma
- Condition: Given a lecture in a classroom environment
- Standard: Received a minimum score of 75% on the written exam IAW course standards
Face and Neck Trauma
PFN: SOMEMLOA

Hours: 1.0