NECK AND FACIAL INJURIES

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Learning Objectives

- Neck zones
- Mechanism of neck injuries
- Presentations of neck injuries
- Hard and soft criteria of neck injuries
- Management according to zones involved
- General features of facial injuries
Relevant Anatomy

The lateral neck is divided into 3 zones:

- **Zone 1** extends from the clavicle to the cricoid cartilage and includes the thoracic inlet. Contains the subclavian artery and vein, jugular vein, and common carotid artery, esophagus, thyroid, and trachea.

- **Zone 2** extends from the cricoid to the angle of the mandible and contains the common carotid artery, internal and external carotid arteries, jugular vein, larynx, hypopharynx, and cranial nerves X, XI, and XII.

- **Zone 3** is a small but critical area extending from the angle of the mandible to the skull base. Contains the internal and external carotid arteries, jugular vein, lateral pharynx, and cranial nerves VII, IX, X, XI, and XII.
Mechanisms of neck Injury

- Penetrating
- Blunt
- Strangulation/ near-hanging
SIGNS AND SYMPTOMS OF NECK INJURIES

Aerodigestive
- Subcutaneous emphysema
- Hematemesis
- Hemoptysis
- Dysphagia (difficulty swallowing)
- Dyspnea
- Hoarseness
- Deformity
**Vasculature**
- Hemorrhage; significant external bleeding or expanding hematoma
- Hemoptysis
- Hematemesis

**Cervical Spine**
- Deformity
- Head fixed in an abnormal position
- Muscle spasms
- Parasthesia in the arms
- Paralysis
- Neural deficits
Evaluation of the stable patient

- ABCs first
- Mechanism of injury?
- Which zone(s) of the neck?
- Depth of wound (through platysma?)
- Transcervical?
Airway management

- Talk to the patient...airway and CNS
- Chin lift and jaw thrust
- Oropharyngeal airway
- Endotracheal/nasotracheal airway
- Cricothyroidotomy
- Tracheostomy
Physical examination

- **Look**
  - Zone of neck
  - Apparent depth
  - Bubbling or bleeding
  - Haematoma

- **Feel**
  - Sub Q emphysema

- **Listen**
  - Bruit
- Right common carotid arterial pseudoaneurysms
- Extravascular collections of contrast material
Left common carotid arterial partial thrombosis in a gunshot wound injury.
- Tracheal posterior wall disruption caused by penetrating injury to the neck
- Secondary air leakage with significant subcutaneous emphysema
- A large bullet (\(\ast\)) located in the right lateral side of the spinal canal
- C2 fracture (arrow) involving the left posterior arch
Diagnostic Procedures

Clinical Diagnosis
ABCDE

Laboratory Studies
- Hemoglobin and hematocrit level to determine the degree of blood loss or detect underlying anemia
- Glucose level, which can affect level of consciousness
- Electrolyte levels (basic electrolyte panel) to detect metabolic disturbances
- ABGs
Imaging Studies

- Radiography
  - Chest and Neck X-rays
  - Air in the prevertebral or deep neck spaces suggests injury to the larynx or trachea.
  - Pneumomediastinum and pneumothorax suggest airway injury

- CT scanning can show:
  - Laryngeal injuries
  - Lacerations of vocal cords
  - Subluxed laryngeal cartilages
  - Crush injuries of the larynx
  - Retained foreign bodies
  - Vertebral fractures/subluxations
  - Vascular injuries
Contrast-enhanced esophagography
- 70-80% sensitivity
- Gastrografin is preferred to prevent barium-induced mediastinitis or pneumonitis.

Doppler ultrasonography
- To detect stenosis or aneurysm formation of carotid arteries
- **Flexible laryngoscopy**
  - Edema
  - Hematoma
  - Mucosal tears
  - Exposed cartilages of oropharynx, hypopharynx and larynx

- **Angiography**
  - Routine angiography is recommended for all suspected vascular injuries of the neck esp; for Zone I and III injuries
Treatment

Medical Therapy

- Penetrating neck injuries without evidence of aerodigestive or vascular injuries should be admitted in ICU and observed for 48-72 hours
- Serial clinical examinations
- Broad spectrum antibiotics
- H2 blockers
- Laryngotracheal injuries causing edema are managed with serial examination, elevation of the bed, and corticosteroids
Esophageal tears are the most common injuries to be diagnosed late.

Signs and symptoms suggestive of an occult esophageal injury include fever, tachycardia, chest pain, and widening of the mediastinum on chest radiographs.

**Surgical Therapy**

- Major vascular injuries
- Esophageal perforation
- Tracheal and laryngeal fractures
- C-spine fractures
- Expanding hematomas
Penetrating neck wounds

- Depending upon the depth and location of the wound
- Lacerations superficial to platysma ... based on the anatomic zones irrigated, debrided and closed primarily
- Lacerations longer than 7cm should be evaluated and closed in the operating room to lower the risk of infection
- Wounds deep to the platysma .... Should be surgically explored
**Zone I injuries** .... commonly involve the great vessels

**Hard evidence of vascular trauma**

- Severe active hemorrhage
- Shock unresponsive to volume expansion
- Absent ipsilateral upper extremity pulse
- Neurologic evidence
**Soft evidence**

- Bruit
- Widened mediastinum
- Hematoma
- Decreased upper extremity pulse
- Shock responsive to volume expansion

**Routine arteriography is needed because difficult to evaluate clinically**
Patients should undergo dual evaluation with bronchoscopy and gastograffin swallow. 

*CT arteriography ... good for evaluation of vascular and aerodigestive tract injuries*
**Zone II injuries**... symptamotology is similar to zone I

**Management**

- Observation alone
- Routine arteriography
- Pan endoscopy
- Contrast enhanced CT
- CT angiography
- Ipsilateral cervical exploration... for all patients with injuries deep to the platysma
Zone III injuries ... problems

- Difficulty in gaining exposure
- Difficulty in gaining control of vessels
- Arteriography/CT angio for vessels
- Embolotherapy (except for internal carotid artery)
- Endovascular stenting
- Direct pharyngoscopy for aerodigestive trauma
Diagnostic strategies

Airway/resus/assessment

Unstable
- Active hemorrhage
- Expanding hematoma
- Evolving stroke

Stable

Zone 1
- Swallow
- Arteriogram
- Explore

Zone 2
- Swallow
- Endoscopy
- Explore

Zone 3
- Swallow
- Arteriogram
- Embolize
- Observe
Facial Injuries

Soft Tissue Injuries
- Blunt trauma
- Penetrating trauma

Bone Injuries (Maxillofacial and Mandibular)
- Blunt trauma
- Penetrating trauma

Eye Injuries
- Blunt trauma
- Penetrating trauma
- Burns
- Foreign objects-debris

Fractured Nose - prior to control of bleeding, determine that there is no cerebral spinal fluid leakage. If so, treat as a skull fracture.
SIGNS AND SYMPTOMS OF FACIAL INJURIES

Soft Tissue Injuries

- Massive hemorrhage even with minor wounds
- Edema
- Laceration
- Ecchymosis
- Avulsion
Bone Injuries

- Lacerated gums may indicate an underlying fracture
- Casualty cannot open mouth without pain
- Misaligned teeth
- Difficulty swallowing
- Pain at fracture site
- Edema
- Facial asymmetry
- Epistaxis (Nose bleed)
- Ecchymosis
- Lacerations
- Visual disturbances
- Limited ocular movements
- Crepitus
Eye Injuries
- Loss of vision
- Pain
- Hemorrhage
- Subconjunctival hemorrhage
- Orbital bony deformity
- Intraorbital deformity

Nose Injuries
- Blood or CSF from nose
- Bruising
TREATMENT OF FACIAL INJURIES

Soft Tissue Injuries
- Consider C-spine
- Assess and secure airway
- Hemorrhage control
- Fluid resuscitation protocol for associated shock

Treatment of Nose Injuries
- Hemorrhage Control
- Pinching nostrils. (Do not tilt patient head back due to postnasal drainage)
- Apply ice to bridge of nose
- Splint by padding
Eye Injuries

Treatment for Chemical Burns of the Eye

- Hold the face under running water with eyes open
- Flush eyes 5-10 minutes for acid burns
- Flush eyes 20 minutes for alkali

Treatment for Protruding Globe

- DO NOT attempt to place eye back in socket
- Apply bulky dressing around eye, moist gauze over the globe and cover with a cup secured in place