

The EM Educator Series

The EM Educator Series: Neck trauma and myriad of hidden injuries

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Cases:

#1: A 24-year-old male presents with a bleeding anterior neck wound from a knife injury. He appears critically ill, tachycardic, and hypotensive. He is currently protecting his airway.

#2: A 23-year-old female presents with neck pain and ecchymoses around the neck. She states her boyfriend tried to choke her.

Questions for Learners:

- 1) What are the zones of the neck and the key structures? When should you consider injuries outside of the neck?
- 2) Who does injury mechanism, blunt vs. penetrating, change your evaluation? Does it
- 3) What about airway management: difficult airway / who needs immediate intubation / beware laryngotracheal injuries?
- 4) When should you consider pneumo/hemothorax / subcutaneous emphysema in the patient with neck trauma?
- 5) What's the evaluation and management of vascular injuries in the neck – penetrating, blunt (carotid / jugular / vertebral / subclavian)?
- 6) When is a C-collar needed for blunt and penetrating injury? Is it needed in penetrating injury?
- 7) How do you evaluate and manage laryngotracheal injuries?
- 8) What about a suspected esophageal injury?
- 9) How does a patient with strangulation present? What exam findings suggest this? How should this be evaluated and managed?
- 10) What diagnostic tools do you have at your disposal? CTA, endoscopy or esophagram, bronchoscopy?
- 11) What should raise your concern for intimate partner violence? What are your options?

Suggested Resources:

- ✓ Articles:
 - [emDOCs – Neck Trauma: A Practice Update](#)
 - [R.E.B.E.L. EM – Penetrating Neck Injuries](#)
 - [emDOCs – A Spinchter Series: A Scary Airway Review](#)
- ✓ Podcast/Vodcast:
 - [CORE EM – Penetrating Neck Trauma](#)
 - [EMin5 – Penetrating Neck Trauma](#)
 - [EM Cases – BCE 65 Intimate Partner Violence – A Silent Epidemic](#)

Answers for Learners:

1) **What are the zones of the neck and the key structures? When should you consider injuries outside of the neck?**

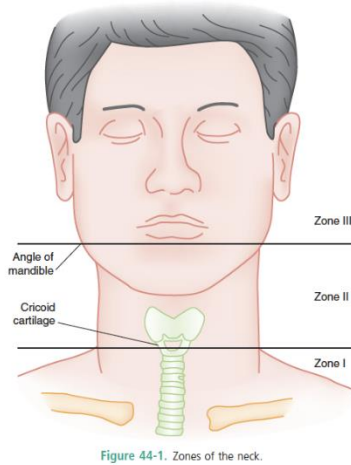


Figure 44-1. Zones of the neck.

	Zone 1	Zone 2	Zone 3
Anatomic Landmarks	Clavicle/Sternum to Cricoid Cartilage	Cricoid Cartilage to the Mandible	Superior Angle of the Mandible
Anatomic Structures in Zone	Proximal Common Carotid Artery	Carotid Artery	Vertebral Artery
	Subclavian Artery	Vertebral Artery	Distal Carotid Artery
	Vertebral Artery	Jugular Vein	Distal Jugular Vein
	Lung Apices	Pharynx	Salivary and Parotid Glands
	Trachea	Trachea	Cranial Nerves IX - XII
	Thyroid	Esophagus	Spinal Cord
	Esophagus	Larynx	
	Thoracic Duct	Vagus Nerve	
	Spinal Cord	Recurrent Laryngeal Nerve	
		Spinal Cord	

2) **Who does injury mechanism, blunt vs. penetrating, change your evaluation? Does it**

The incidence of penetrating neck trauma is 0.55-5% of all traumatic injuries. The major mechanisms are GSW, stab wounds, and shrapnel. Stab wounds and lower-velocity GSW cause a 50% lower incidence of clinically significant lesions.

Blunt neck trauma is even more uncommon than penetrating neck trauma. The majority of blunt neck trauma is from MVCs, as well as assault and strangulation. The major issue with blunt trauma of the neck is in missed or delayed diagnosis.

3) **What about airway management: difficult airway / who needs immediate intubation / beware laryngotracheal injuries?**

Eggen et al. defined criteria for emergent intubation: respiratory distress, airway compromise from blood or secretions, subcutaneous emphysema, tracheal shift, or change in mental status.

Many authors subscribe to the early management in the trauma patient = easier management. Potentially, the neck trauma airway can become progressively more difficult, i.e. with expanding hematoma/swelling/subcutaneous air, etc. This can all lead to airway narrowing and the risk that the patient will develop acute airway obstruction.

To head this off at the pass, many practitioners tend to err on the side of caution, with intubation in both blunt and penetrating neck injury earlier as opposed to later. There are no current agreed upon guidelines on “when to intubate”, or how to intubate, so obviously clinical judgment is in play here. As of now, it seems that the general consensus is that patients should be intubated sooner rather than later, before the patient clinically deteriorates and needs an emergent intubation with a distorted airway scenario.

For our purposes, anyone arriving with instability (either from an airway perspective with evidence of progressive or impending airway obstruction from subcutaneous emphysema or expanding hematoma, or instability from a hemodynamic standpoint from penetrating wounds) should be intubated.

- 4) **When should you consider pneumo/hemothorax / subcutaneous emphysema in the patient with neck trauma?**
- 5) **What's the evaluation and management of vascular injuries in the neck – penetrating, blunt (carotid / jugular / vertebral / subclavian)?**

Hard Signs	Soft Signs
Airway Compromise	Hemoptysis
Expanding or Pulsatile Hematoma	Oropharyngeal Blood
Active, Brisk Bleeding	Dyspnea
Hemorrhagic Shock	Dysphagia
Hematemesis	Dysphonia
Neurologic Deficit	Nonexpanding Hematoma
Massive Subcutaneous Emphysema	Chest Tube Air Leak
Air Bubbling Through Wound	Subcutaneous or Mediastinal Air
	Vascular Bruit or Thrill
	Crepitus

Breathing

- Zone I injuries can result in pneumothorax (PTX)
- Injuries that traverse zones can also cause PTX

6) **When is a C-collar needed for blunt and penetrating injury? Is it needed in penetrating injury?**

Cervical spine immobilization is unnecessary unless the trajectory suggests direct spinal cord injury and may be harmful ([Vanderlan 2009](#), [Haut 2010](#), [Stuke 2011](#), [Lustenberger 2011](#), [Theodore 2013](#))

- Can obscure neck injuries
- Preclude an adequate assessment
- Make airway visualization more difficult
- Delay definitive airway stabilization

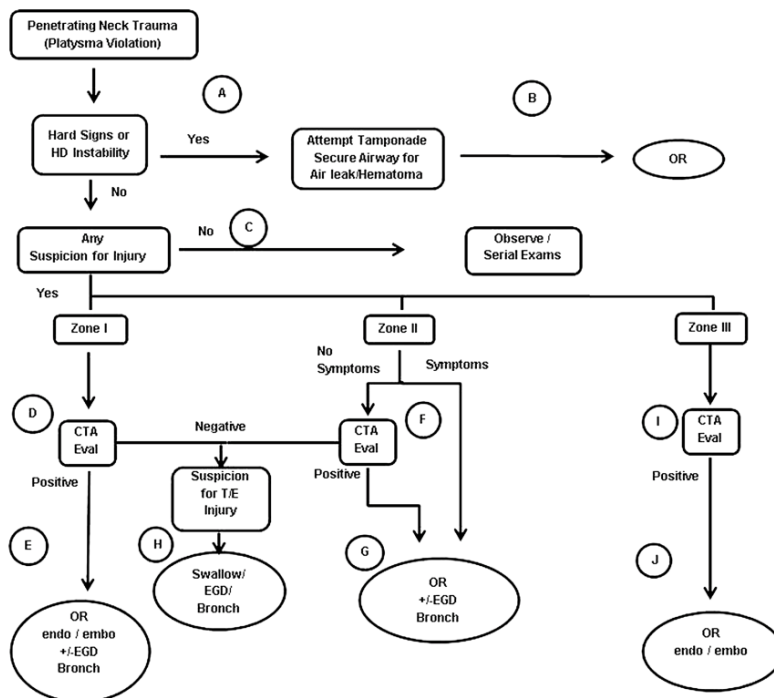
7) **How do you evaluate and manage laryngotracheal injuries?**

- Signs/symptoms
 - Hard signs: Bubbling or air leakage from a neck wound, massive subcutaneous air
 - Soft signs: dyspnea, dysphonia, stridor, hemoptysis, subcutaneous emphysema, laryngeal crepitus
- Diagnostics
 - Plain X-rays: extraluminal air, foreign bodies, fracture of cartilaginous structures (i.e. larynx), edema
 - CT scan
 - Need to obtain thin slices (1-mm) and multiplanar reconstructions
 - Do not rely solely on the cervical spine CT

- Laryngoscopy and nasopharyngoscopy with flexible endoscopes are necessary for evaluating internal injuries

8) What about a suspected esophageal injury?

- Signs/Symptoms
 - No pathognomic signs/symptoms
 - Soft signs: hematemesis, dysphagia, subcutaneous emphysema, hoarseness, cough
- Diagnostics
 - Plain X-rays (Thoma 2008, Bryant 2007)
 - May suggest perforation but are not sensitive (cannot rule out injury)
 - Findings: pneumomediastinum, retropharyngeal air
 - Contrast esophogram with poor sensitivity for injury (Asensio 1997)
 - Gastrograffin and barium studies may be performed. Gastrograffin may be safer as it is water-soluble and leakage is less likely to cause a chemical mediastinitis
 - Flexible endoscopy offers direct visualization and is consider to be the most sensitive for ruling out injuries. It is often used in combination with contrast enhanced studies
- Because esophageal injuries are difficult to diagnose and there is no ideal approach, observation with reassessment is often necessary
- Treatment
 - Broad-spectrum antibiotics (with coverage of anaerobes)
 - Nasogastric tube typically placed under endoscopic guidance to avoid further injury



9) **How does a patient with strangulation present? What exam findings suggest this? How should this be evaluated and managed?**

Bruise marks to neck with evidence of patechia to subconjunctiva / face. Blunt cardiovascular injury is a concern for these patients and show be risk stratified. Based on this, imaging modalities such as CTA should be performed to evaluate for vascular / tracheal / spinal injuries.

10) **What diagnostic tools do you have at your disposal? CTA, endoscopy or esophagram, bronchoscopy?**

CTA – immediate

Call in GI / Pulmonary for endoscopy and bronchoscopy respectively

Esophagram – Usually done at later time

11) **What should raise your concern for intimate partner violence? What are your options?**

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 you administration team and get a protocol up and running.

Management of Intimate Partner Violence in the ED

You may find it uncomfortable to know exactly what to say and do once you have discovered intimate partner violence in the ED. There are 3 recommended steps:

1. Validate and empower the victim
2. Assess safety
3. Set up a plan