



Throat Trauma

Introduction

This tutorial is concerned with the fundamentals of blunt and penetrating neck trauma. It is not a resource for the management of cervical spine injury.

Overarching Principles

The components of the anterior neck: digestive tract, airway, and the neurovascular conduits to and from the brain, are all at risk during trauma to the neck. The direction of that trauma is generally from the front or side as the throat is protected behind by the cervical spine and from above by the head.

For convenience the neck is divided into three zones that help in assessing the trauma and deciding on management.

Zone 1: Between the cricoid cartilage and the sternal notch:

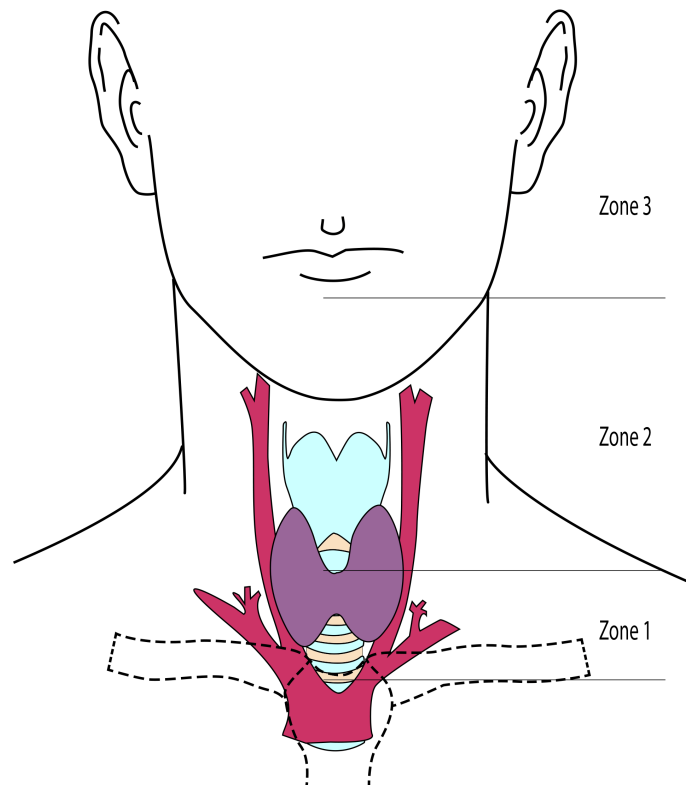
1. Trachea, lung, oesophagus
2. Proximal carotid artery, subclavian vertebral artery
3. Mediastinal contents, thoracic duct

Zone 2: Between the cricoid cartilage below and the angle of the mandible above:

1. Carotid and vertebral artery
2. Larynx, trachea, oesophagus, pharynx
3. Jugular vein
4. CN X including recurrent laryngeal nerves

Zone 3: Above the angle of the mandible:

1. Distal carotid, vertebral artery, Jugular Vein
2. Salivary glands
3. CN IX - XII

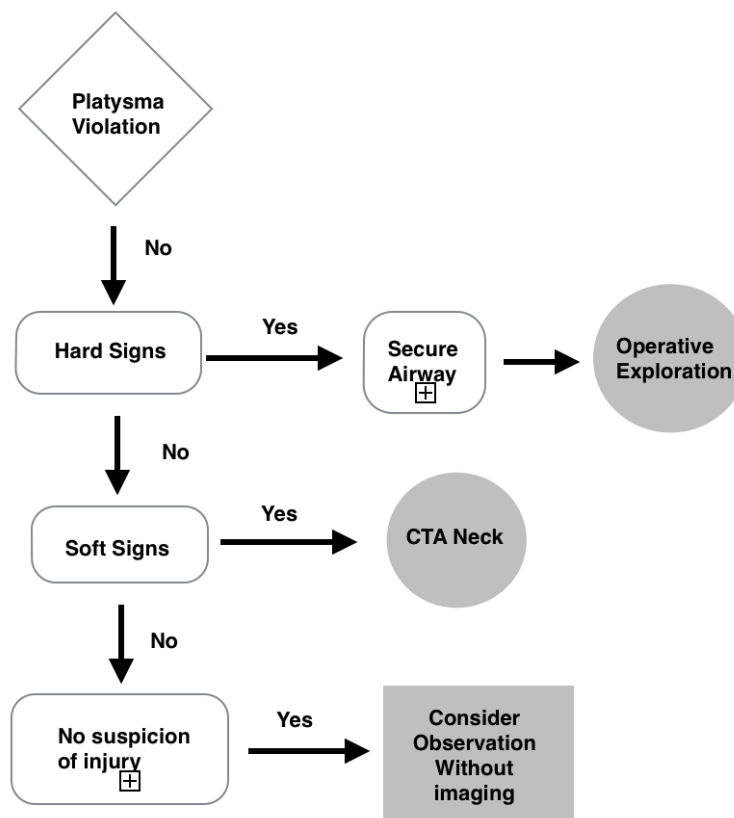


Given the above it is logical that signs and symptoms may vary according to where the trauma is and how severe it is. Here is a brief list of the signs and symptoms. A knowledge of anatomy is very helpful when trying to remember these.

Evaluation: Signs and Symptoms

Rapid assessment of the patient is essential. Signs can be grouped into hard or soft as below. This is quick and leads to a simple management strategy when the wound extends deep to the platysma.

Hard Signs	Soft Signs
Airway compromise / obstruction	Subcutaneous emphysema
Air bubbling wound	Dyspnoea, dysphagia
Expanding or pulsatile haematoma	Non-pulsatile, non-expanding haematoma
Active bleeding	Venous oozing
Shock, compromised radial pulse	Chest tube air leak
Haematemesis	Minor haematemesis, haemoptysis
Nero deficit / paralysis / cerebral ischaemia	Paraesthesia
Vascular bruit or thrill	Oropharyngeal blood



Management algorithm for penetrating neck injury.

While CT Angiography is a useful investigation the gold-standard is angiography. A chest X-ray should always be performed.

Blunt Trauma

Blunt trauma is more common than penetrating neck injury. It occurs during road traffic collisions, bicycle accidents, and occurs in strangulation. The trauma can affect any of the zones and any of the components inside the throat.

Oesophageal and pharyngeal blunt trauma

These are not common after blunt neck trauma. They are often associated with laryngeal fractures as the oesophagus can become contused when the larynx is displaced posteriorly against the cervical spine. The signs are as above.

After clinical examination a contrast swallow is a good first line investigation together with direct visualisation of the area via endoscopy.

Management is usually conservative if the patient has no serious injury. In penetrating injury surgery may be performed to close the wound. NG feeding for a period is useful in that case and cover with antibiotics is recommended.

Vascular injuries in blunt trauma

These occur during violent neck movements as in a car collision. The vessels in the neck are stretched and twisted over the cervical spine and develop shear injuries within the intima of the vessel. Physical signs are as above.

These are investigated with four-vessel angiography as the gold standard. CT Angiography is less specific and sensitive.

In cases of minimal damage systemic anticoagulation, if safe, is the recommended action. In pseudo-aneurism or transection surgical repair is the best option. If the vessel is totally occluded the patient's outcome will already be decided and only anticoagulation is sensible.

Laryngo-tracheal injury in blunt trauma

After intracranial injury this is the second most common cause of death after head and neck injury. The symptoms are as above.

Laryngo-tracheal injury can occur in the supraglottis, the glottis, the subglottis or in a combination of these. It is classified into five groups depending on severity.

Schafer-Fuhrman Classification

Group 1	Minor endo-laryngeal haematoma and lacerations. No fractures Humidifies oxygen and observation required. Regular airway examination. Head of the bed should be elevated, antibiotic and antacids are prescribed.
Group 2	Oedema, haematoma, mucosal disruption without cartilage exposure, un-displaced fracture Tracheostomy and panendoscopy
Group 3	Massive oedema, large mucosal lacerations, exposed cartilage, displaced fractures, vocal cord immobility

	Tracheostomy with exploration and repair
Group 4	Same as Group 3 but more severe, disruption of anterior commissure, more fracture lines Tracheostomy with exploration and repair and stent placement
Group 5	Complete laryngo-tracheal separation Urgent tracheostomy with exploration and repair

The severity of the injury dictates the management. You will notice that in all but the mildest cases a tracheostomy is required to secure the airway.

Surgical repair of the larynx takes a number of forms depending on the severity of the injury. Lacerations of the free edge of the vocal cord, areas of exposed cartilage, multiple and displaced fractures, avulsed arytenoids. Detachment from the anterior commissure, crico-tracheal separation, cricoid fracture and airway compromise all require one form of surgery or another.

The aim of surgery is to return the larynx to normal or near normal function.

Crico-tracheal separation

This is most associated with ‘clothesline’ injuries. These occur when the neck is struck against wire, tree branches or other high velocity injuries low Zone 1.

These have a high risk of asphyxiation and are significantly associated with recurrent laryngeal nerve trauma.

Repair is by primary re-anastomosis of mucosa with non-absorbable tension sutures placed from cricoid to tracheal ring. If the cricoid itself is fractured this is repaired first.

Penetrating Trauma

The management of penetrating neck wounds depends upon factors related to the patient: zone of injury, degree of shock, airway status etc, and upon the skills of the team, available imaging and operative experience etc. A simple assessment tool and management algorithm is presented above.

In the past all such wounds were explored but the advent of improved imaging modalities a more selective, zone based, approach can be advocated depending upon investigation results and availability of close monitoring.

Emergency Management

As always start with ABC.

1. Secure the airway by oro-tracheal intubation, if this is safe to do, or by tracheostomy.
2. Use direct pressure to stem blood flow – don’t probe the wound or clamp indiscriminately
3. Establish IV access on the contralateral side of the patient.
4. Avoid air embolization by putting the patient in a slight head down posture
5. If the patient is stable a Chest X-ray should be performed and angiography / CTA can be organised.
6. Antibiotics and NG tube placement should be considered if safe

If they are unstable they should be taken to the operating room for control of bleeding and transfusion.

Note that where the facilities for CTA / angiography do not exist patients should be taken to theatre without the investigation for neck exploration. This is what happened before these investigations were developed and it represents a considerably better option than simple observation even though some patients may not have needed exploration.

Signs and Symptoms by organ affected.

Laryngeal or tracheal injury may produce the following signs:

1. Change in voice
2. Stridor
3. Haemoptysis
4. Subcutaneous crepitus
5. Sucking or hissing through a neck wound
6. Crepitus in the cartilages
7. Pain on palpation
8. Change in shape of the larynx

Oesophageal or pharyngeal injury

1. Dysphagia
2. Blood stained saliva
3. Crepitus on palpation
4. Sucking wound
5. Pain and tenderness in the neck
6. Blood aspirated on NG tube placement

Carotid artery injury

1. Contralateral stroke
2. Decreased consciousness
3. Bruit with or without thrill
4. Haematoma or haemorrhage
5. Loss of pulse

Jugular vein trauma

1. Haemorrhage
2. Haematoma

Spinal cord or Brachial plexus injury

1. Quadriplegia
2. Weakness in arms
3. Pathological reflexes
4. Retention of urine, faecal incontinence
5. Horner's syndrome

Cranial nerve injury

1. Lower motor neurone facial weakness
2. Vagal injury with hoarseness
3. Glossopharyngeal weakness – decrease gag reflex
4. Accessory weakness – inability to shrug shoulders
5. Hypoglossal injury with weakness in tongue and deviation on protrusion