Evaluation of the Trauma Patient

Ahmed Jan
Associate Professor, Consultant
Oral and Maxillofacial Surgeon

Initial Management of the Trauma Patient

- Death from trauma has a trimodal distribution (3 peaks).

First Peak:

- Death within seconds or minutes.
  - Lacerations of the brain
  - Injury to brainstem , aorta, heart , spinal cord

Death from Trauma

Second peak:

- Within hours after injury “golden hour”
- Victims saved with rapid assessment and management.
- Death occurs from CNS injury or hemorrhage.

Death from Trauma

Third Peak

- Days or weeks after injury

- Sepsis, multiple organ failure or pulmonary embolism.

THE GOAL OF INITIAL EMERGENCY CARE IS

To recognize life-threatening injuries.

To provide life-saving and support measures until definitive care can be initiated.

Assessment of severity of injury

- Prioritize victims

TRIAGE

Correlations with severity of injury

- Mechanism of injury:
  - High energy collision
  - Fall of 6 m or more
  - Dangerous environment (e.g. icy water)
  - Auto accident that result in greater than 20 minutes to remove the patient
  - Auto accident with significant damage to the passenger compartment, ejection, rollover, death of passengers

Correlations with severity of injury

- Anatomic factors:
  - Penetration to head or neck
  - Penetration to groin
  - Penetration trauma to thigh
  - Flail chest
  - Major burns
  - Amputations
  - Two or more proximal long bones fractures
  - Paralysis

Correlations with severity of injury

- Systemic Factors
  - Concurrent systemic disease (cardiac or respiratory)
  - Age < 5 years or >50 years

Glasgow Coma Scale

- Eye Opening (E)
  - 4 = opens spontaneously
  - 3 = opens to voice
  - 2 = opens to pain
  - 1 = no opening
- Verbal Response (V)
  - 5 = appropriate and oriented
  - 4 = confused conversation
  - 3 = inappropriate words
  - 2 = incomprehensible sounds
  - 1 = no sounds
- Motor Response (M)
  - 6 = obeys commands
  - 5 = localizes to pain
  - 4 = withdraws to pain
  - 3 = abnormal flexor response
  - 2 = abnormal extensor response
  - 1 = no movement

ALGORITHM

ATLS

Advanced Trauma Life Support

PRIMARY SURVEY

Life-threatening conditions are identified and reversed.

- **A** - Airway evaluation and maintenance
- **B** - Breathing and Ventilation
- **C** - Circulation and control of hemorrhage
- **D** - Disability: Neurologic Status
- **E** - Exposure/Environmental Control

PRIMARY SURVEY: *AIRWAY*

- A patent airway is the highest priority in the initial assessment of the trauma patient.

PRIMARY SURVEY: *AIRWAY*

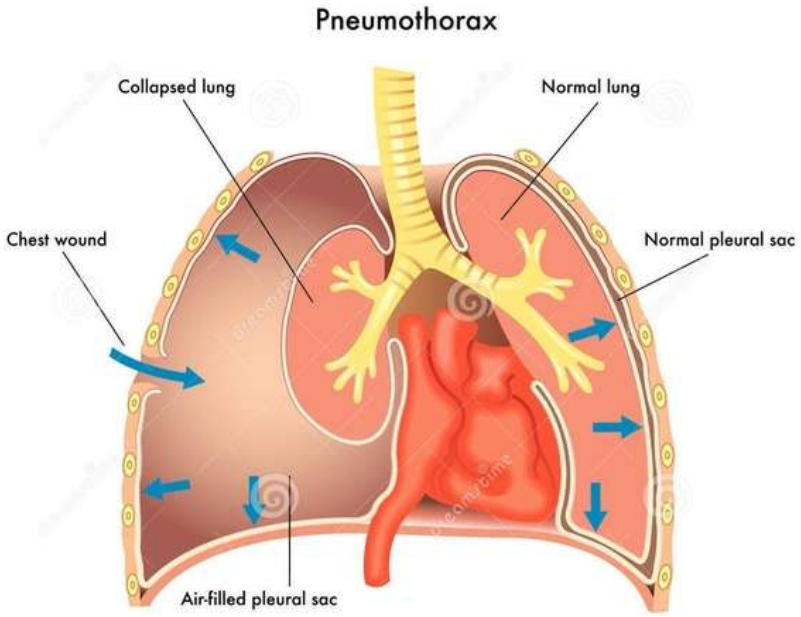
Initial Assessment: Recognize airway obstruction:

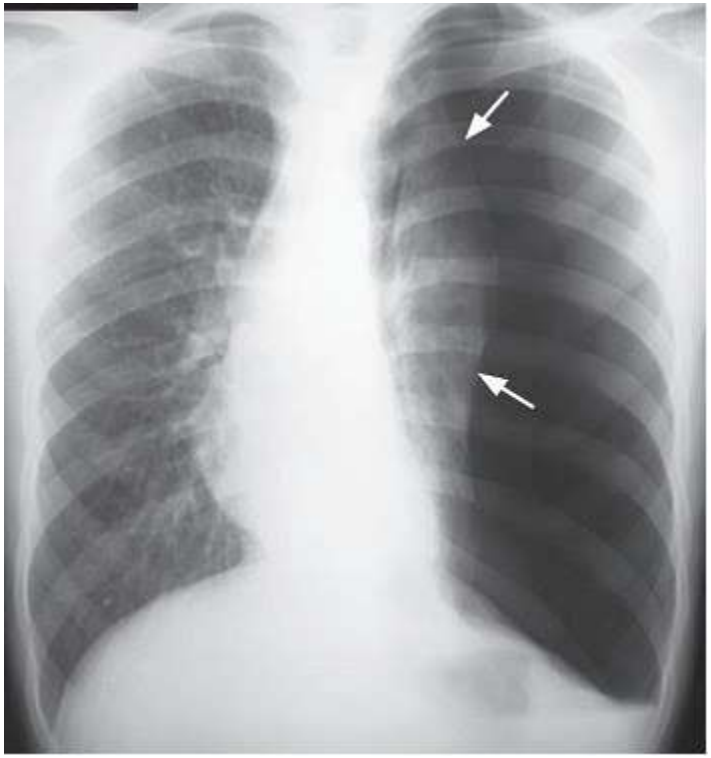
LOOK: posture (leaning forward), hematomas, loose teeth, pallor, cyanosis, deviation

LISTEN: talking, high-pitched inspiratory sounds (obstruction), gurgling, wheezing, listen to the chest for breath sounds

FEEL: Palpate facial bones, crepitation, swelling, subcutaneous air in the neck.

Tension Pneumothorax





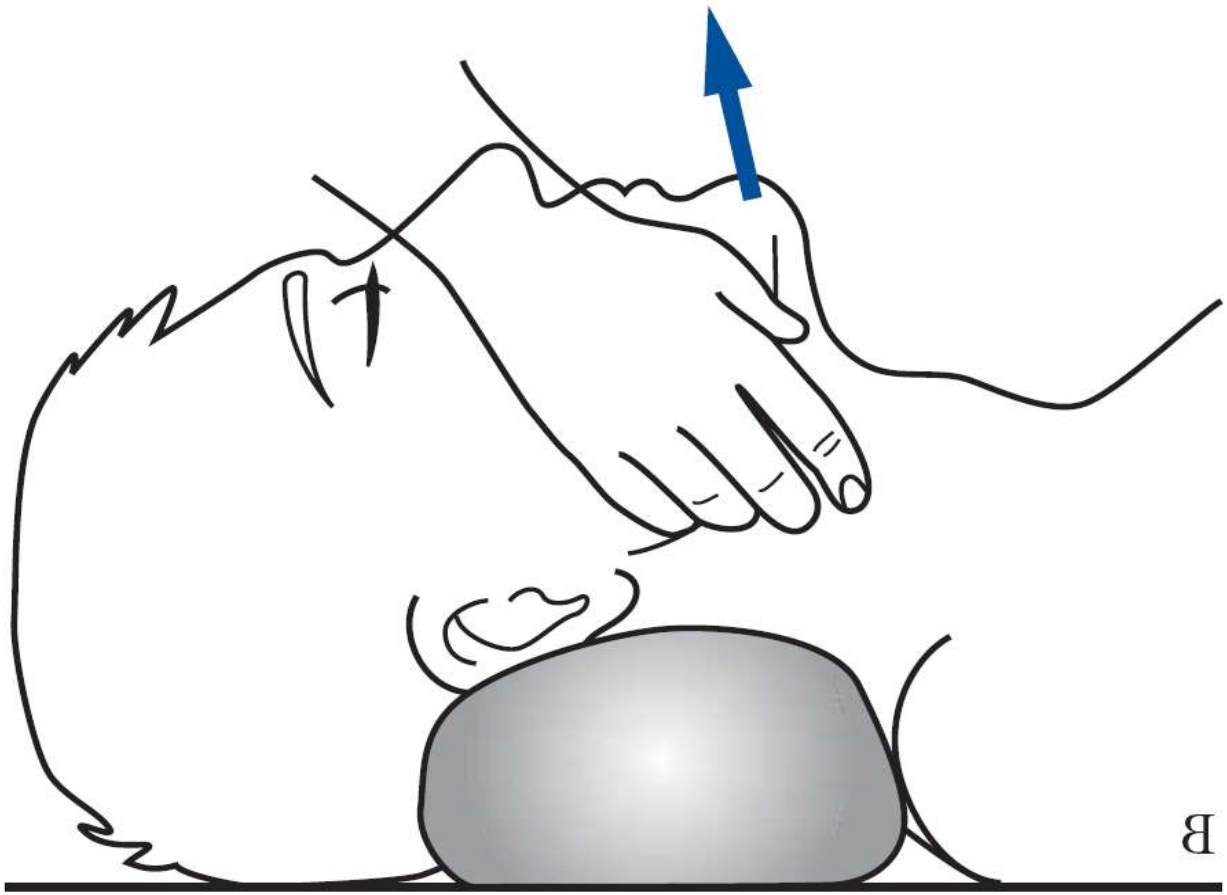
PRIMARY SURVEY: *AIRWAY*

Systematic Approach:

- Recognize airway obstruction
- Clear the airway and reposition the patient
- Artificial airways, Ventilate
- Intubate, Ventilate
- Surgical airway, Ventilate

PRIMARY SURVEY: *AIRWAY*

- Jaw Thrust



PRIMARY SURVEY: *AIRWAY*

Initial Assessment: Recognize airway obstruction:

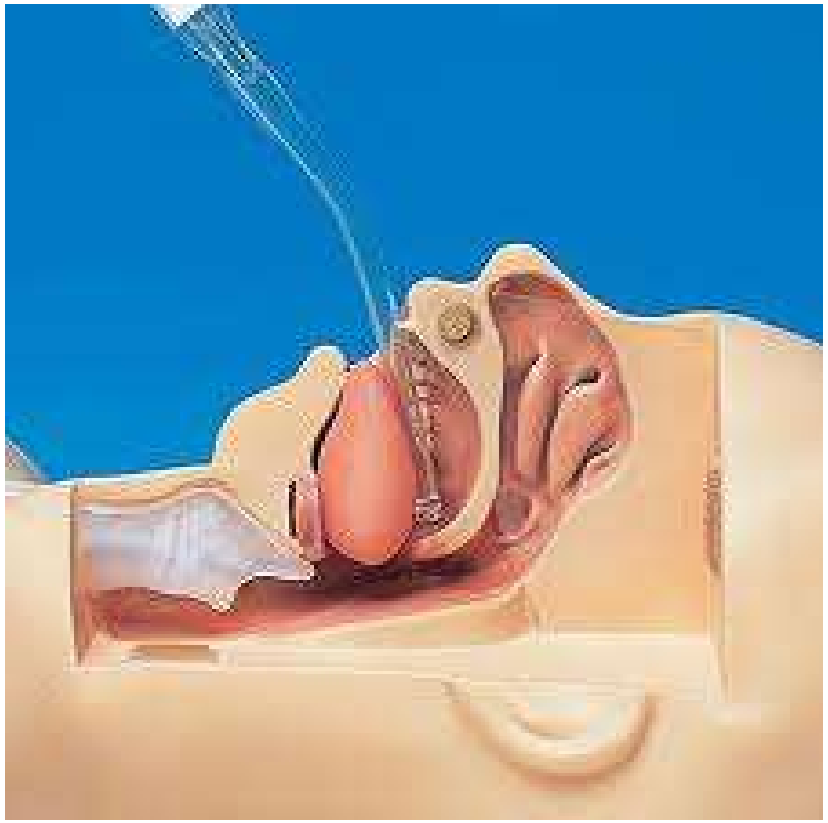
- Tongue position (most common)
- Bleeding from oral or facial structures
- Foreign body
- Regurgitation of stomach contents

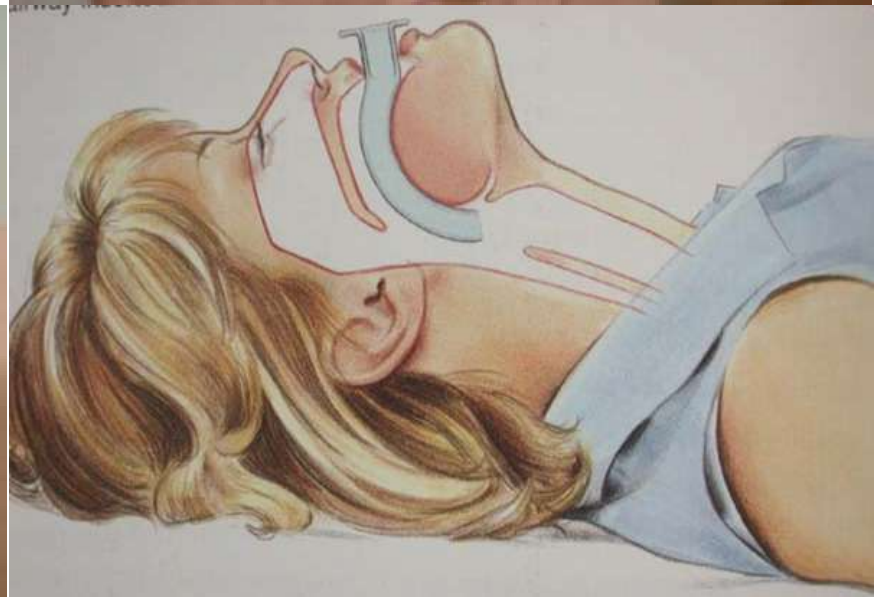
PRIMARY SURVEY: *AIRWAY*

- Finger sweep
- **Do NOT** perform a blind finger sweep!

PRIMARY SURVEY: *AIRWAY*

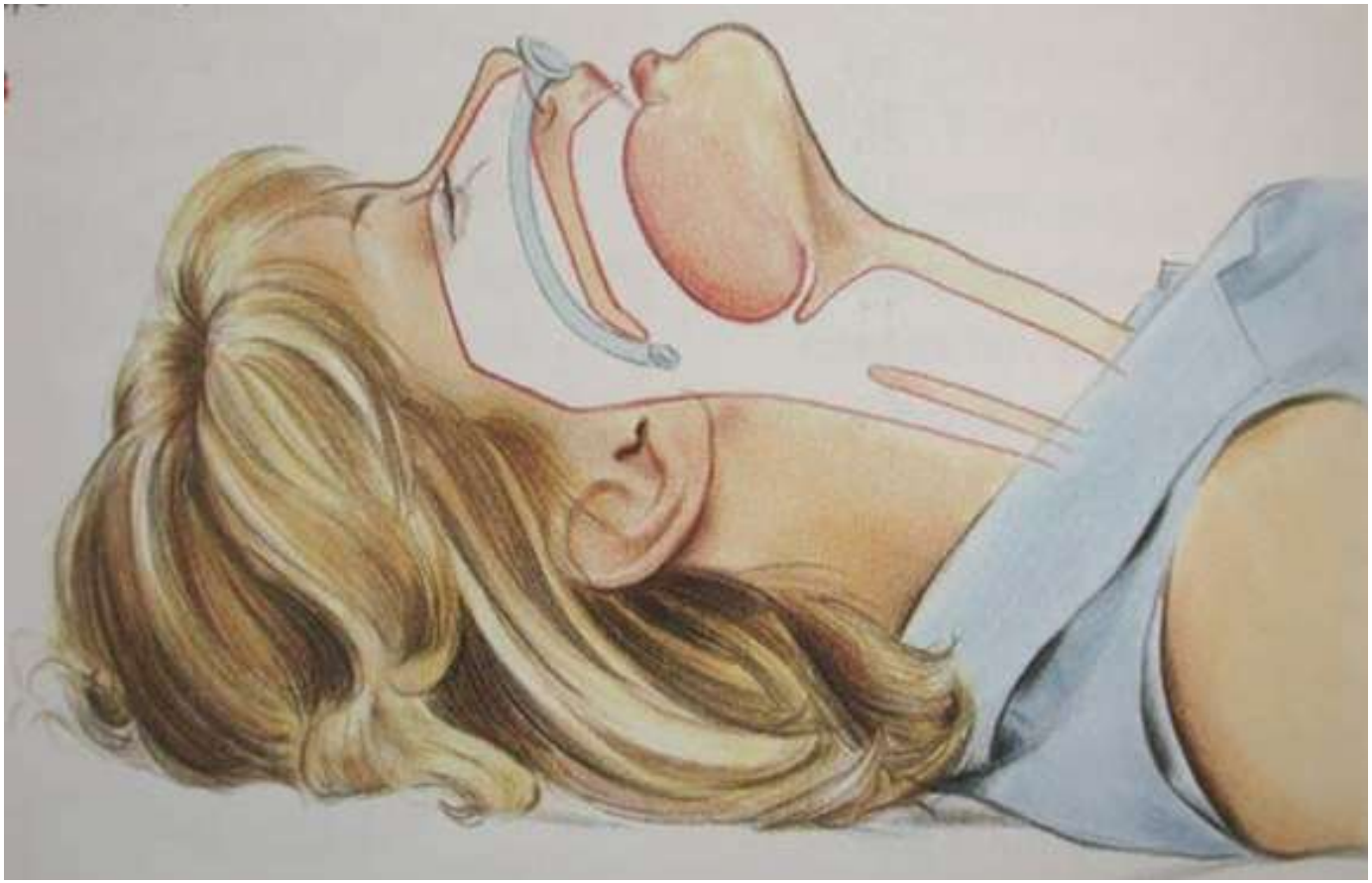
- Tonsillar Suction

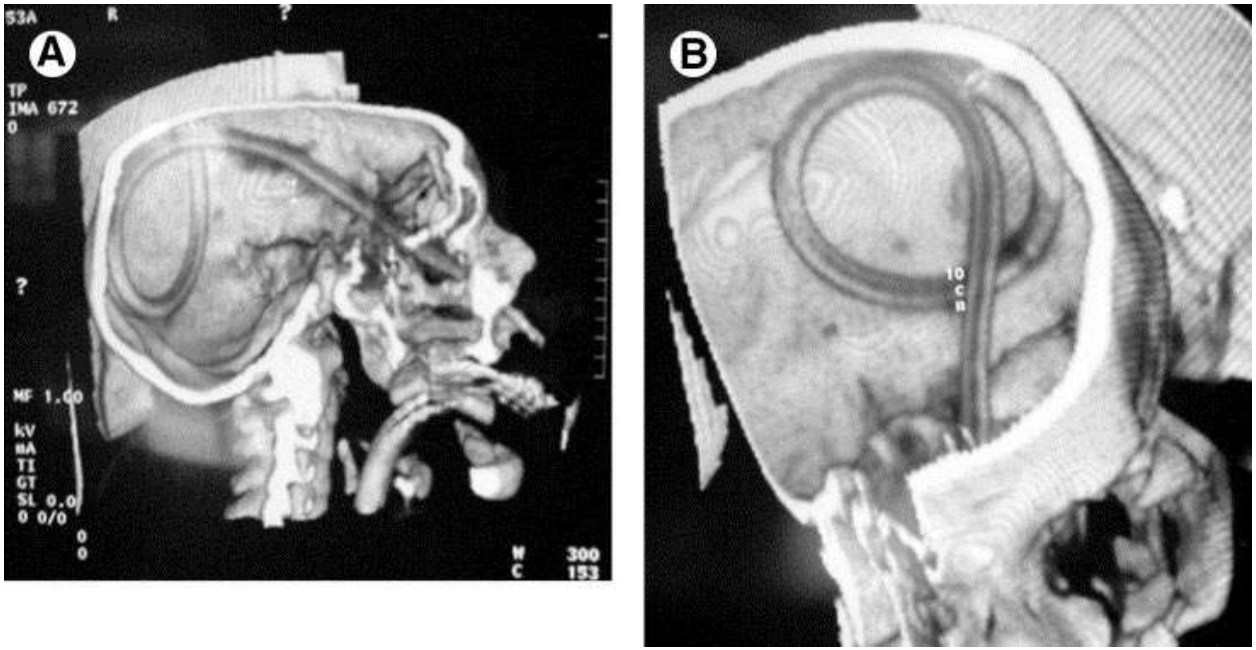




PRIMARY SURVEY: *AIRWAY*

- Nasal Airway (Not in Midface Trauma)

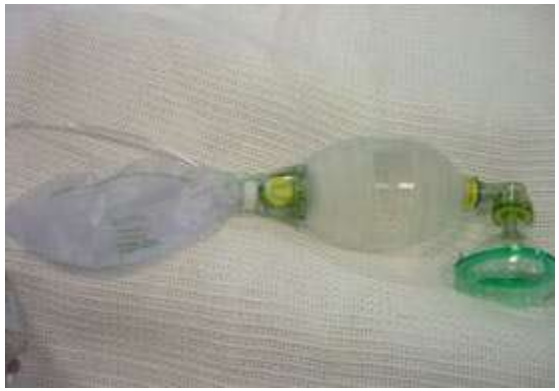




C. Michael Gibson, M.S., M.D. Cafer Zorkun, M.D., Ph.D.
https://www.wikidoc.org/index.php/Misplaced_catheter

PRIMARY SURVEY: *AIRWAY*

- Bag Valve Mask BVM:



PRIMARY SURVEY: *AIRWAY*

- Bag Valve Mask BVM:

PRIMARY SURVEY: *AIRWAY*

- Endotracheal intubation

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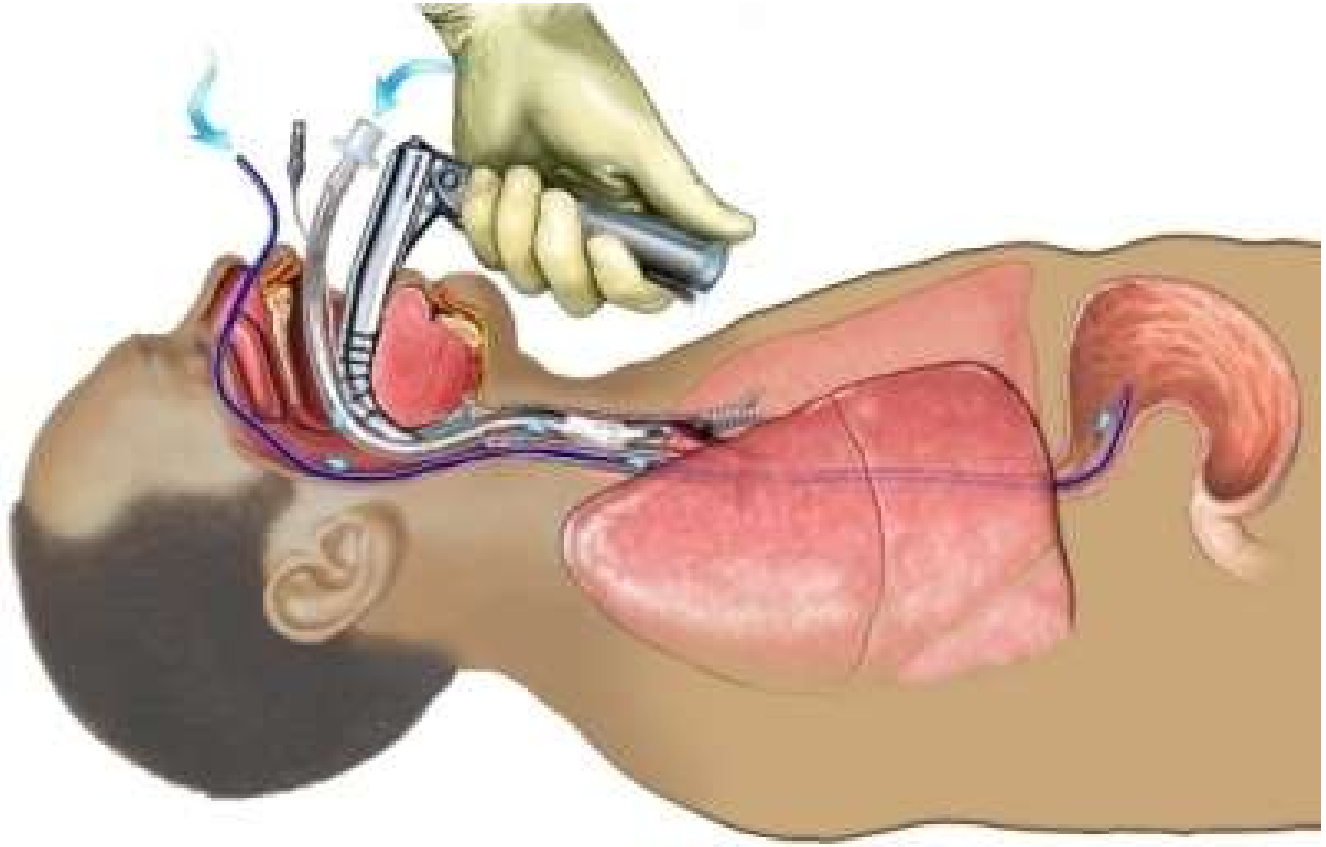


PRIMARY SURVEY: *AIRWAY*

Indications for Endotracheal intubation

1. Need for Airway Protection

- Severe maxillofacial Trauma
- Risk for aspiration
- Bleeding, vomiting
- Risk for obstruction
- Neck hematoma
- Laryngeal or tracheal injury

2. Need for Ventilation

- Apnea
- Inadequate respiratory effort
- Severe closed head injury
- hyperventilation

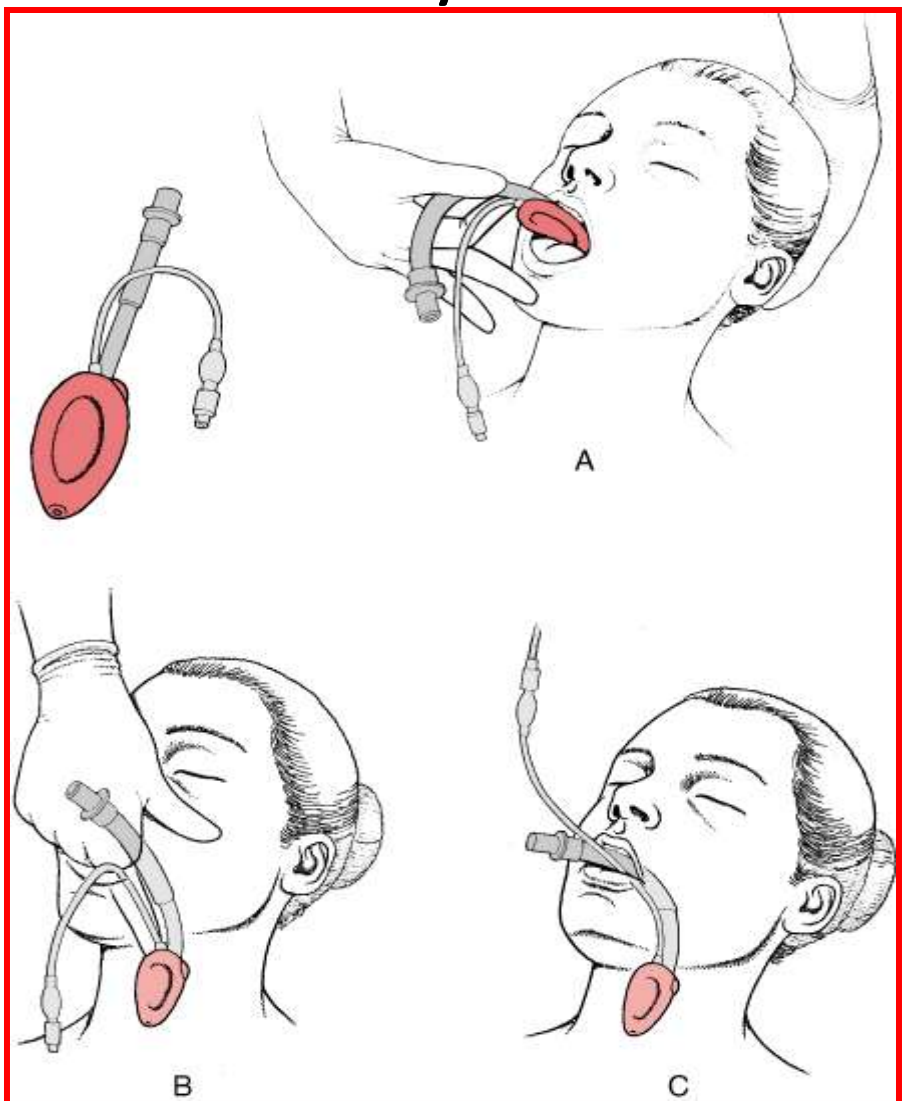
PRIMARY SURVEY: *AIRWAY*

Relative Contraindications for Endotracheal intubation

1. Severe midface injury which may be associated with basilar skull fractures
2. Severe laryngeal trauma with tracheal separation

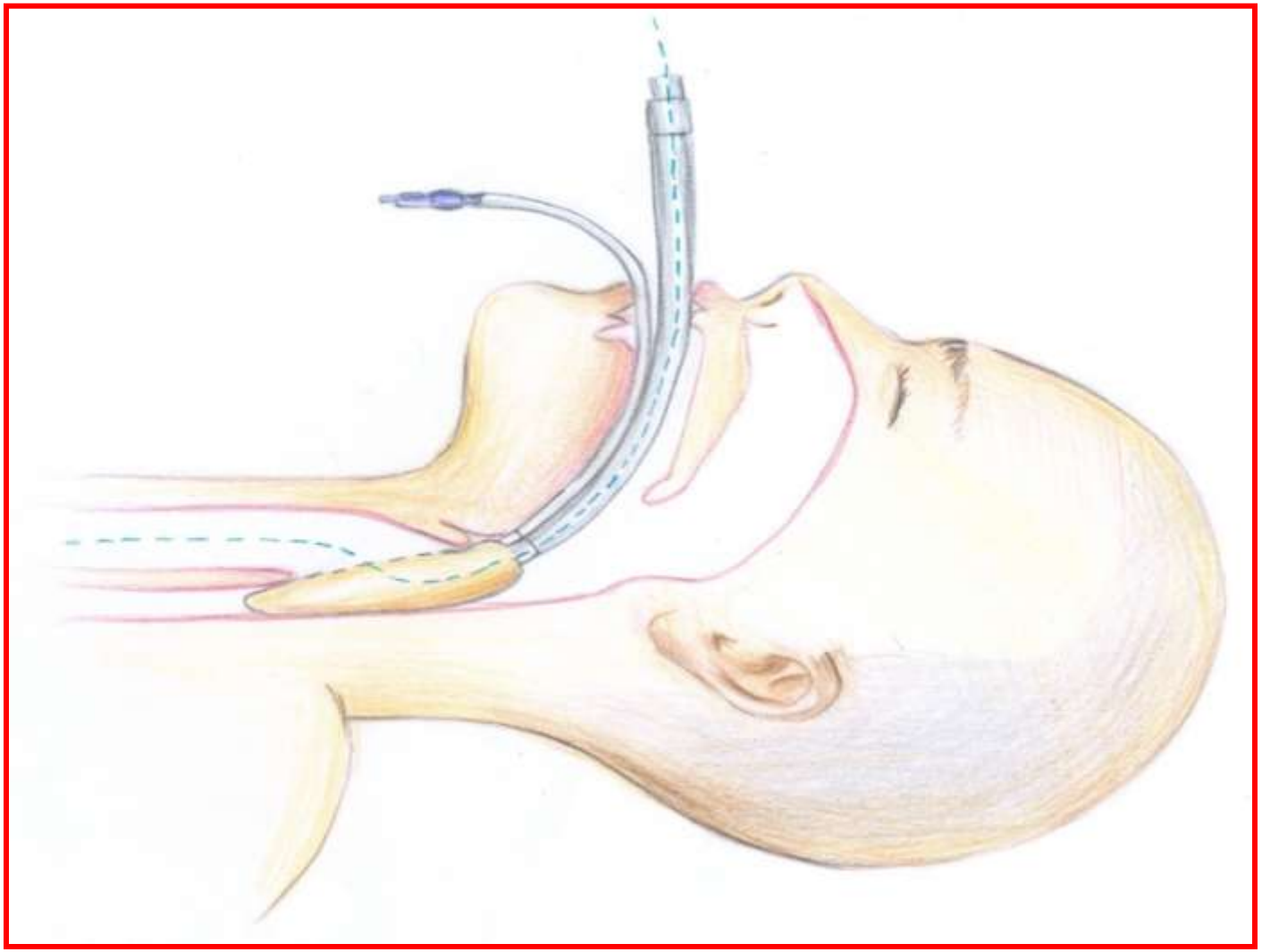
PRIMARY SURVEY: *AIRWAY*

- Laryngeal Mask Airway LMA:



PRIMARY SURVEY: *AIRWAY*

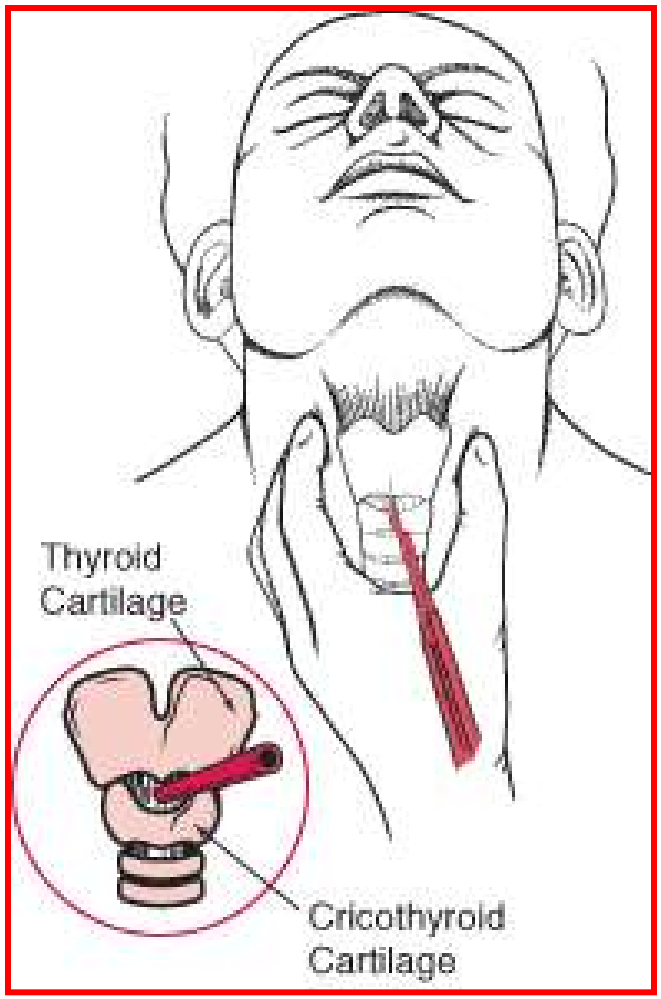
- Laryngeal Mask Airway LMA:



PRIMARY SURVEY: *AIRWAY*

- Cricothryrotomy:

  An incision through the cricothyroid membrane



Advantages

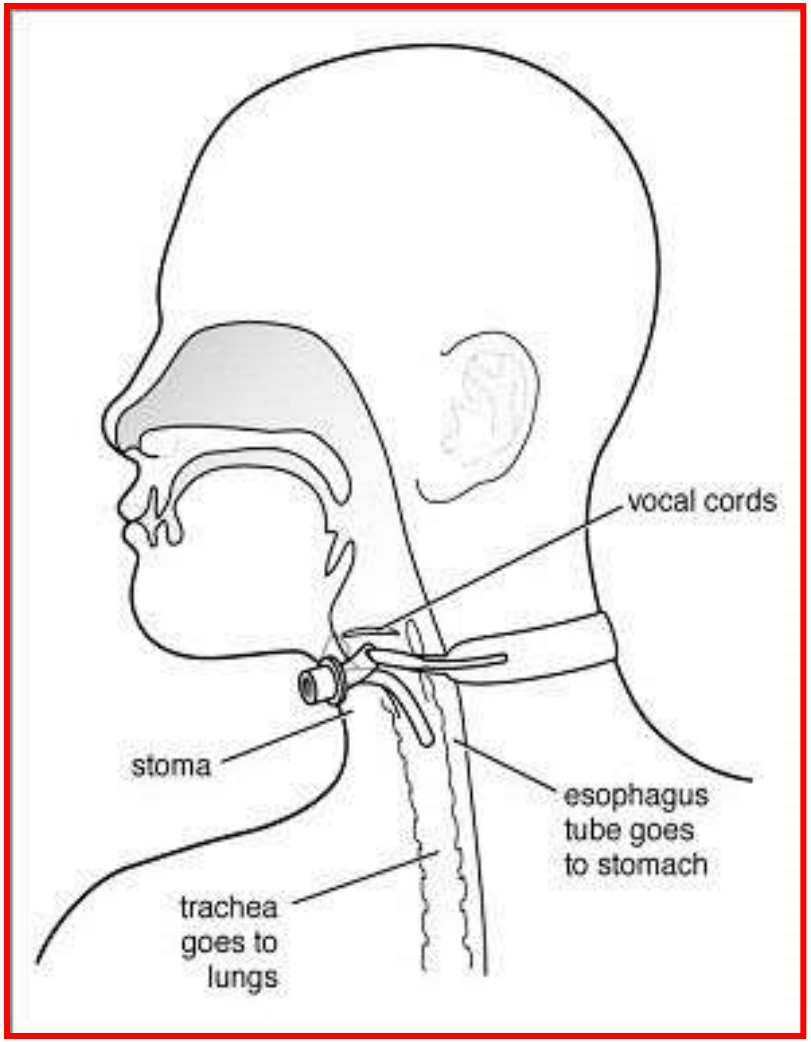
- Fast
- Easy
- Few complications
- No need to hyperextend the neck

Cricothyrotomy

PRIMARY SURVEY: *AIRWAY*

- Tracheostomy:

Opening in between the second and third tracheal rings.

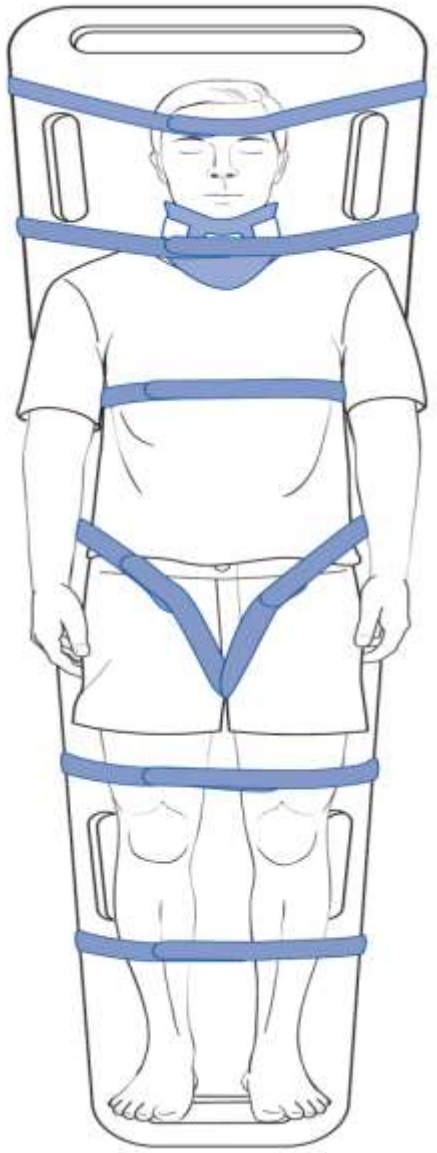


PRIMARY SURVEY: *AIRWAY*

- Assume Cervical spine injury
- Avoid Neck hyperflexion

PRIMARY SURVEY: *AIRWAY*

- Stabilize with back board, bindings, purpose built head immobilizers



PRIMARY SURVEY: *BREATHING*

- Spontaneous Breaths
- Air Exchange
- Chest wall movement

- The lungs, chest wall, and diaphragm must move adequately to ensure proper ventilation.

PRIMARY SURVEY: *BREATHING*

Systematic Approach:

- Expose the chest to RULE OUT injuries
  - Flail chest
  - Open Pneumothorax
  - Tension Pneumothorax
  - Hemothorax
- Inspect the chest for bruising or bleeding
- Palpate the chest: rule out rib fracture
- Auscultate: look for bilateral equal breath sounds
- Pulse oximetry monitor: Oxygen saturation in arterial blood SaO2

PRIMARY SURVEY: *CIRCULATION*

- Baseline circulation
- Organ perfusion and oxygenation

- Demand-Supply mismatch cause irreversible Organ damage

PRIMARY SURVEY: *CIRCULATION*

- The most common cause of shock in a trauma patient is:

HYPOVOLEMIA

Hemorrhage

PRIMARY SURVEY: *CIRCULATION*

Systematic Approach:

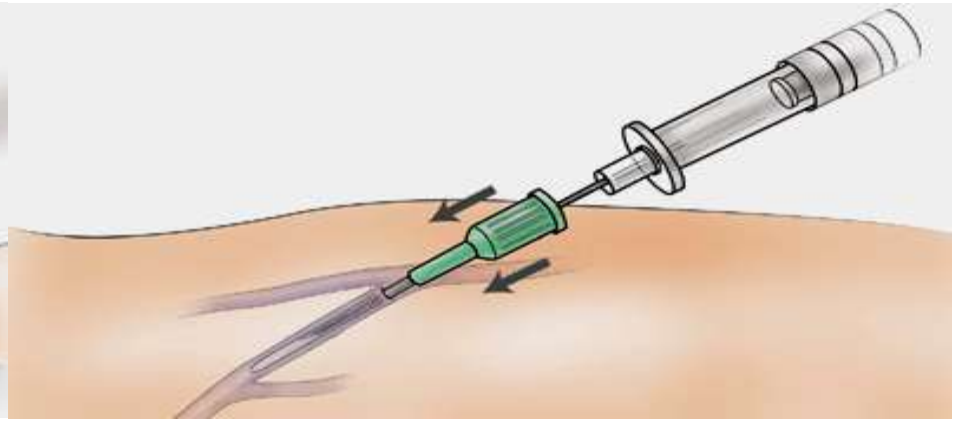
- Placement of two large bore IV catheters.
- Physical Examination
- Control bleeding
- Intravenous resuscitation

PRIMARY SURVEY: *CIRCULATION*

Systematic Approach:

- Placement of two large bore IV catheters

(14-16 gauge)



PRIMARY SURVEY: *CIRCULATION*

Physical Examination

- Skin color
  - pallor = poor skin perfusion.
- BP
  - Initially compensates
  - Drop quickly later
- Pulse: more sensitive to hypovolemia than BP
- Urine Output
- Mental status

Table 18-5 Estimated Fluid and Blood Losses*

	Class I	*Class II*	*Class III*	*Class IV*
Blood loss (mL)	Up to 750	750–1,500	1,500–2,000	> 2,000
Blood loss (% vol)	Up to 15	15–30	30–40	> 40
Pulse rate	< 100	> 100	> 120	> 140
Blood pressure	Normal	Normal	Decreased	Decreased
Pulse pressure	Normal or increased	Decreased	Decreased	Decreased
Respiratory rate	14–20	20–30	30–40	> 35
Urine output (mL/h)	> 30	20–30	5–15	Negligible
Mental status	Slightly anxious	Mildly anxious	Anxious, confused	Confused, lethargic
Fluid replacement†	Crystalloid	Crystalloid and blood	Crystalloid and blood	Crystalloid

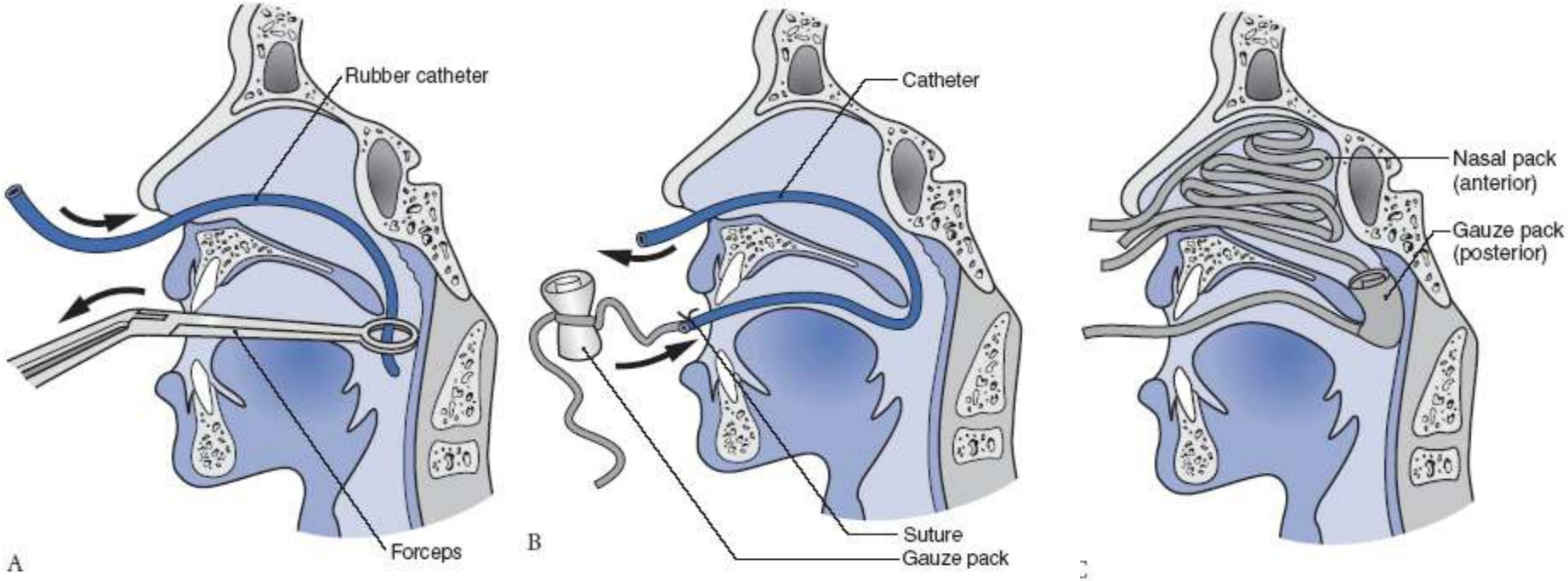
PRIMARY SURVEY: *CIRCULATION*

- Normal blood volume is 7% of the adult ideal body weight = approx 5L of blood in a 70 kg male.

- The head and neck has a rich blood supply!!

Approximate large wounds with sutures

Use packing or dressing to stop bleeding



Physical Exam to abdomen, pelvis extremities and retroperitoneum

PRIMARY SURVEY: *CIRCULATION*

- The initial fluid given to a trauma patient is lactated ringer's LR or 0.9% normal saline (crystalloid). 2L given rapidly.

- Blood transfusion in patients who continues to develop hypovolemic shock.

- Which type of blood ??
- O negative.

PRIMARY SURVEY: *DISABILITY*

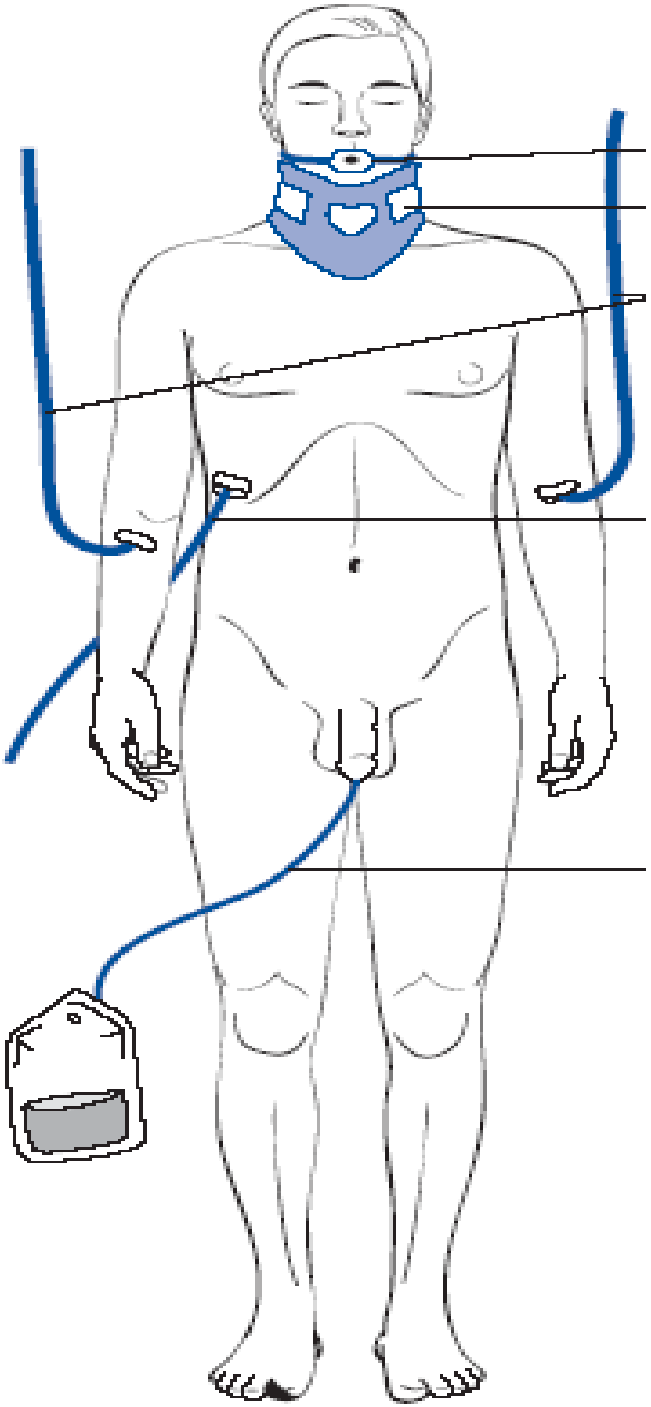
Brief Neurologic Examination

- The level of consciousness (decreased cerebral oxygen level)
- Pupillary size
- Pupillary reaction (cerebral function)

- To identify any severe CNS problems
- This is only a baseline exam

PRIMARY SURVEY: *EXPOSURE*

- The patient should be exposed so that all the body can be visualized, palpated and examined for injuries or bleeding sites.



SECONDARY SURVEY

Systematic Approach

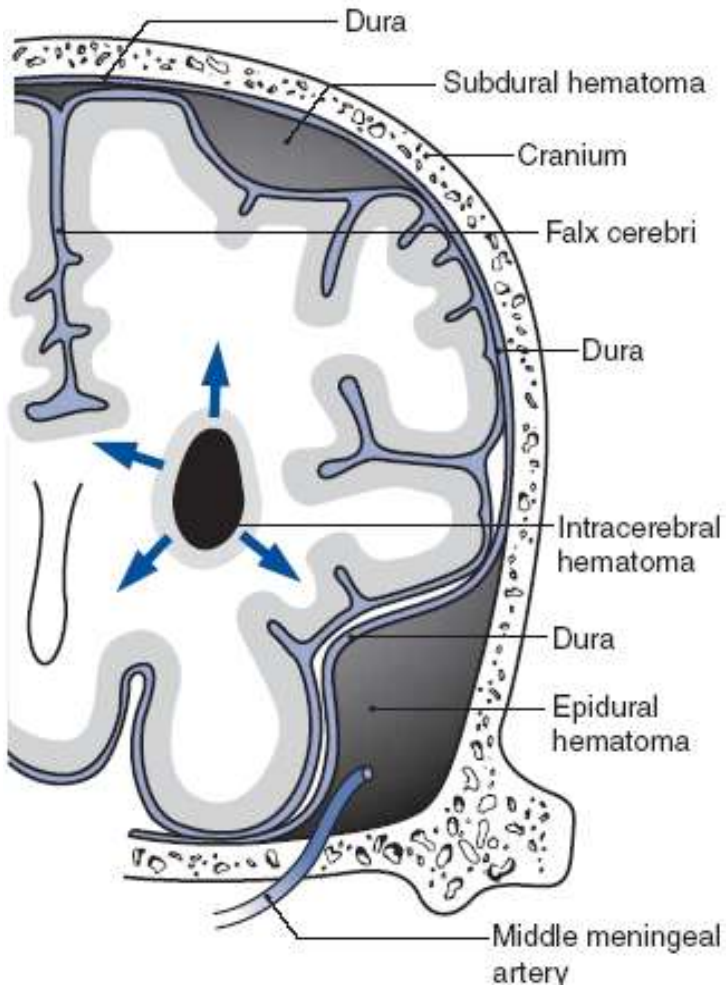
- Evaluation of Vital signs constantly
- Subjective Assessment:
  - History, medication, PMH, h/o injury, location, duration, etc.
- Objective Assessment: Head to Toe
  - Inspection
  - Palpation
  - Percussion

SECONDARY SURVEY

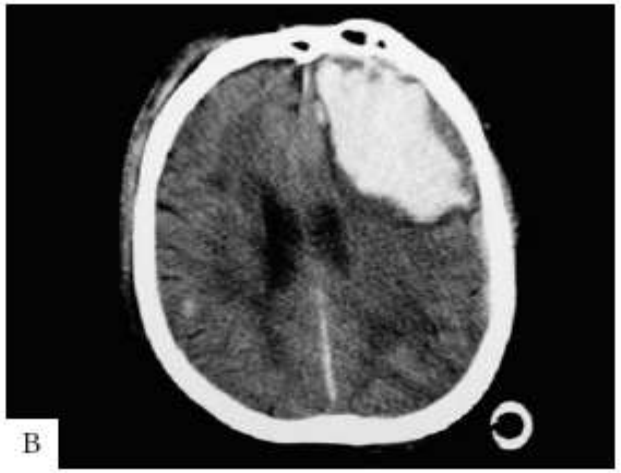
Head to Toe Assessment

Head and Skull

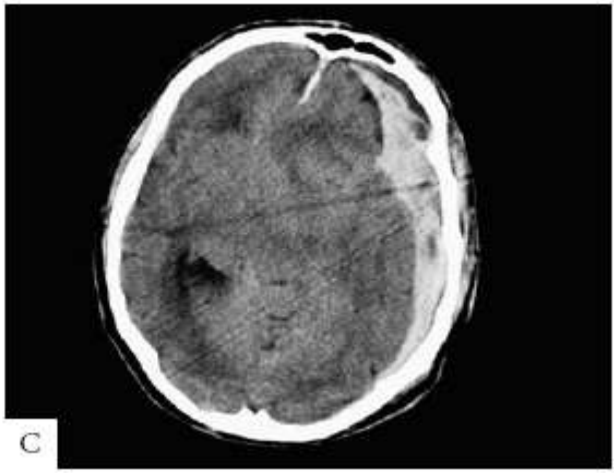
- A CT scan is take to rule out lesions commonly associated with head trauma:
  - Epidural hematoma
  - Subdural hematoma
  - Intracerebral hemorhage



Subarachnoid hemorrhage



Intracerebral hemorrhage



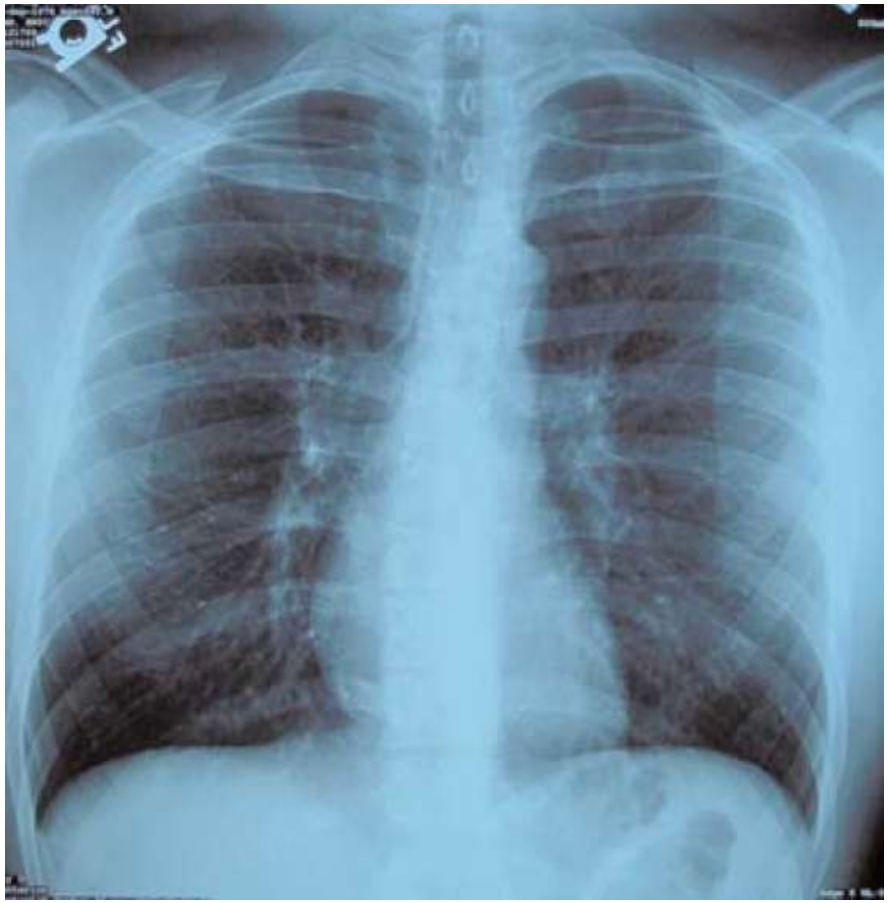
Subdural hematoma

SECONDARY SURVEY

Head to Toe Assessment

Chest

- Upright Chest x-ray or CT scan.
- Evaluate for potentially lethal chest injuries such as pulmonary contusion or aortic disruption



SECONDARY SURVEY

Head to Toe Assessment

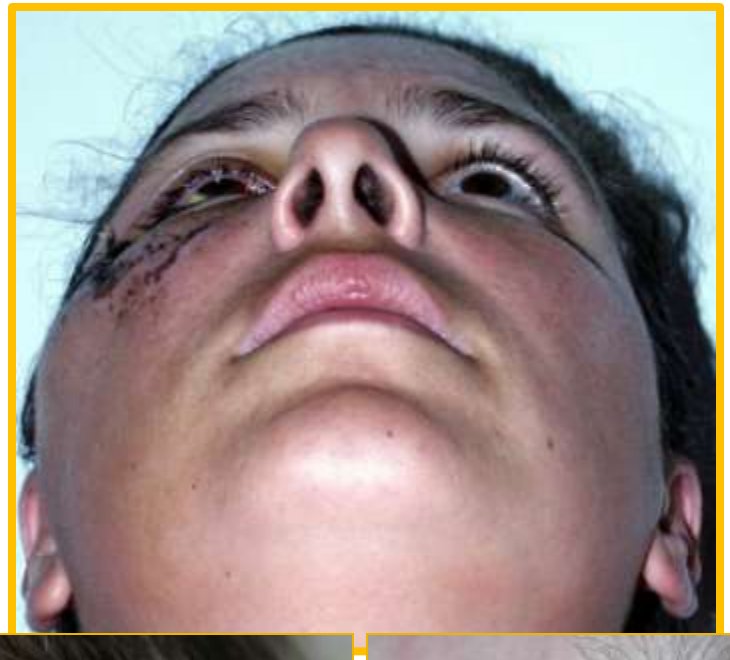
Spinal Cord

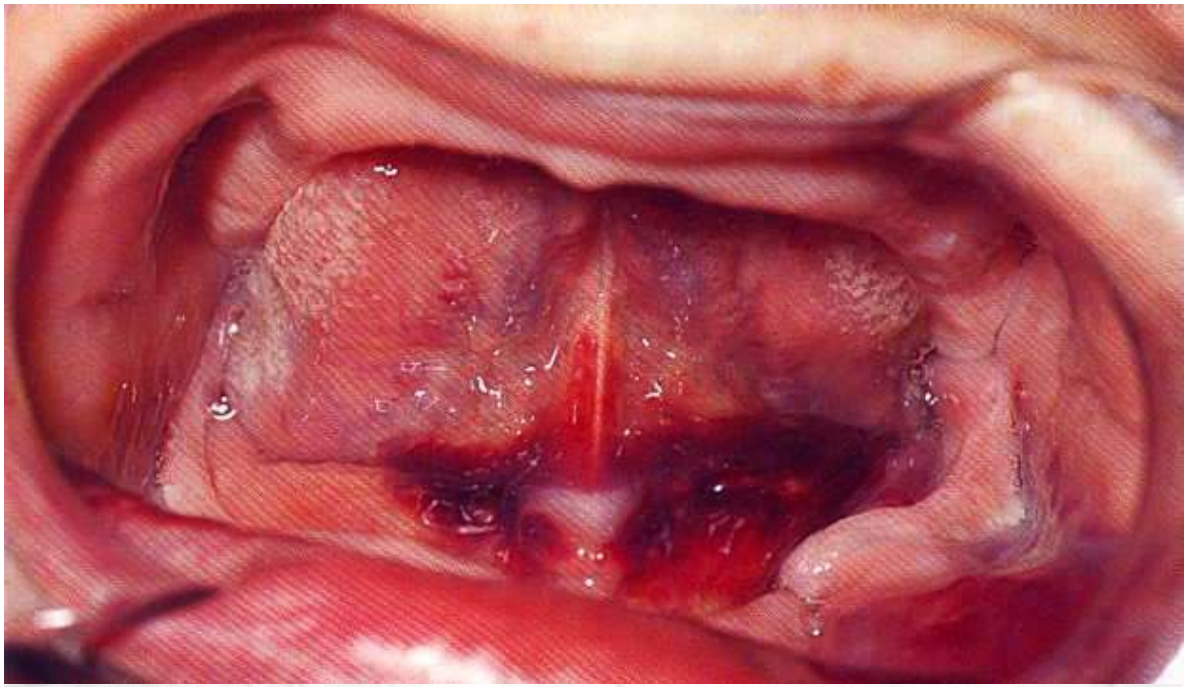
- Neck and spine should be evaluated for deformity, edema, ecchymosis, muscle spasm
- An injured neck which has not been stabilized may lead to Quadriplegia
- Cevical spine Plain x-ray or CT scan is used

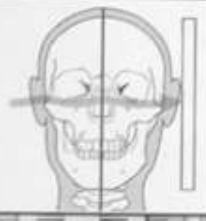
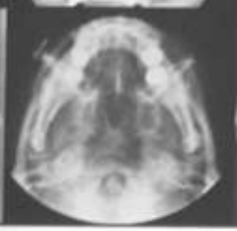
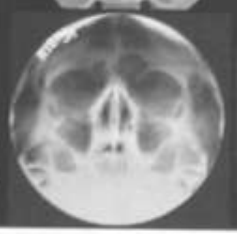
SECONDARY SURVEY

Head to Toe Assessment

Maxillofacial Area and Neck





	Lateral Ceph	SMV	Waters	PA Ceph	Reverse Towne	Oblique Lateral	
						Body	Ramus
Patient placement	Film parallel to midsagittal plane	Canthomeatal line parallel to film	Canthomeatal line at 37° with film	Canthomeatal line at 10° with film	Canthomeatal line at −30° with film	Film in contact with cheek at molar area	Film in contact with cheek at ramus area
Central beam	Beam perpendicular to film	Beam perpendicular to film	Beam perpendicular to film	Beam perpendicular to film	Beam perpendicular to film	Beam aims at the molar-premolar area	Beam aims at the ramus area
Diagram of patient placement							
Illustration of patient placement							
Skull view							
Resultant image							

SECONDARY SURVEY

Head to Toe Assessment

Maxillofacial Area and Neck

- Use a large tonsilar suction to clear the oral cavity and remove foreign debris or avulsed teeth
- Avoid manipulation of the neck
- A thorough physical Exam of the H&N area
  - Soft tissue injuries e.g. facial nerve, parotid duct, eyelids
  - Evaluate for asymmetries
  - Palpate bony landmarks
  - Examine the oral cavity for loose teeth, lacerations
  - Examine the neck for injury, subcutaneous air, edema or hematoma
  - Feel for carotid pulses