

Ibraheem Qudaisat



Ibraheem Qudaisat (Anesthesia and Intensive Care)

This group is intended for use by medical students joining Anesthesia course at school of Medicine-UJ

Airway Management

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Dept. of Anesthesia

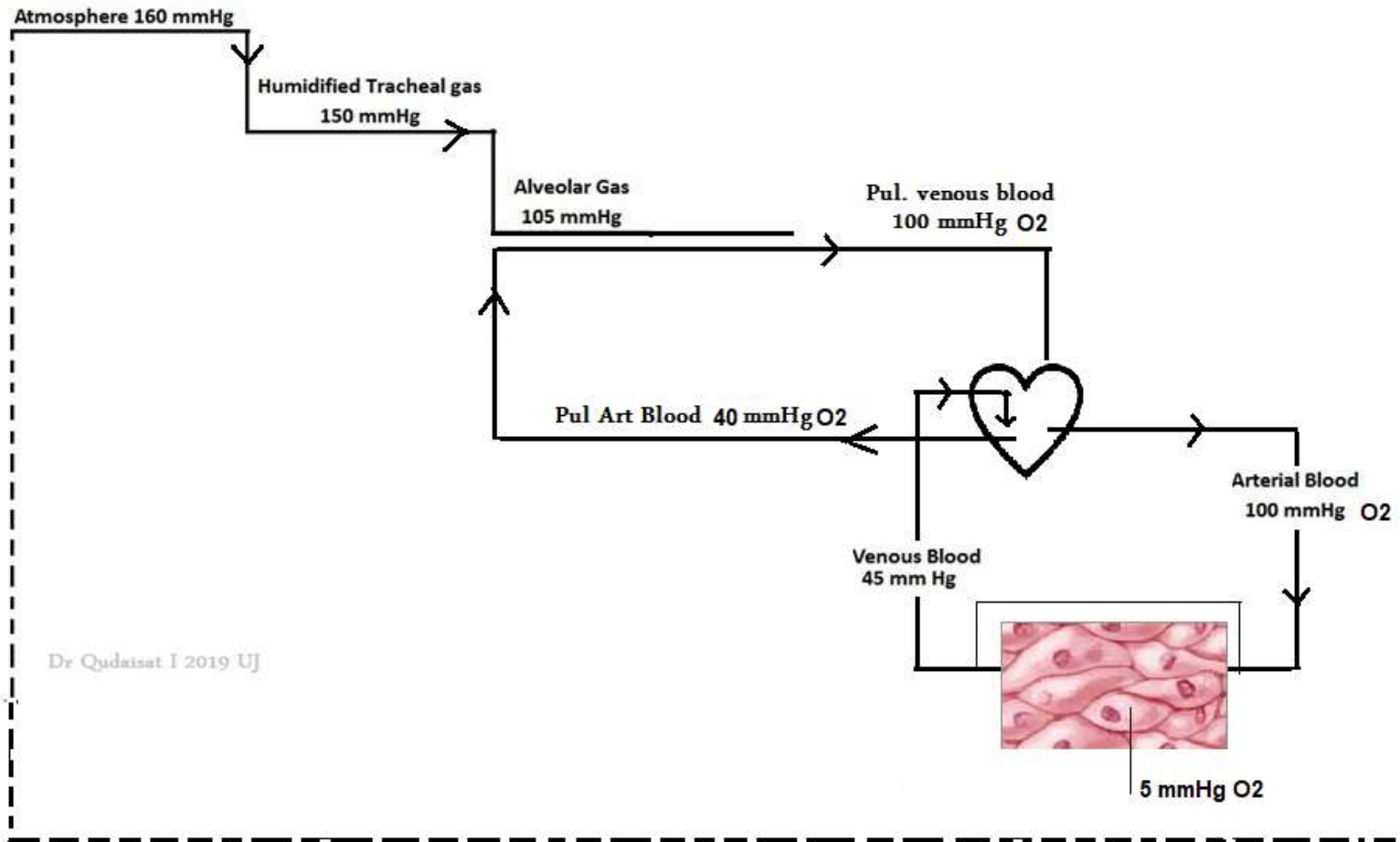
Faculty of Medicine

JORDAN UNIVERSITY

Concept

- In the ABCs of Life, A stands for Airway Patency
- Apart from Cardiopulmonary by-pass (with extracorporeal oxygenation), oxygen cannot reach the blood when the flow of Oxygen to the Gas exchange membrane is obstructed, and even CPB is initiated under controlled airway conditions.

Oxygen Cascade



Oxygen Reserve in the Body

Is provided by:

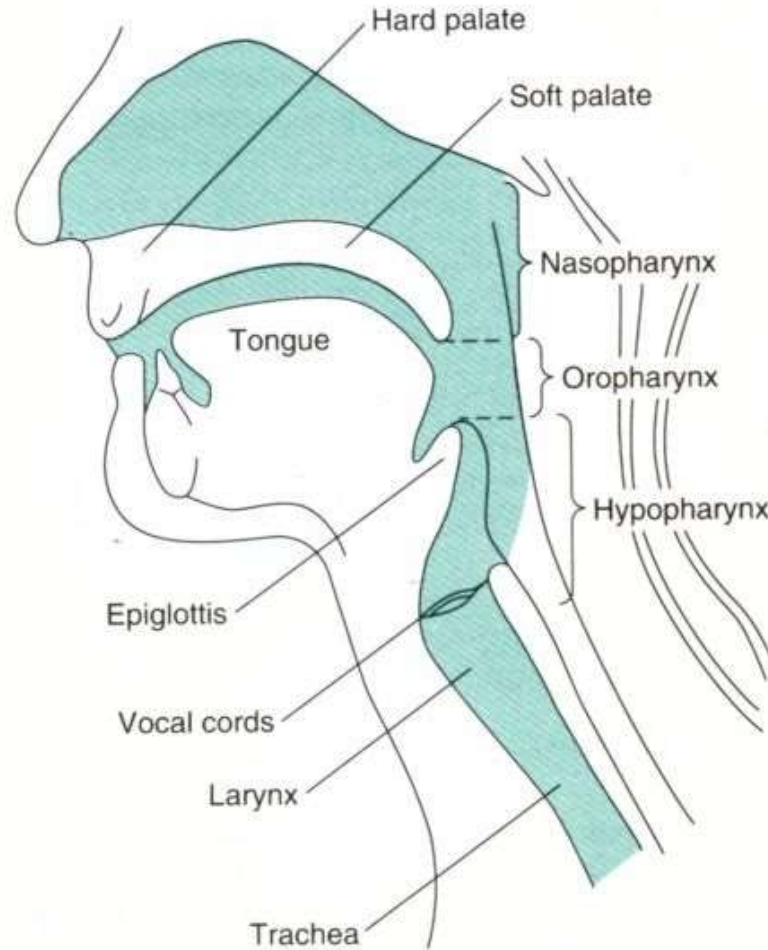
- Expired Air Oxygen tension of ~ 120 mmHg

VS. Alveolar Oxygen tension of around 100mmHg.

- Oxygen flux of ~1000 ml/min **VS.** Oxygen Consumption of ~ 250 ml/min

- Intracellular Oxygen tension 5-40 mmHg **VS.** Mitochondrial critical oxygen tension 1-3 mmHg

Airway anatomy



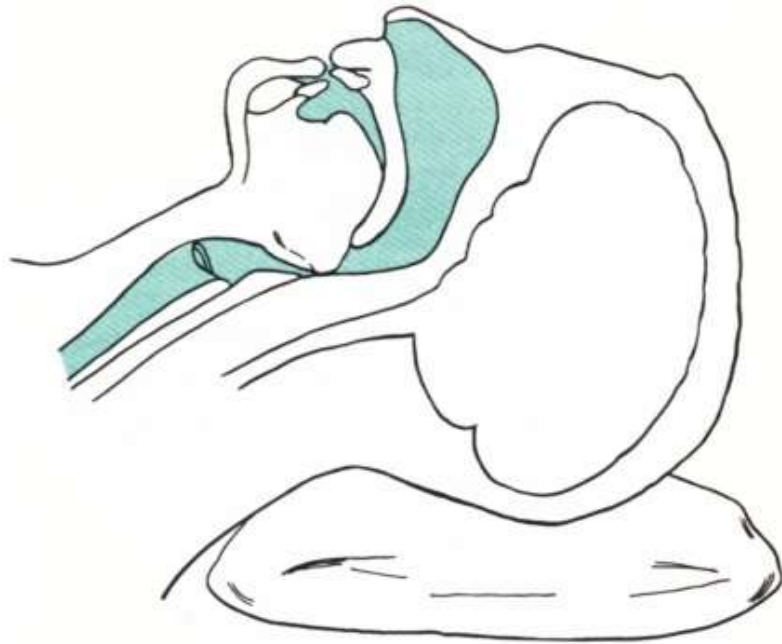
General Diagnostic Rules

- Obstruction can occur due to many causes
- Always think of and exclude common things first (tumors come at the end of the list)
- In unconscious patients, the tongue falling back against the posterior pharyngeal wall is the commonest airway obstructing cause.

General management Rules

- Always start by shouting at and shaking the patient (remember the Pickwickian syndrome!?)
- Look into the patient's mouth and if applicable Swab the mouth and pharynx with your finger to remove any foreign bodies (e.g. a loose denture, vomitus, etc.)
- Patient still not breathing proceed →

Head tilt-Chin Lift Maneuver



Jaw thrust Maneuver



Applying face mask with jaw thrust

- USING SINGLE HAND TECHNIQUE



- USING TWO HAND TECHNIQUE



Maintaining patency of airway using airway assistant devices

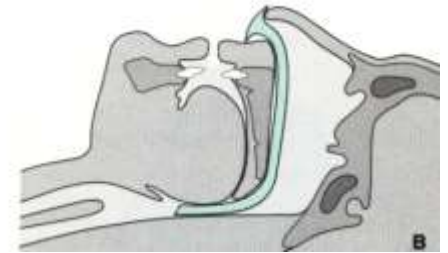
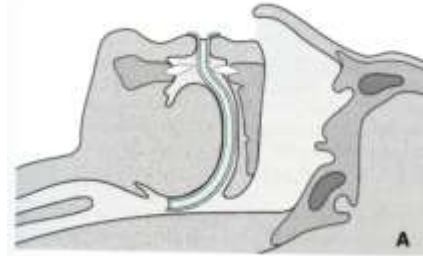
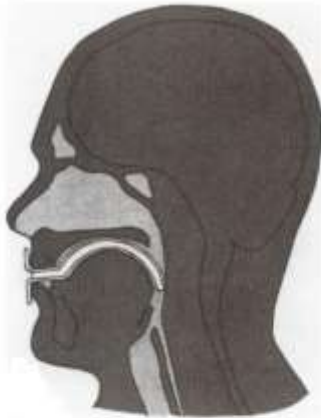
- Oral airways



- Nasal airways



Maintaining patency of airway using airway assistant devices

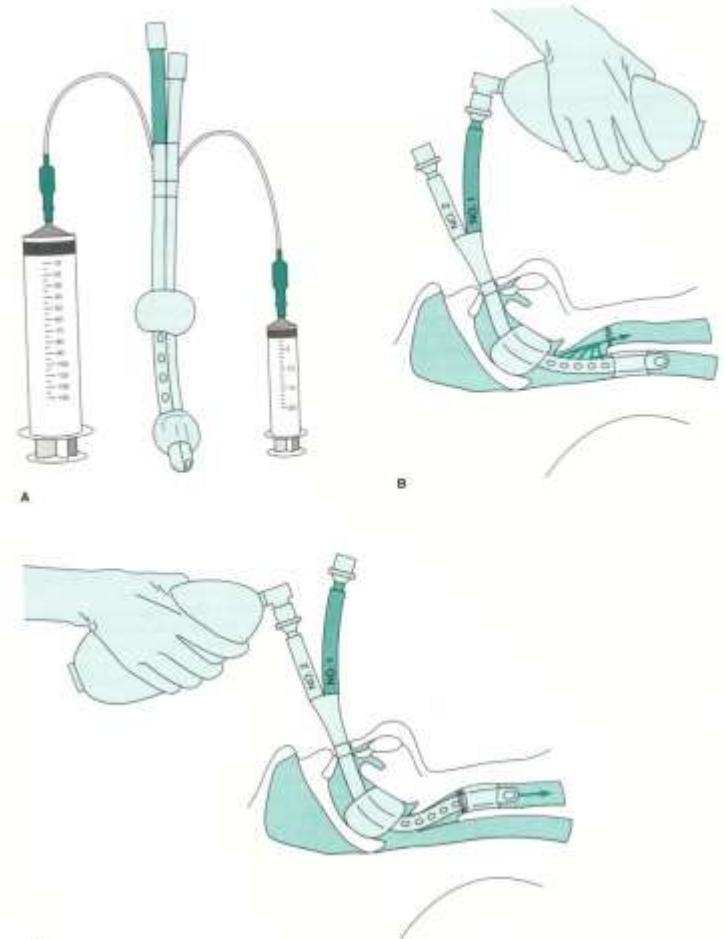


Insertion technique of the Oral and Nasal airways



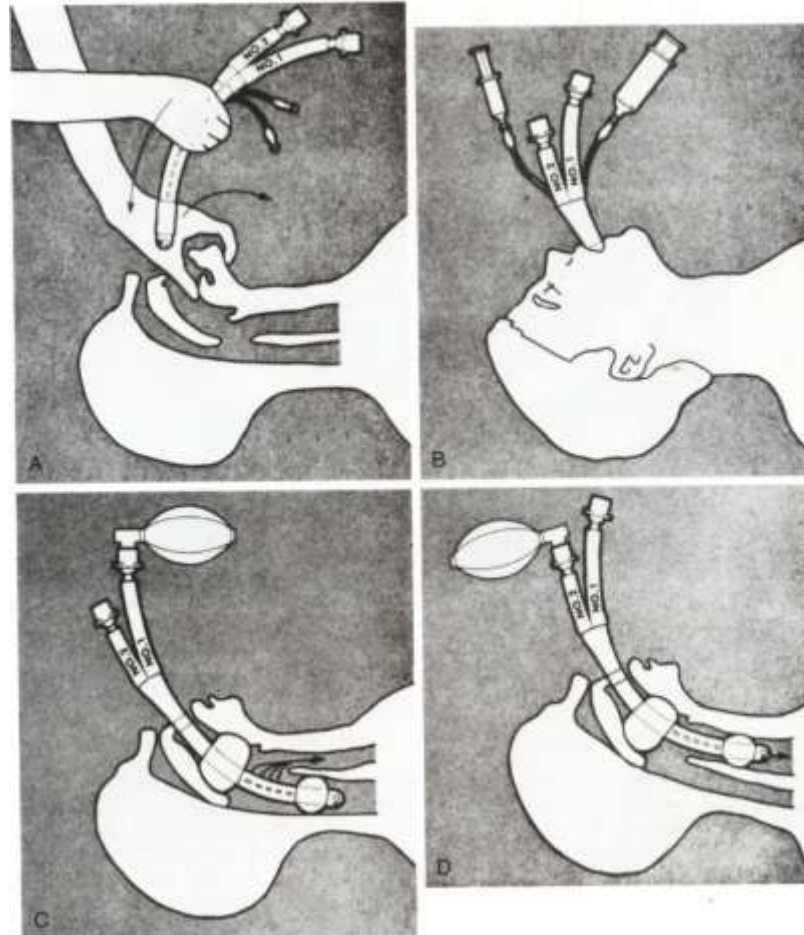
Maintaining patency of airway using the Combitube

- An Esophageal-tracheal combined tube with two lumens and two cuffs
- Blindly inserted
- Ventilation lumen depends on wheatear the distal end goes into the esophagus or the trachea



Combitube

(Insertion Technique)



Disadvantages and contra- indications of Combitube

- **Disadvantages:**

- Available only in one size, proper for patients >15 years
- Expensive
- Can't be used to guide fiber-optic intubation

- **Contra-indications:**

- Not practical for pediatric patients
- Patients with intact gag reflexes
- Patients with esophageal pathology
- Patients with caustic substance ingestion

Laryngeal tube

- A single lumen tube with both an esophageal and pharyngeal cuff
- A single pilot balloon inflates both cuffs
- Available in a variety of sizes
- Successful insertion by non-anesthetists
- New versions have an open esophageal end allowing for drainage and suctioning

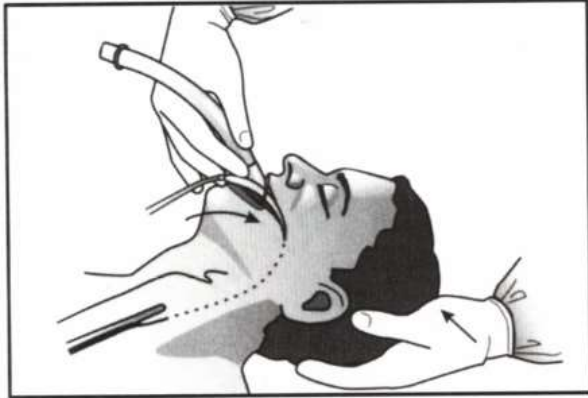


Laryngeal Mask Airway (LMA)



Laryngeal Mask Airway

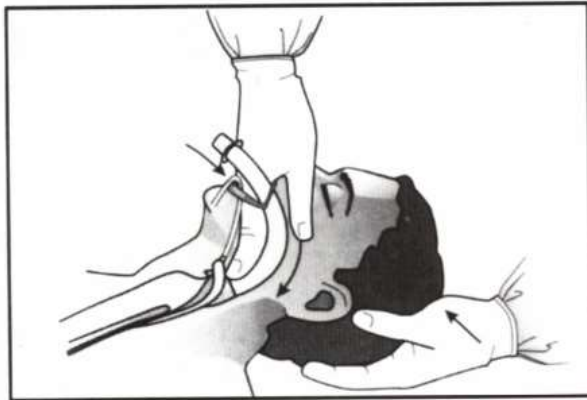
(Technique of insertion)



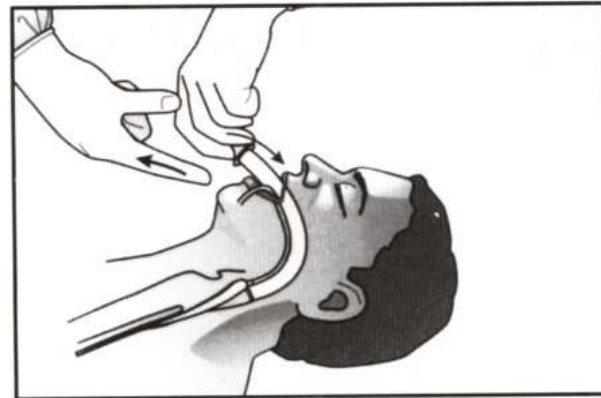
A



B

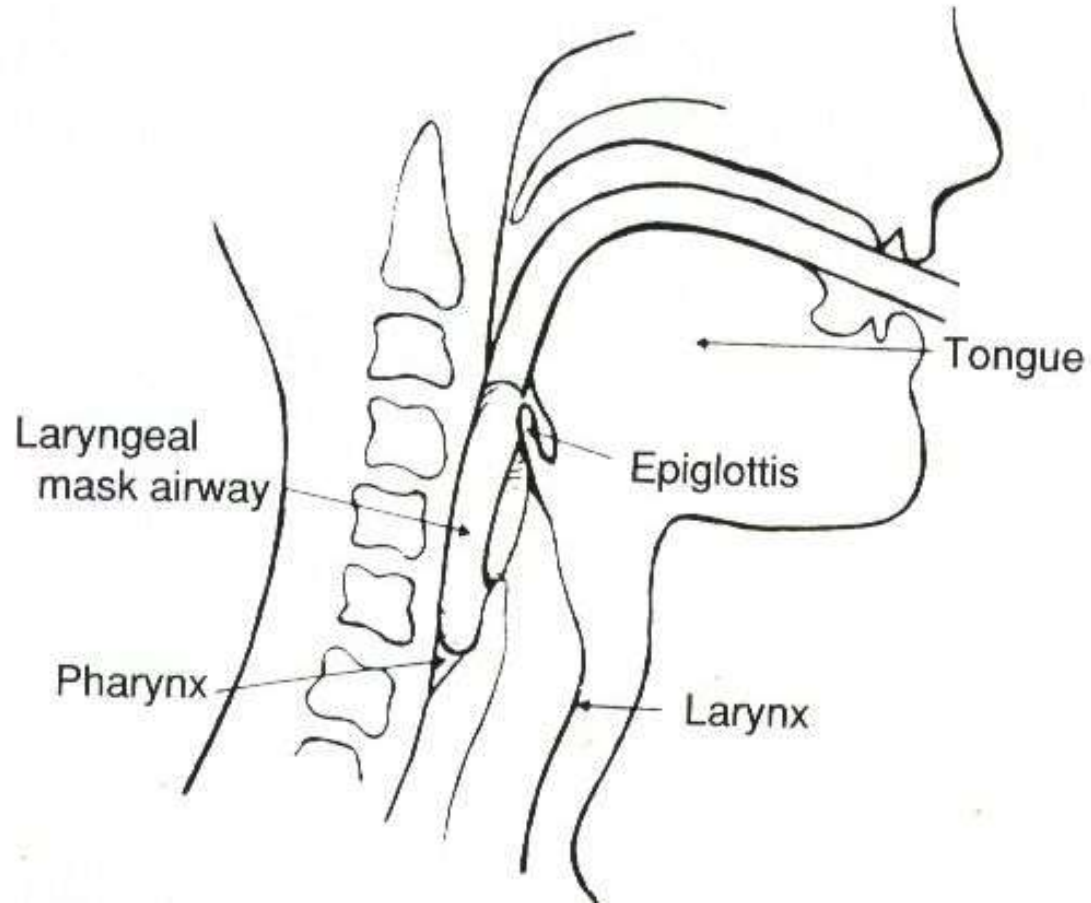


C



D

Laryngeal Mask Airway (*In Position*)



Choice of LMA size

Mask Size	Patient Size	Weight (kg)	Cuff Volume (mL)
1	Infant	<6.5	2-4
2	Child	6.5-20	Up to 10
2½	Child	20-30	Up to 15
3	Small adult	>30	Up to 20
4-5	Normal and large adult		Up to 30

Advantages of LMA compared with Endo-tracheal tube

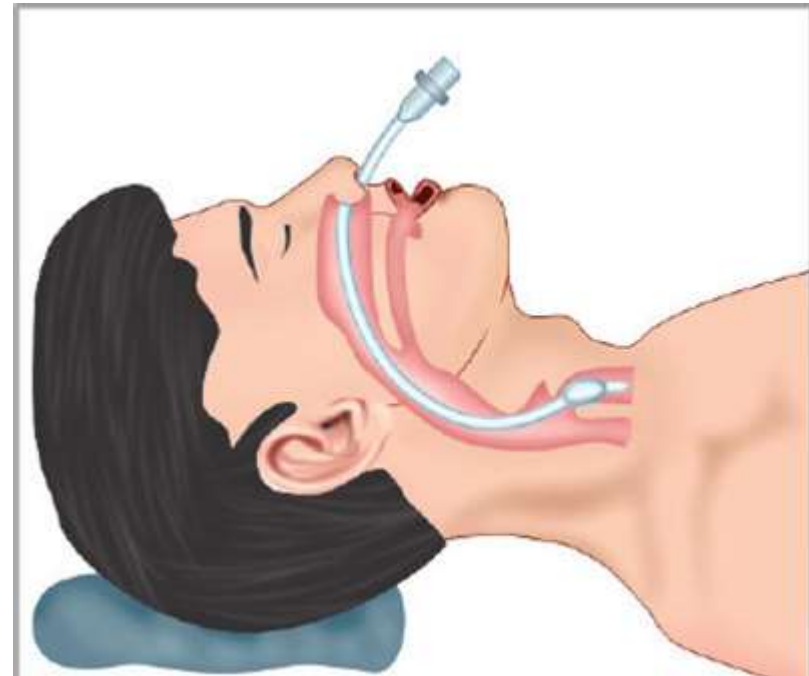
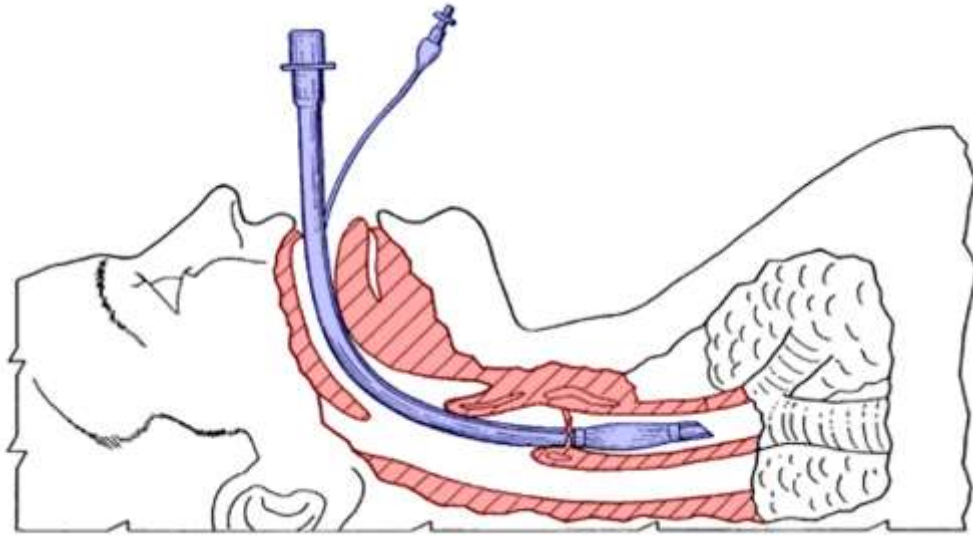
- Less invasive
- Less anesthetic depth required
- Useful in difficult airway management
- Less tooth and laryngeal trauma
- Less laryngospasm and Bronchospasm
- Does not require muscle relaxation
- Does not require neck mobility
- Less effect on B/P, H/R, ICP, IOP
- Less risk of Esophageal, or endo-broncheal intubation

Disadvantages of LMA compared with Endo-tracheal tube

- Increased Risk of GI content aspiration
- Not practical in prone or jackknife positions
- Unsafe in Morbidly obese
- Limits maximum PPV
- Less secure airway
- Greater Risk of gas leak and pollution
- Can Cause gastric distention

End of Part One

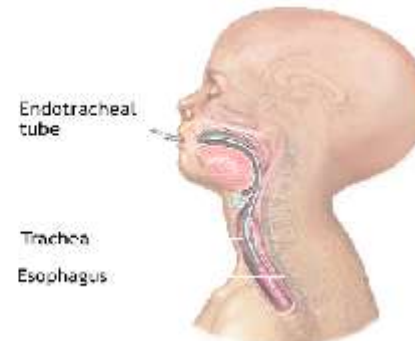
Endotracheal Intubation



Types of Endotracheal Tubes

1- Sealing of trachea

- Cuffed vs. Non-cuffed



2- Type of Cuff:

- High pressure-low volume Vs. Low pressure-high volume.



3- Shape of tube

- Regular, pre-formed or armored (Reinforced or non-kinkable)



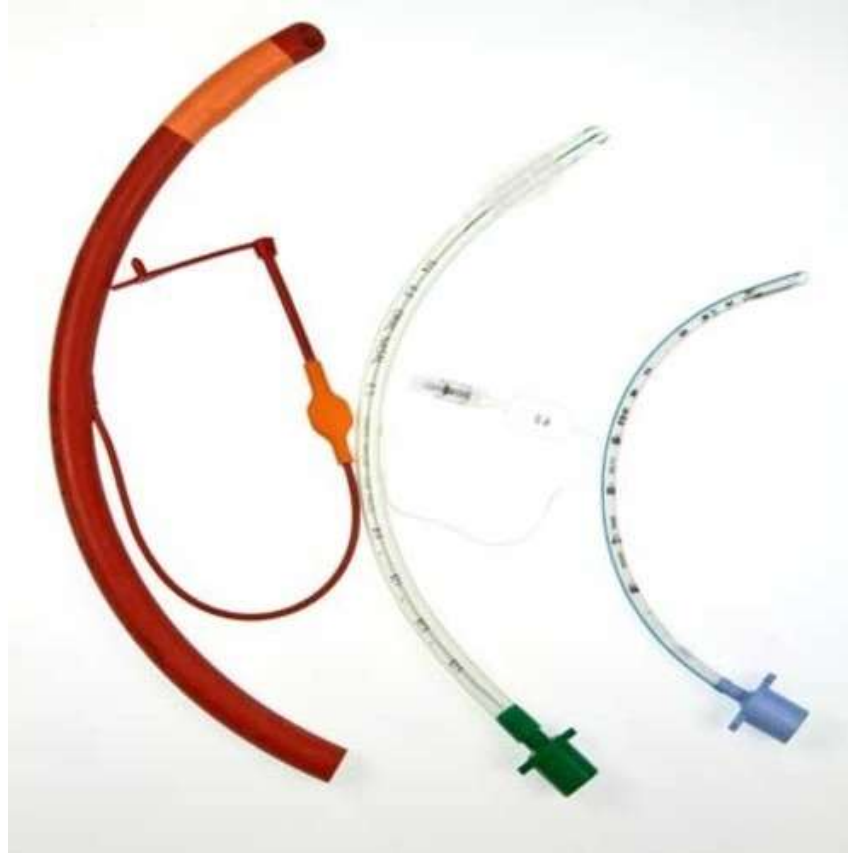
3- Lumen

Single lumen vs. Double lumen

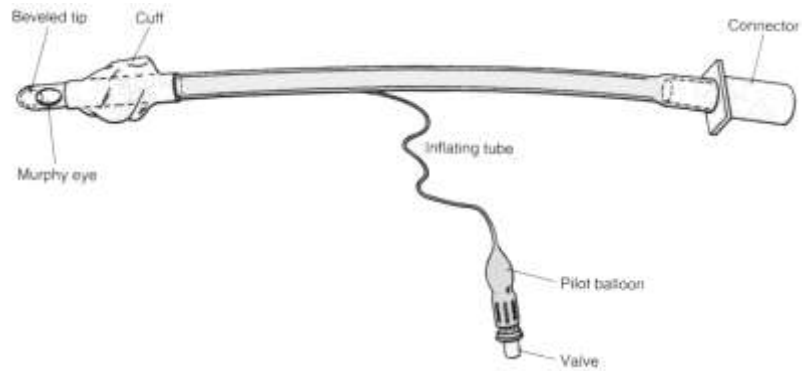


4- Usage times

- Disposable vs. Disposable



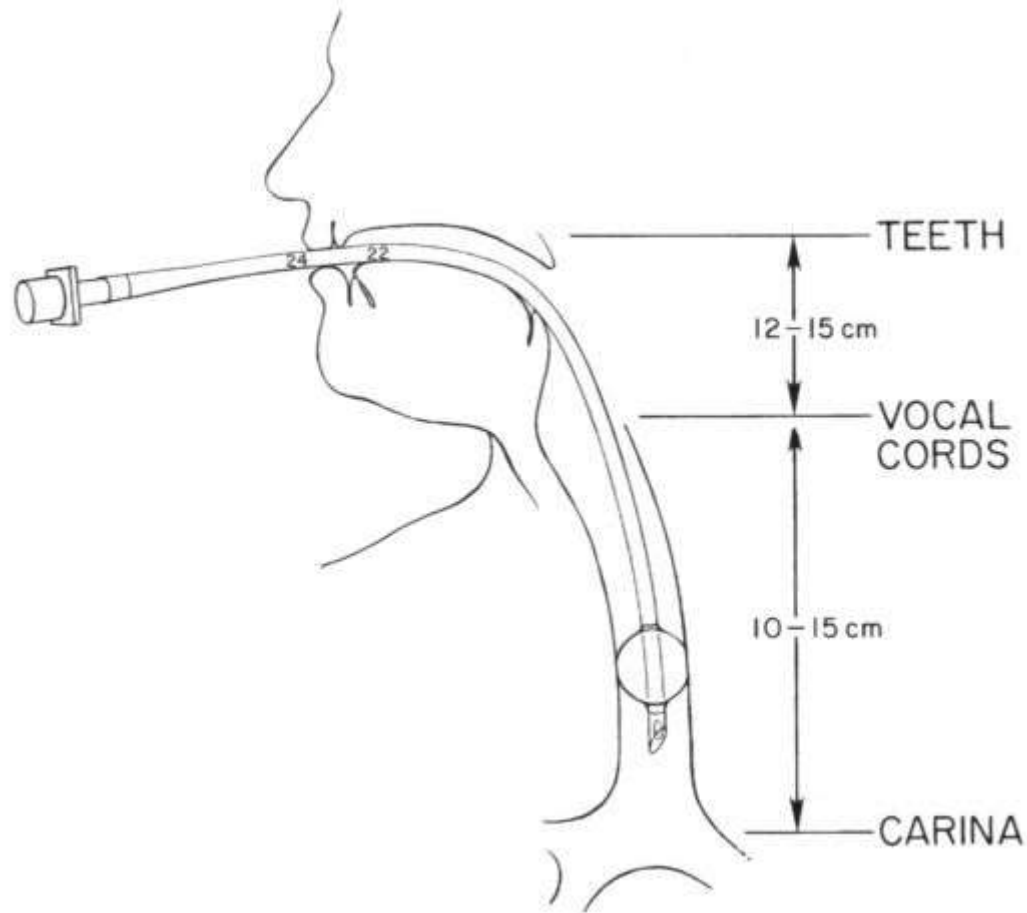
Endotracheal Tube (*Design*)



Endotracheal Tube (Choice)

Age		Internal Diameter (in mm)	Depth of Insertion (in Cm)
Newnate or (full-term infant <3.5 kg weight)		2.5 - 3	9 - 10
Full term infant (non cuffed tube)		3.5	9 - 11
Child	Non-cuffed tube	$4 + (\text{Age}/4)$	12 + (Age/2)
	cuffed tube	$3.5 + (\text{Age}/4)$	
Adult	Male	7.5 - 9	21 - 24
	Female	7 - 7.5	21 - 24

Endotracheal Tube (in Position)

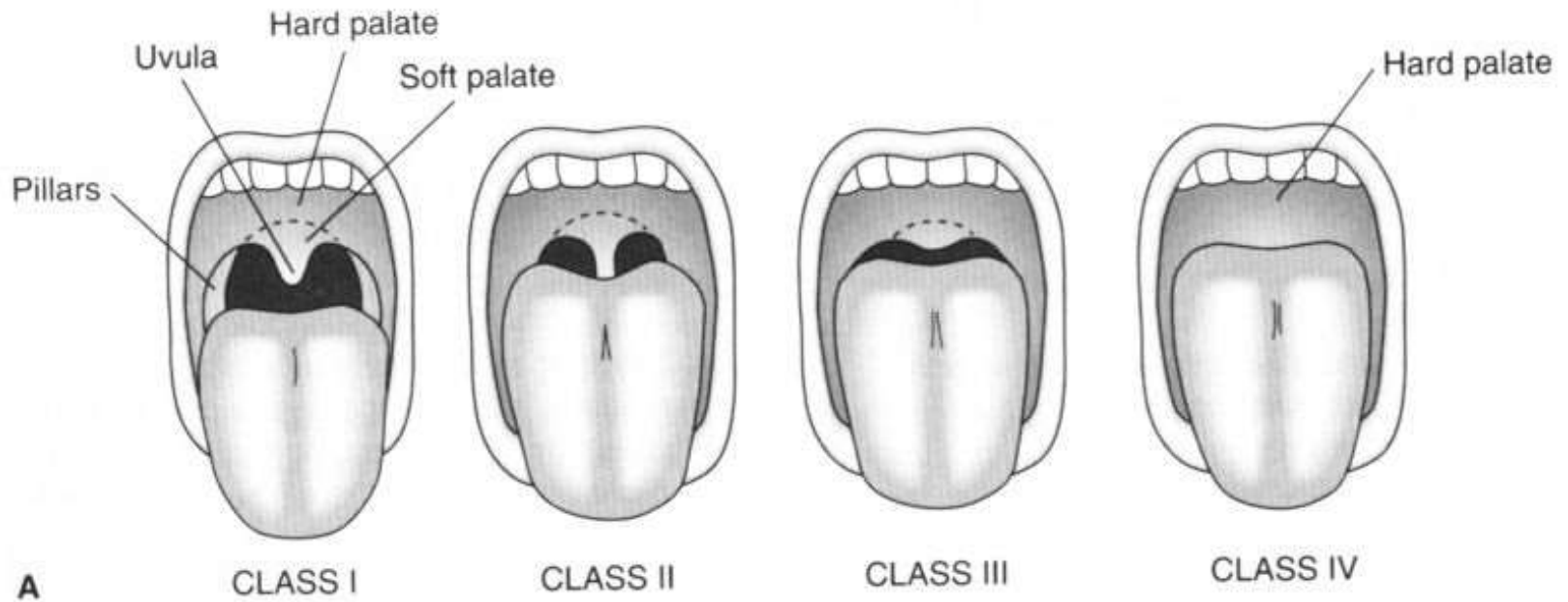


Endotracheal Intubation

- Airway assessment:

Feature	Visualization of Larynx during laryngoscopy	
	Likely Easy	Likely Difficult
History	free	Previous difficulty/snoring/ Neck pathology/radiation
Facial Features:	symmetry	Asymmetry/Jaw recession
Pharyngeal view	Non-crowded	Crowded
Dental condition	Good	Protruding teeth/ mobile teeth
Head extension:	> 35 °	< 35 °
Neck length	Normal	Short
Mouth opening: > 2 fingers width	> 2 finger breadths (3 cm)	< 2 finger breadths
Thyro-mental distance: < 6 cm >	> 6 cm	< 6 cm
Jaw protrusion ability.	able	Not able

Mallampati classification



Patient Head Positioning Sniffing Position



Sniffing Position-Alignment of Airway Axes

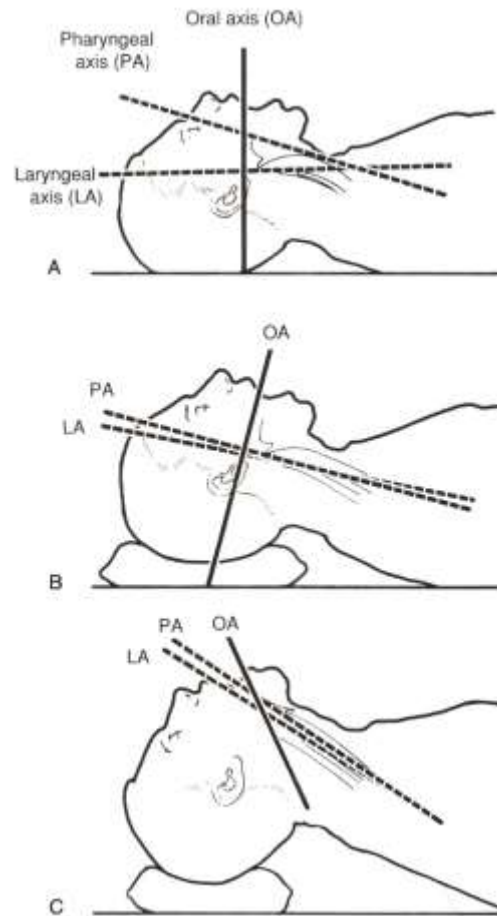
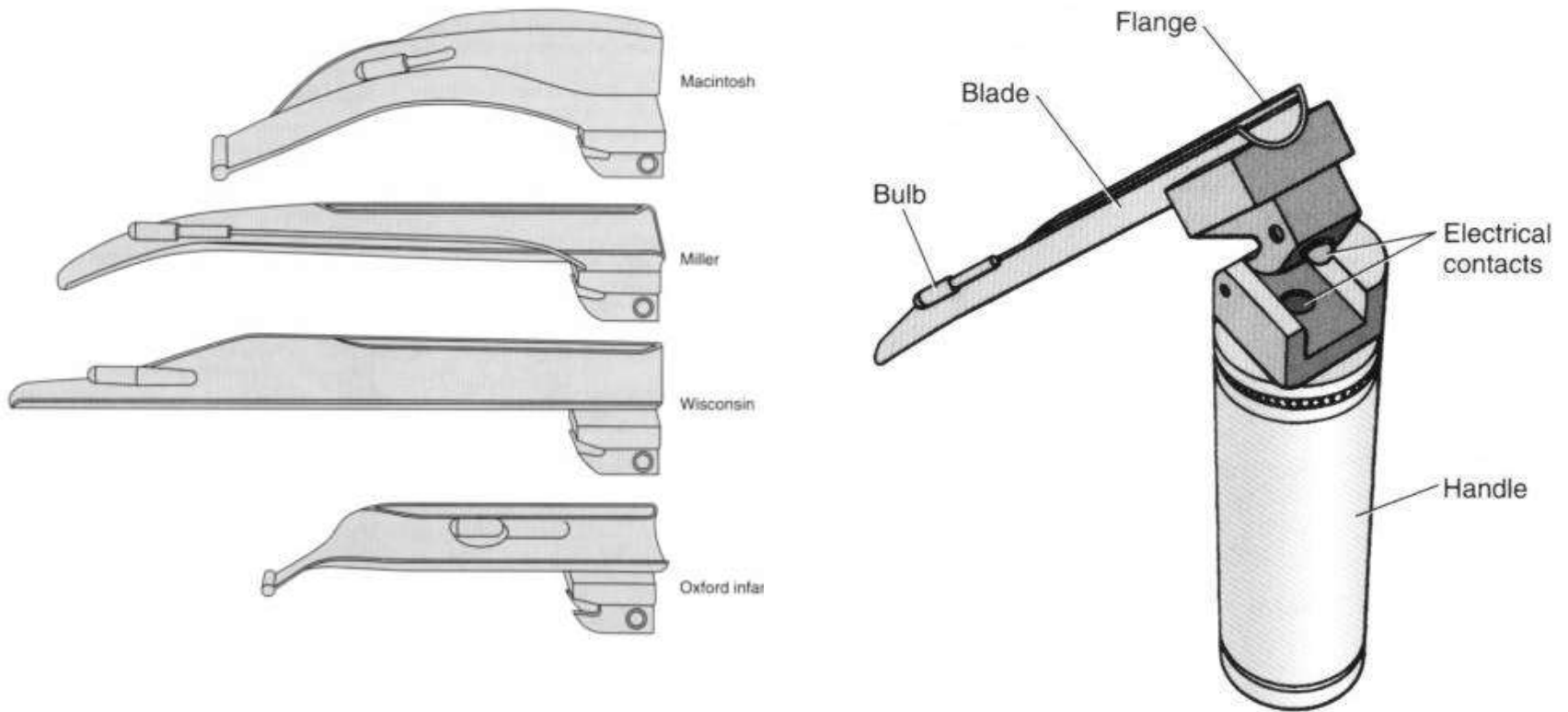


Figure 30-3 Sagittal section demonstrating head position for sniffing.

Direct Laryngoscopy

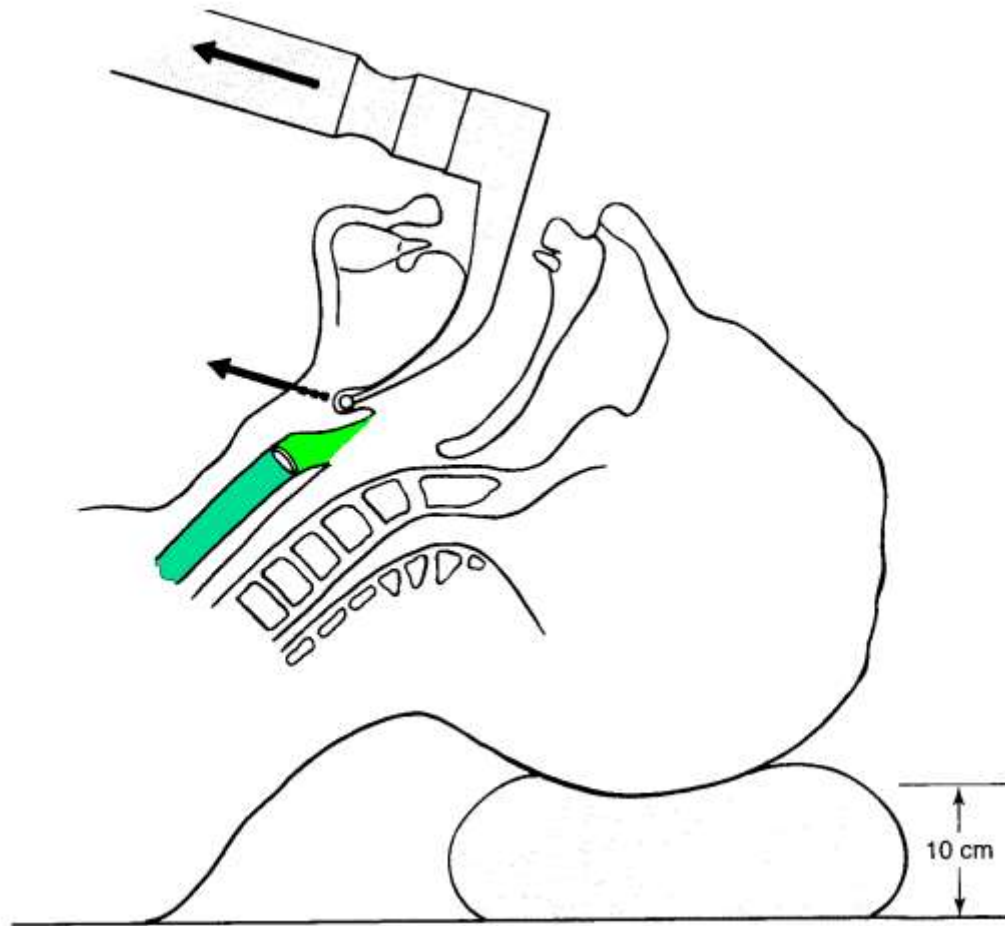
“The Laryngoscope”



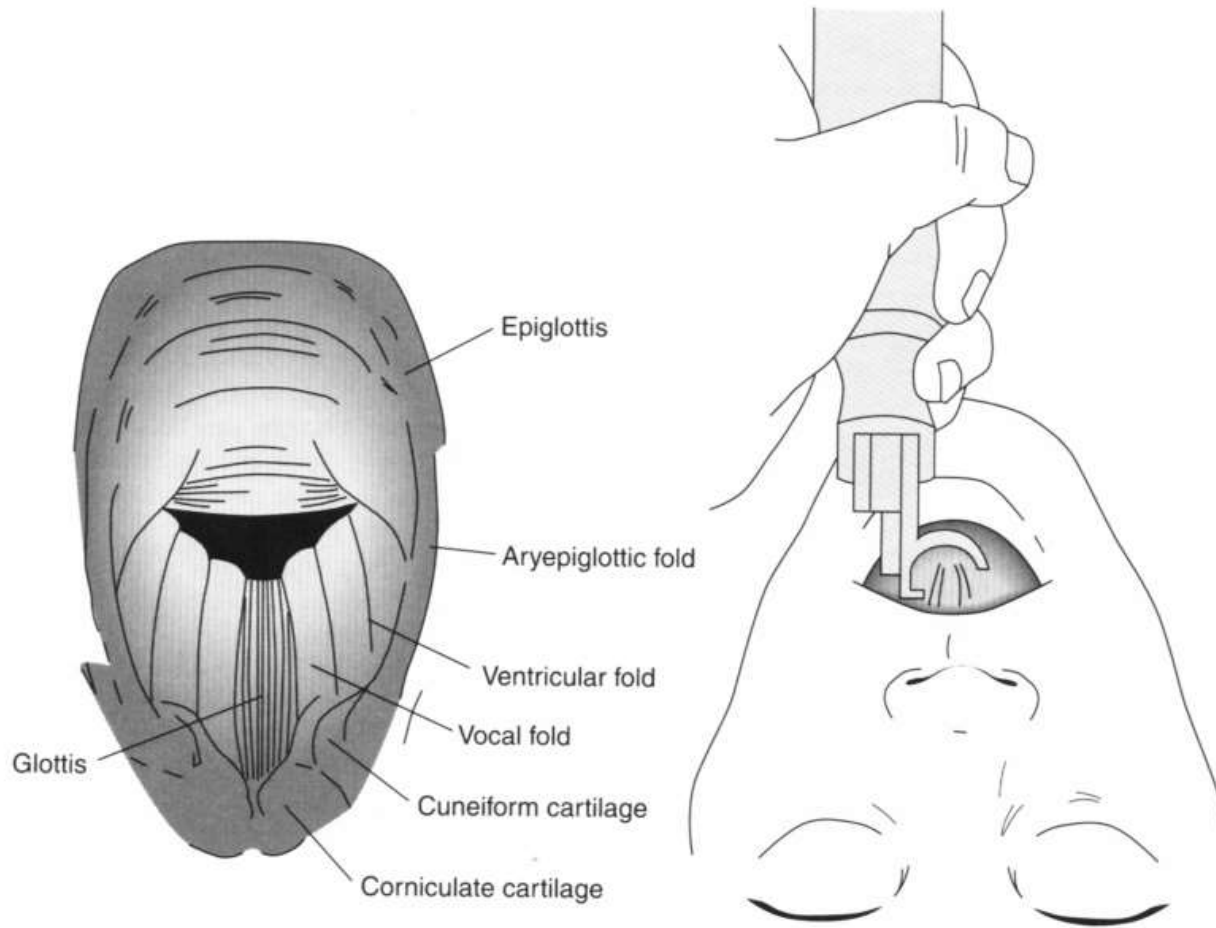
“The Laryngoscope”



Laryngoscopy



Laryngoscopy



Principles of Direct Laryngoscopy

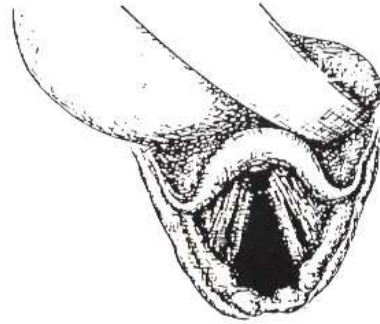
- Ideal Patient Position
 - Ideal table Height: Head of patient at the Level of the operator's Xiphisternum.
 - Proper size of Laryngoscope Blade
 - Check adequacy of laryngoscope light
 - Proper Endotracheal tube size
-
- Hold the Laryngoscope handle firmly with your left hand
 - Introduce the laryngoscope blade at the right side of the tongue, with the right tongue border lying on the laryngoscope's blade flange.
 - Slide the blade gently inward along the tongue, with gentle elevation of the tongue in the upward and forward axis direction until you see the epiglottis
 - Advance the tip of the laryngoscope blade anterior to the Epiglottis ((i.e. in the vellucula against the Hypoid bone)
 - Moving the tip of the laryngoscope blade anteriorly (*upward for you since the patient is supine*), will move the epiglottis away from the laryngeal inlet

Principles of Intubation

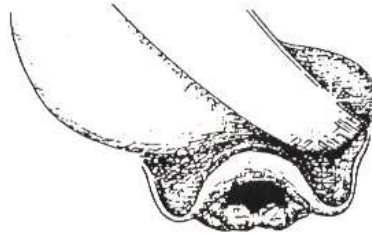
- Hold the curved endotracheal tube with your right hand with its distal end directed forward.
- Introduce the tube through the Vocal cords into the trachea for an adequate distance (*until the horizontal black line mark on the tube is at the vocal cord level*)
- Avoid undue force when introducing the tube (*try slight rotation of the tube if it did not bypass the laryngeal inlet, otherwise, check the tube size*)
- Gently withdraw the laryngoscope blade out with your right hand firmly holding the tube in place
- Inflate the tube Cuff with proper volume(adequate to provide the seal, and not exceeding 30 cmH₂O)
- Ventilate through the tube and check that both lungs are equally ventilated by auscultating both lungs
- The tube distal end should ideally be 1 to 2 cm above the Carina, otherwise right bronchial intubation is likely with only the right lung being ventilated
- Adapt the depth of the tube up or down according to you check and record the required depth
- Firmly secure the tube by plaster taping it to the face or by the use proper tying tape

Laryngeal View Classification

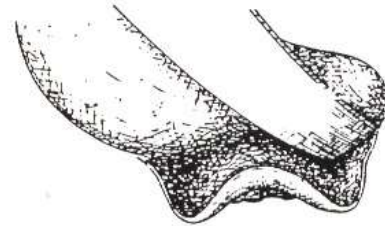
Grade 1



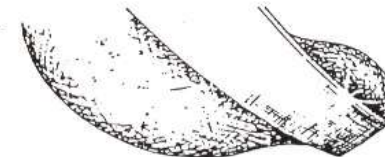
Grade 2



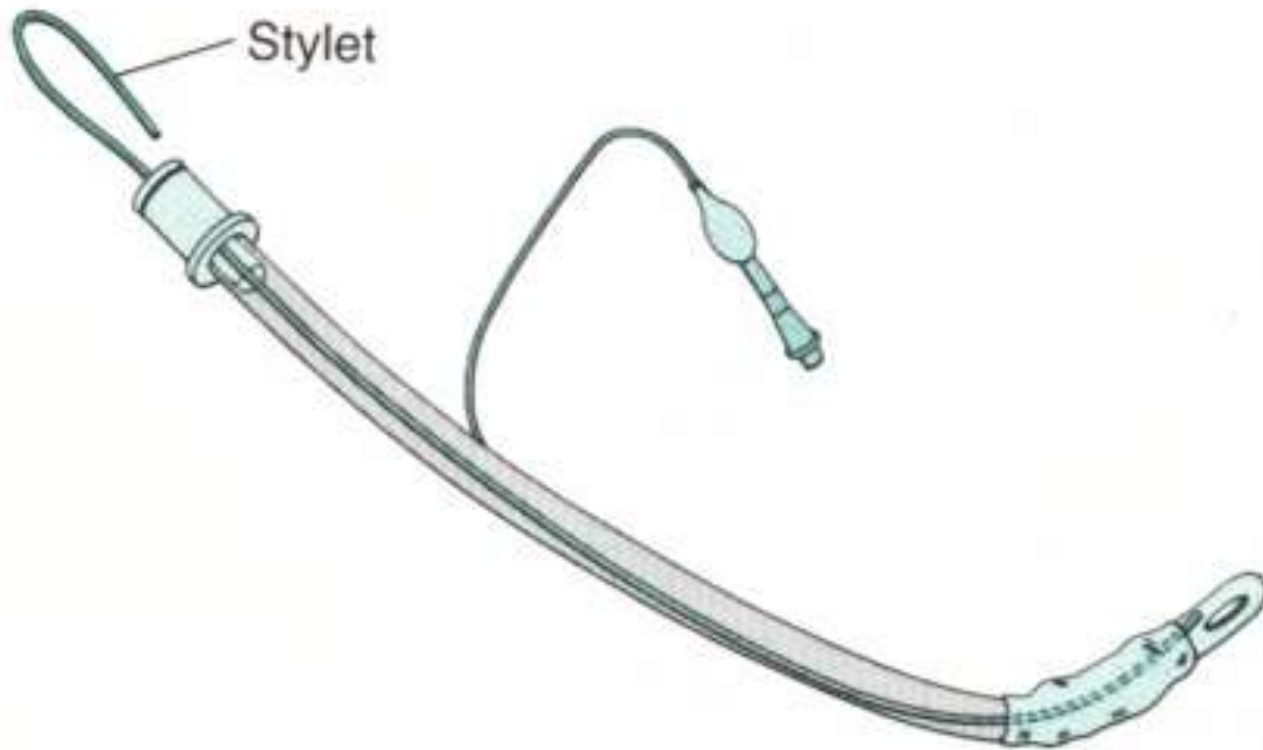
Grade 3



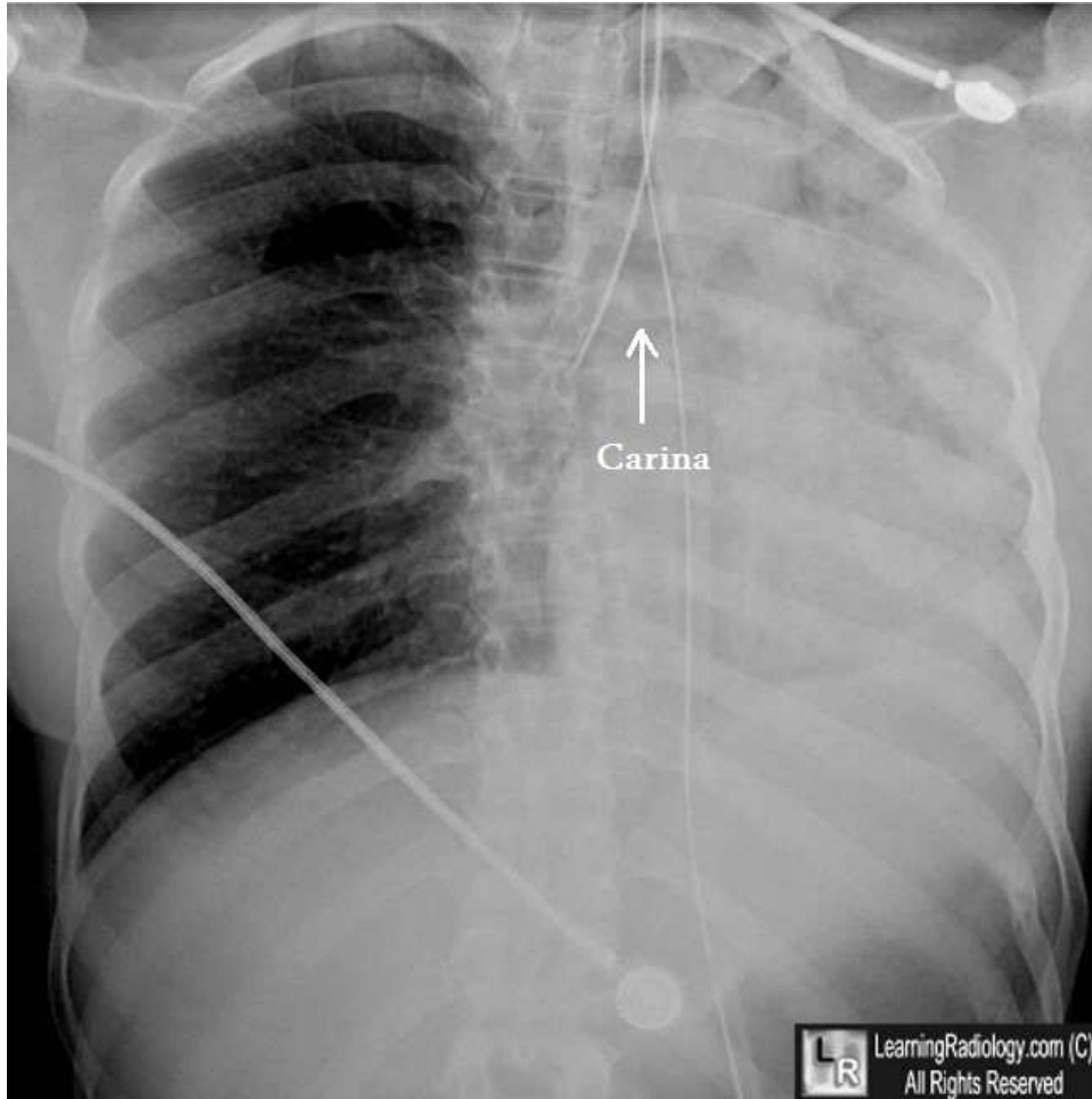
Grade 4



Endotracheal tube with Stylet



Right endo-bronchial Intubation

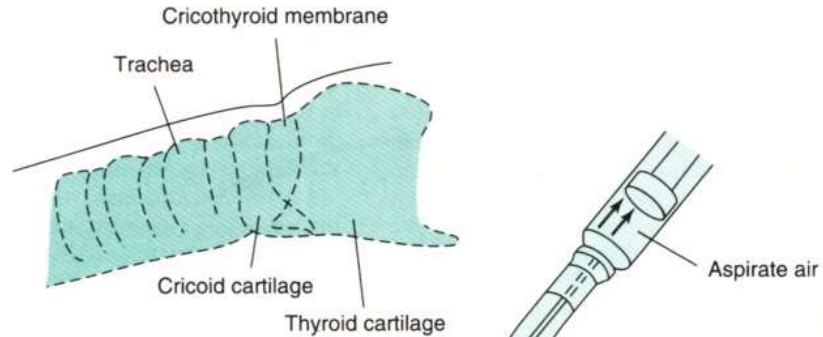


Cricothyrotomy

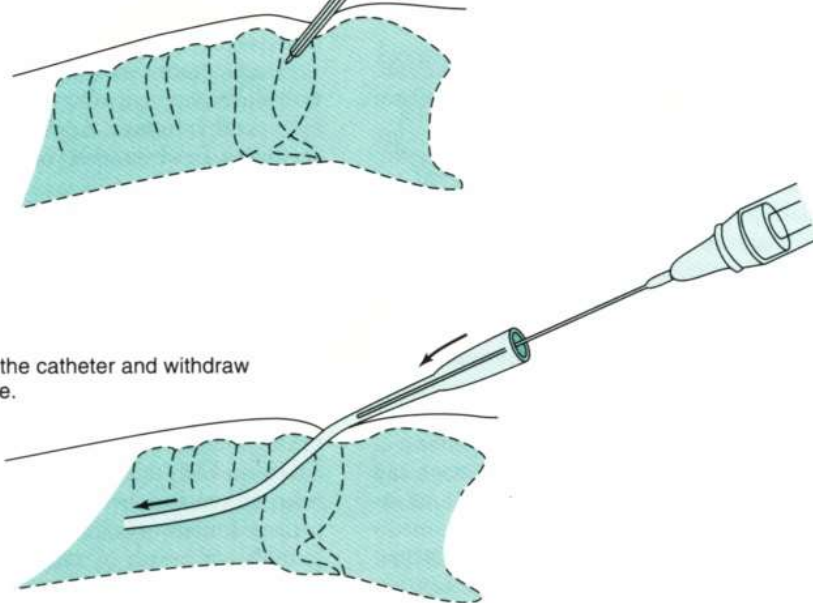
- In Can't intubate-can't ventilate Scenario
- A temporary life saving measure awaiting
Fiber-optic Intubation / Tracheostomy
- Transtracheal Jet Ventilation adopted

Cricothyrotomy- Procedure

A Locate the cricothyroid membrane.



B Puncture the membrane at the midline while stabilizing the trachea with the other hand. Proper location is confirmed by easy aspiration of air.



C Advance the catheter and withdraw the needle.

Cricothyrotomy



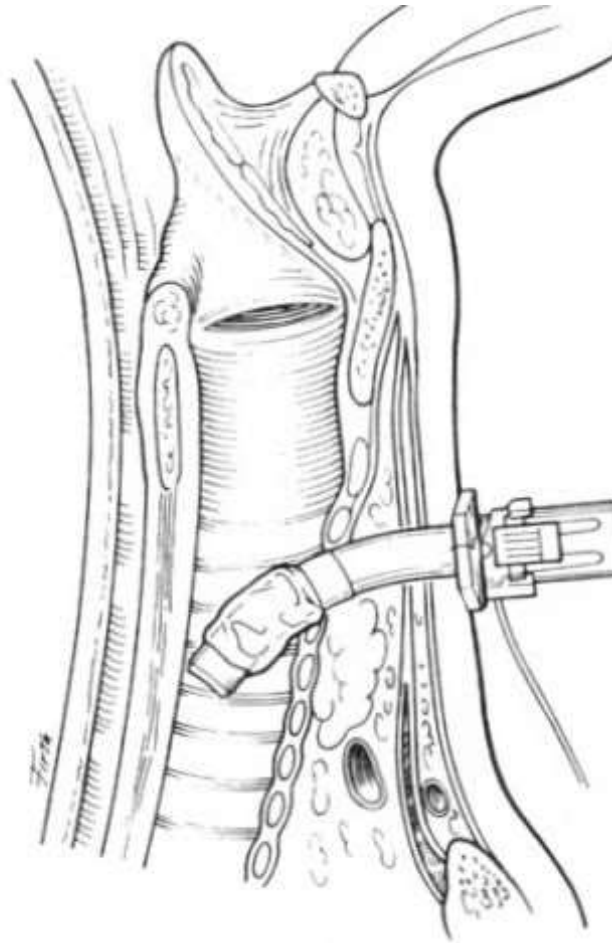
Tracheostomy

- Classic Tracheostomy is done by specially trained people
- Percutaneous Tracheostomy is becoming popular and similar in principle to Cricothyrotomy except for the site (2nd and 3rd tracheal rings) and Tracheostomy Tube

Tracheostomy Procedure



Tracheostomy tube in Position



Thank You