Airway evaluation and Management

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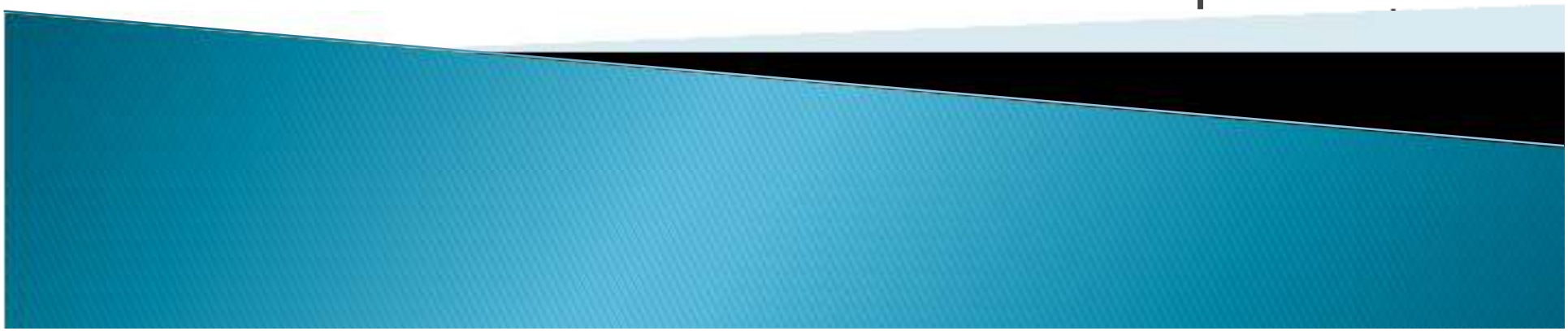
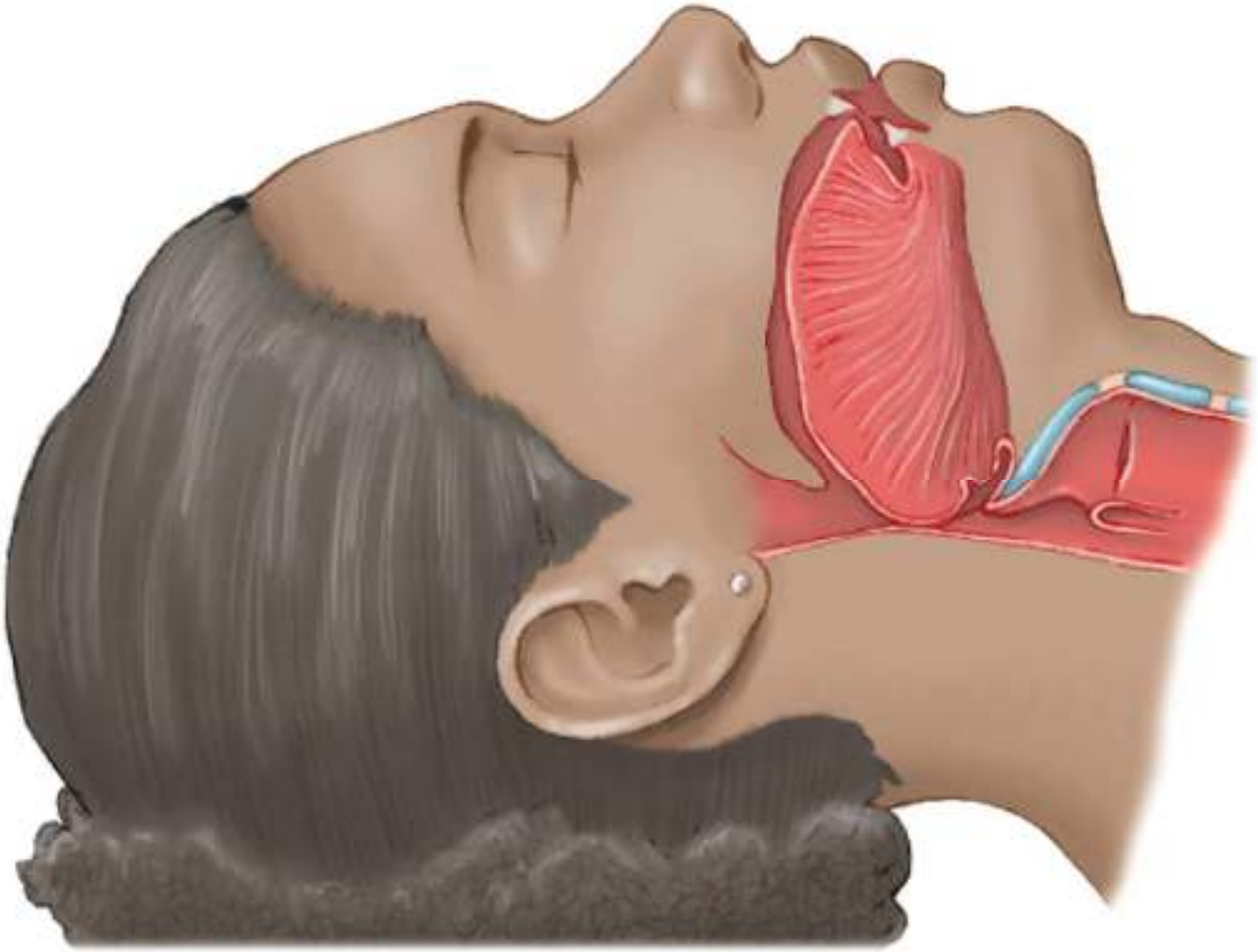


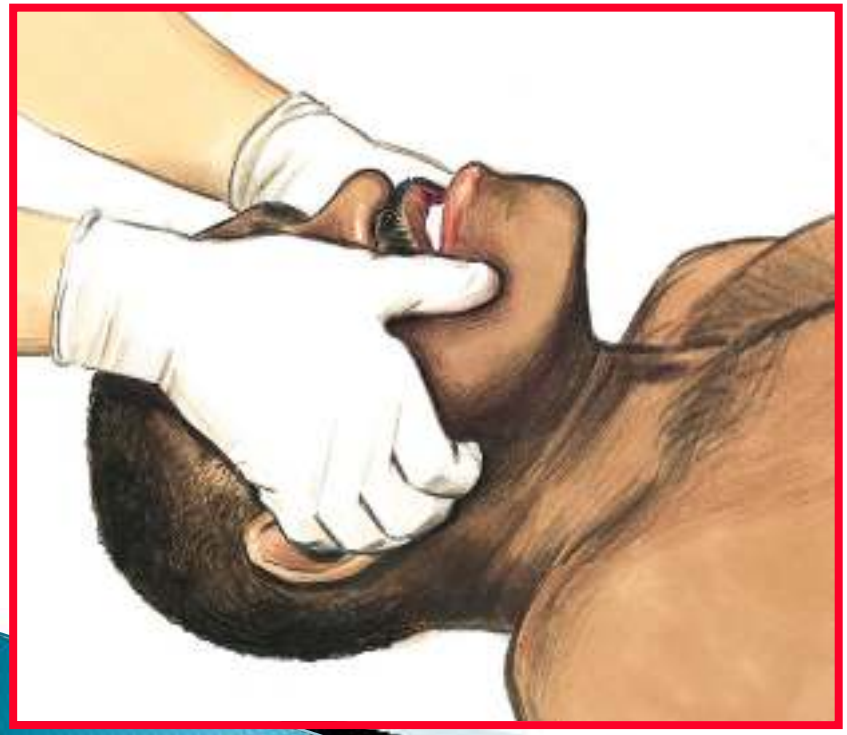
Lecture Objectives

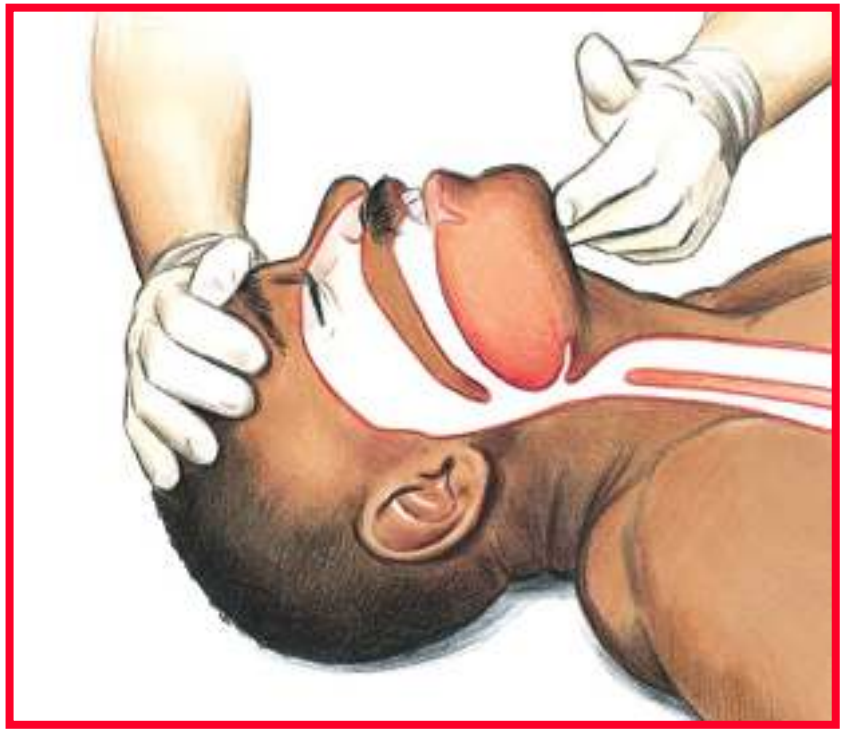
Students at the end of the lecture will be able to :

- Describe the applied anatomy of the airway.
- Conduct a preoperative airway assessment .
- Identify a potentially difficult airway.
- Learn about management of airway .
- Become familiar with airway equipment.
- Understand issues around aspiration prophylaxis.
- Become familiar with controlled ventilation.



AIRWAY CONTROL



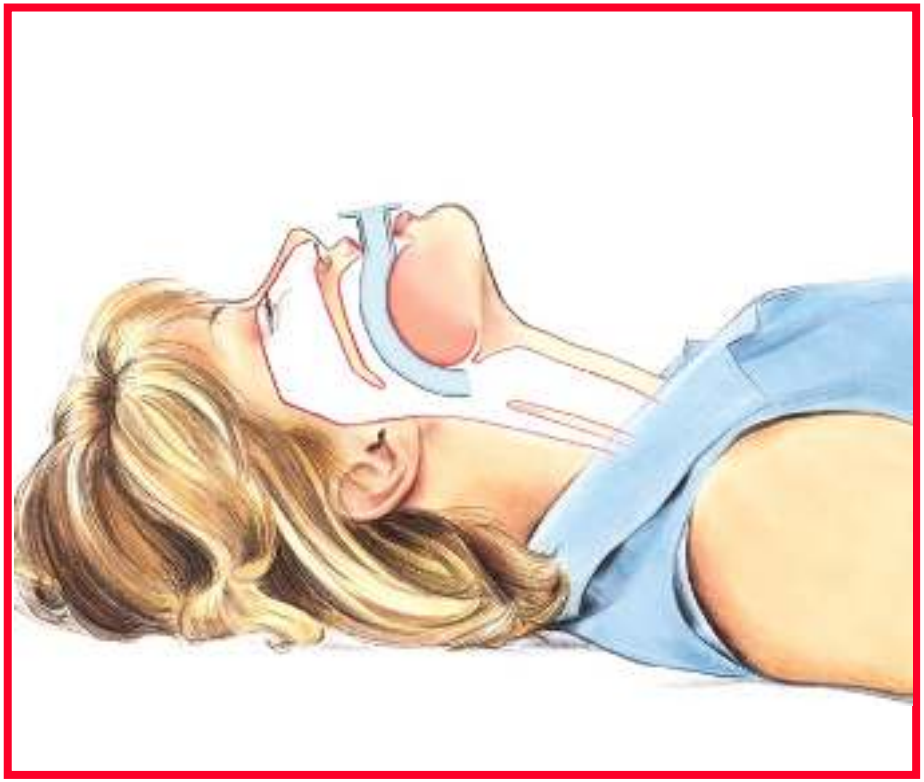


AIRWAY CONTROL

Oral Airway

- Proper size

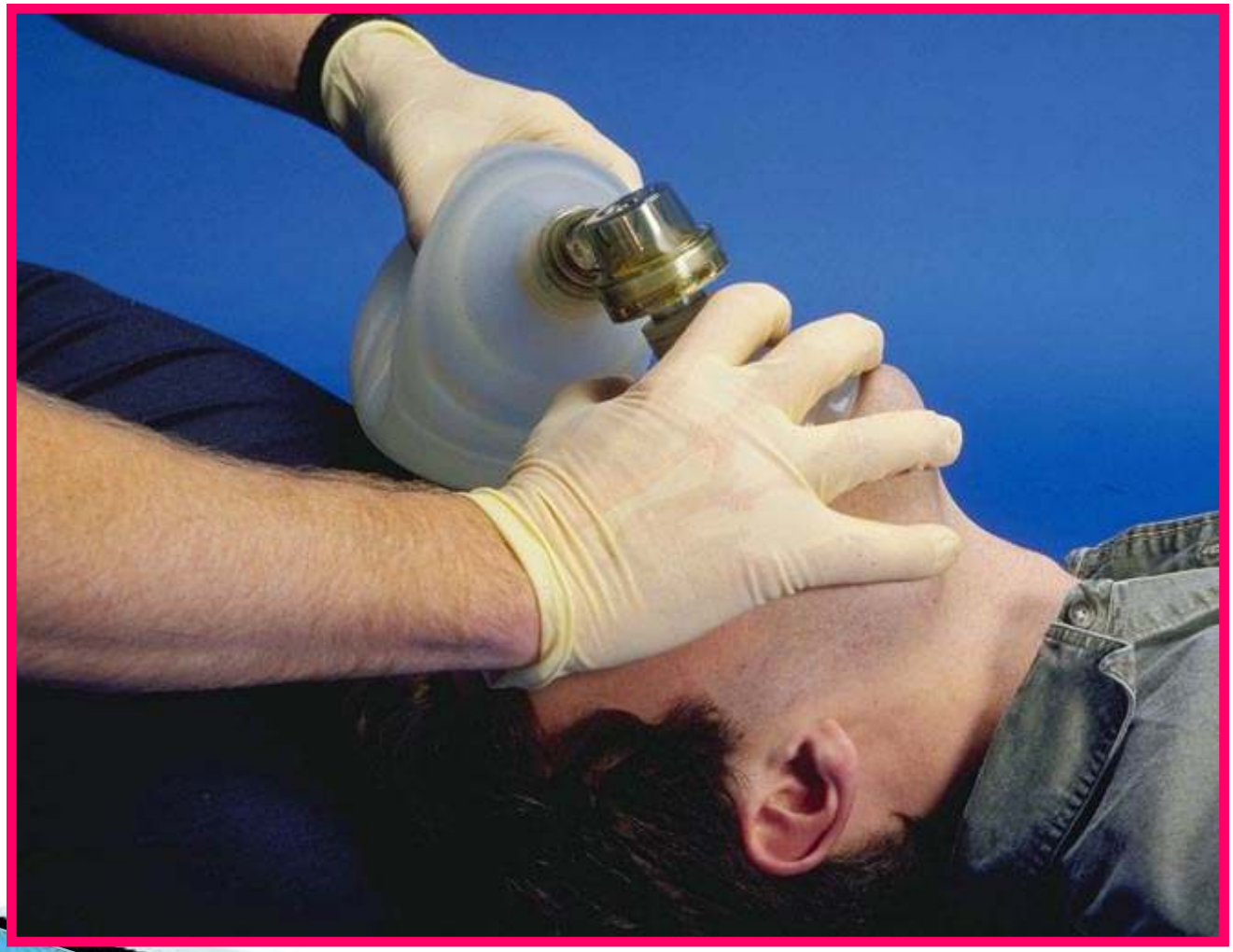
AIRWAY CONTROL



NASAL AIRWAY

Ambu bag

C-E maneuver



Esophageal-Tracheal Combitube

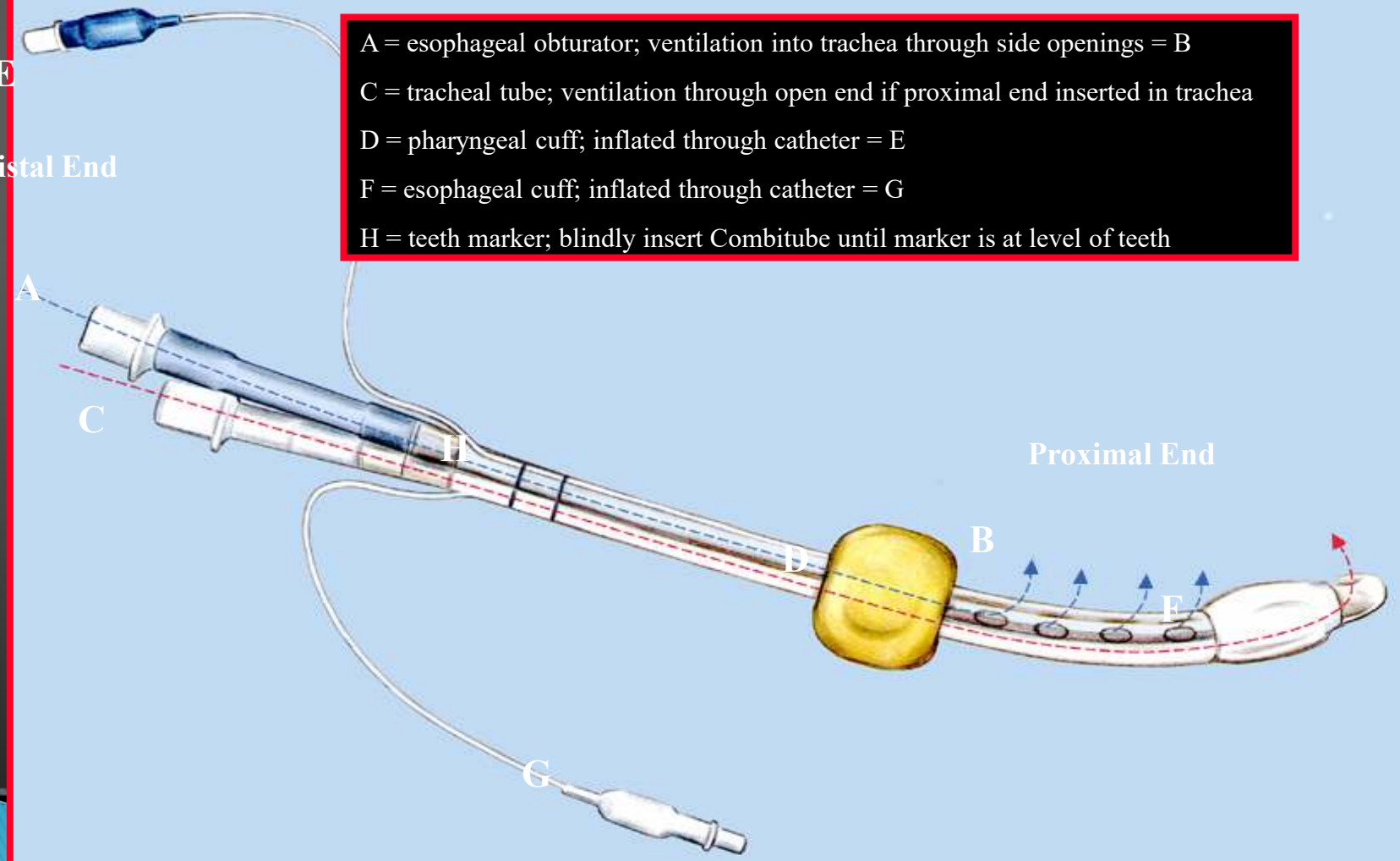
A = esophageal obturator; ventilation into trachea through side openings = B

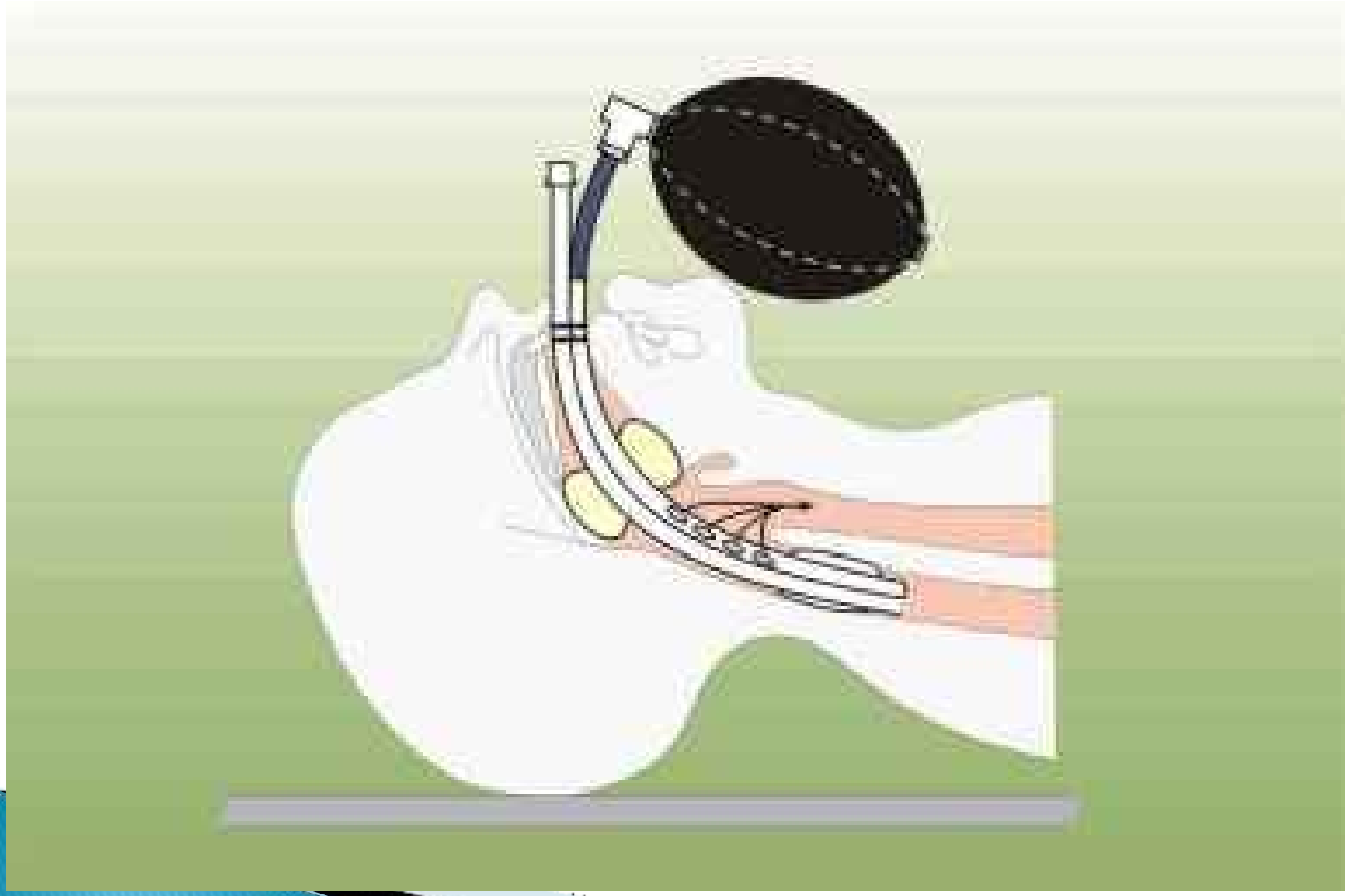
C = tracheal tube; ventilation through open end if proximal end inserted in trachea

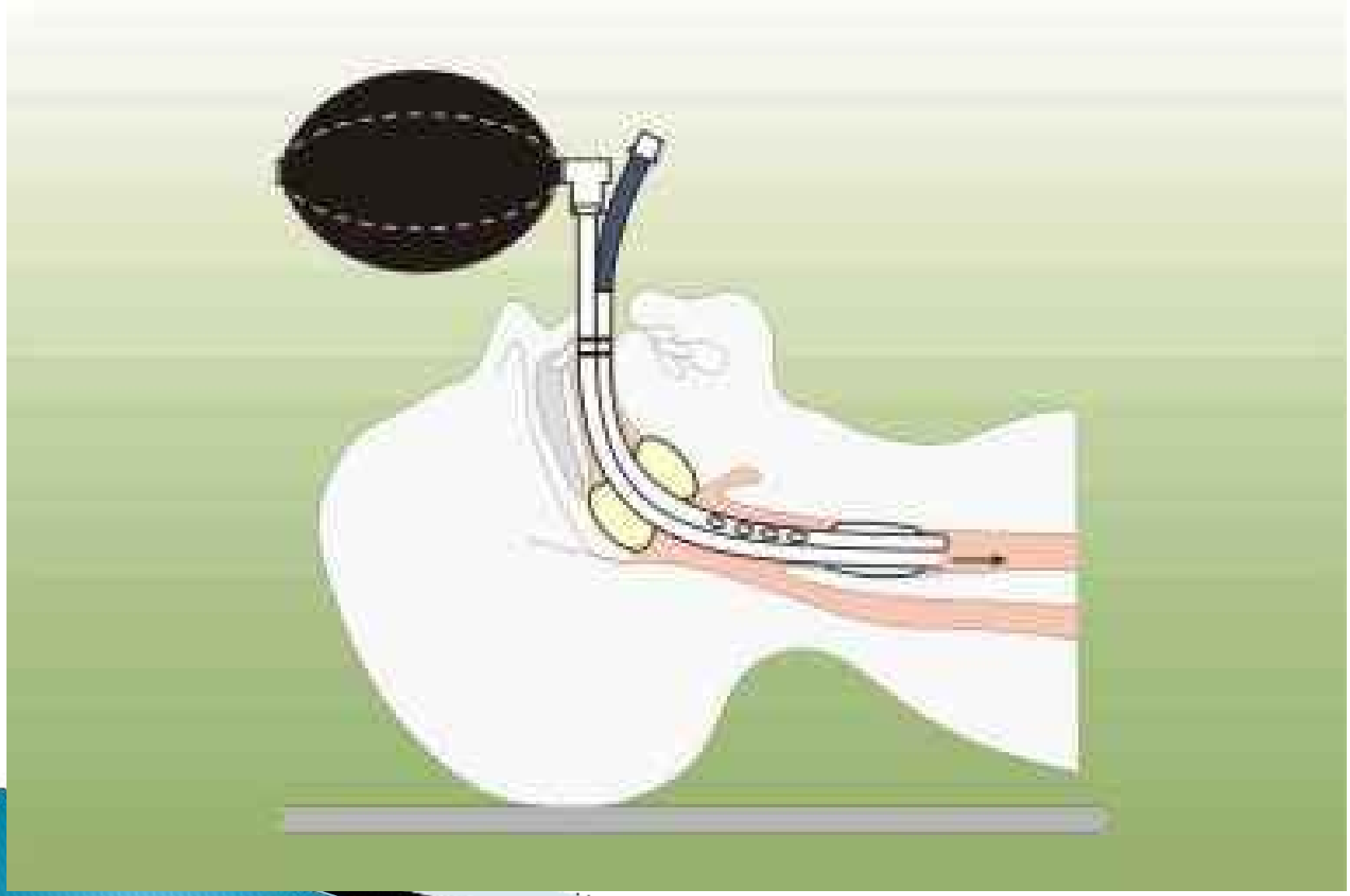
D = pharyngeal cuff; inflated through catheter = E

F = esophageal cuff; inflated through catheter = G

H = teeth marker; blindly insert Combitube until marker is at level of teeth







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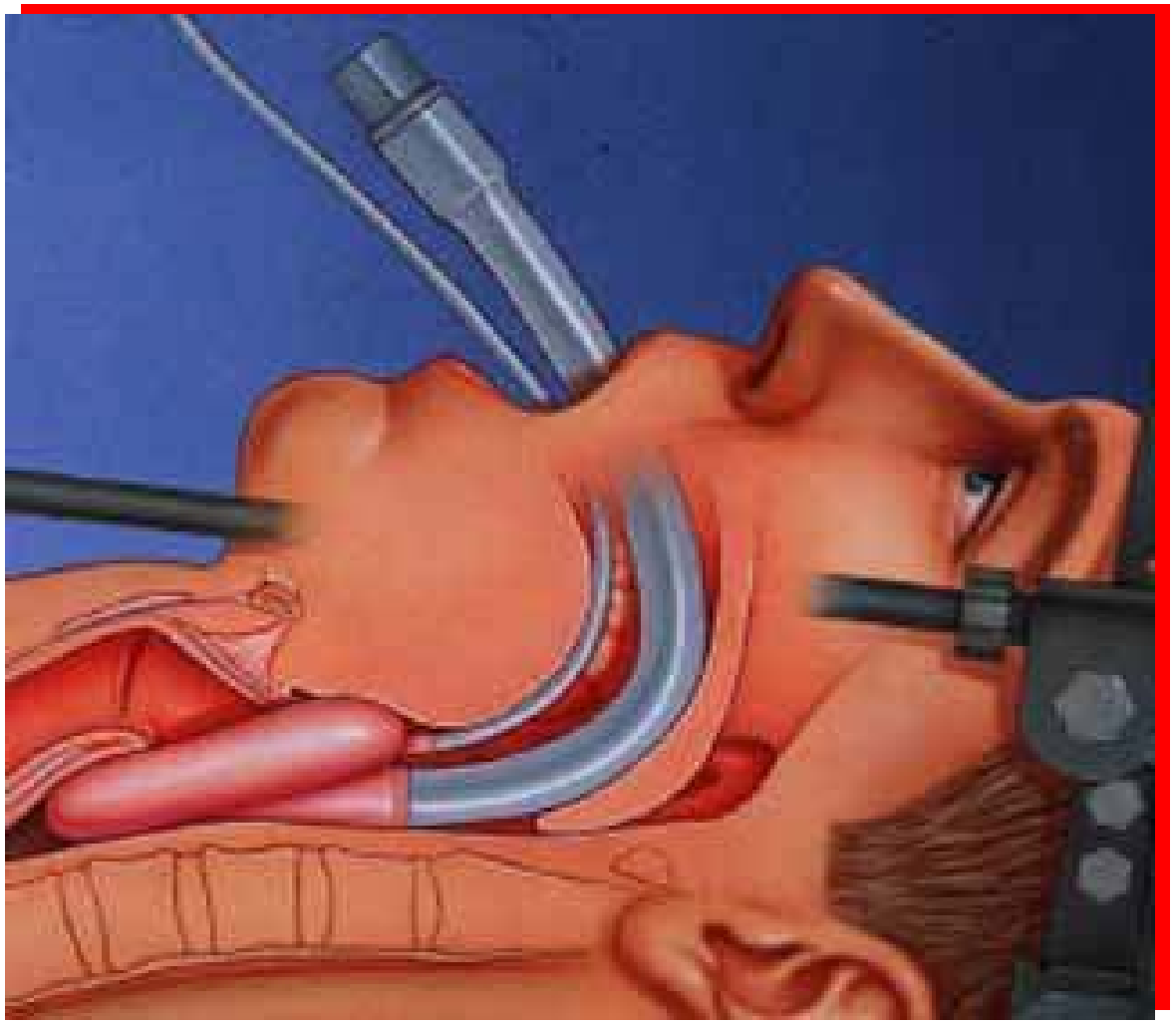
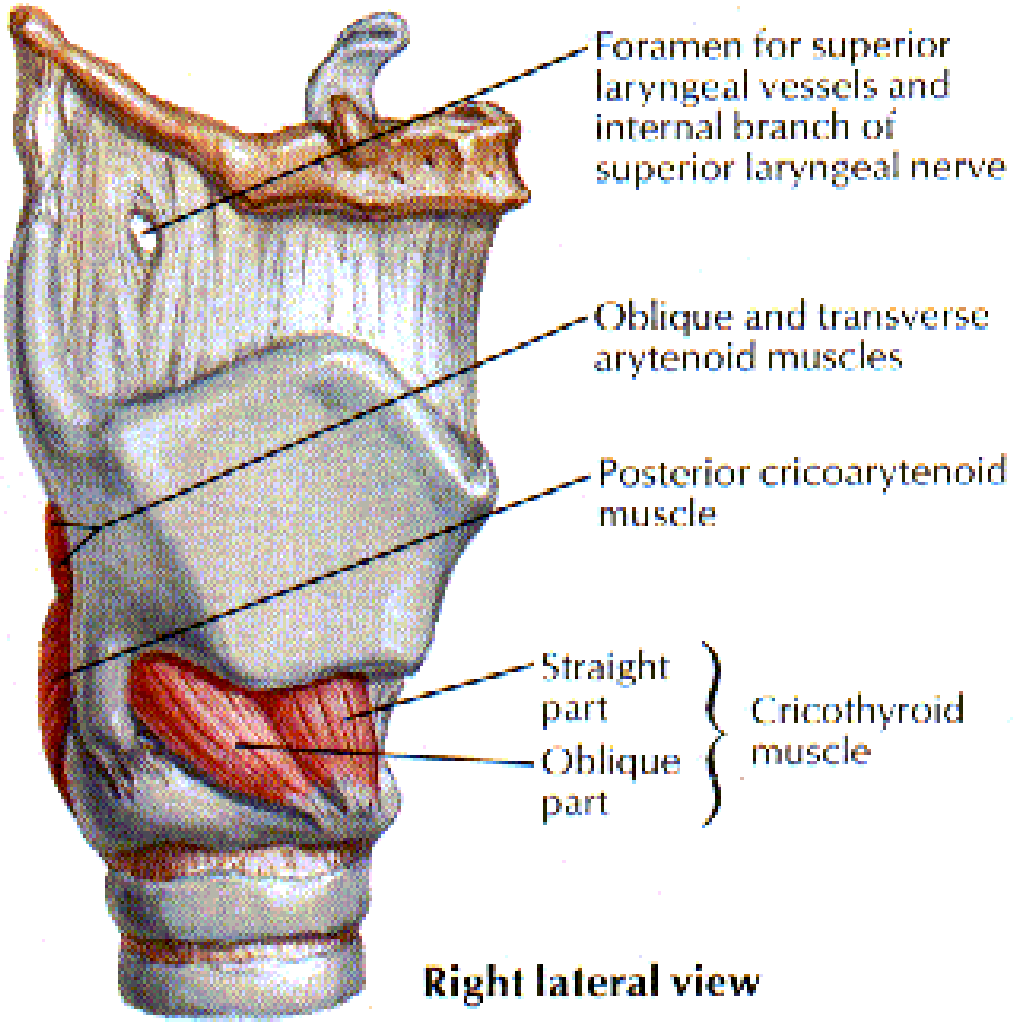


Airway Anatomy



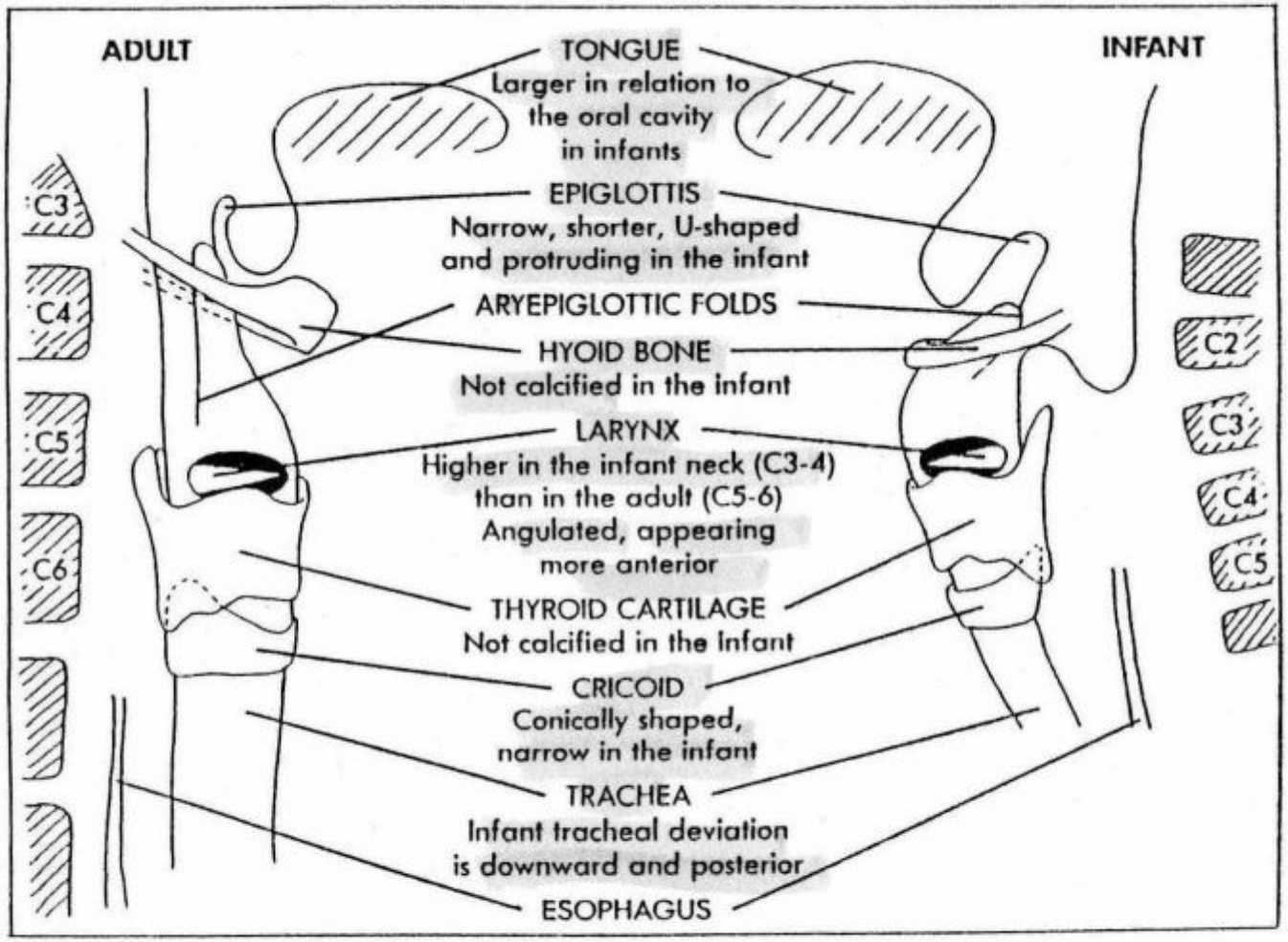
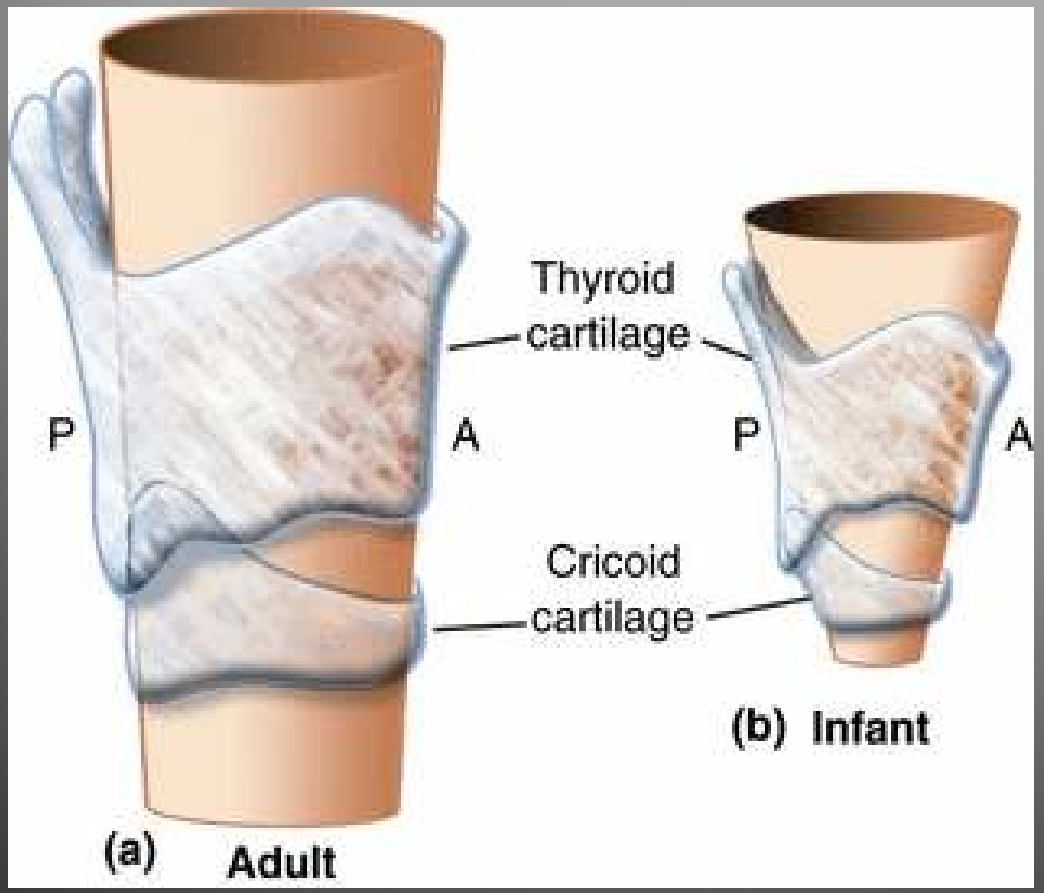


Figure 1. Comparison of adult and infant airway anatomic differences. (*From* Ho M: The Pediatric Airway. *In* Bell C, Hughes C, Oh T (eds): The Pediatric Anesthesia Handbook. St. Louis, Mosby Year Book, 1991, p 130. *Adapted from* Cote CJ, Todres ID: The Pediatric Airway. *In* Ryan JF, et al (eds): A Practice of Anesthesia for Infants and Children. Orlando, Grune & Stratton, 1986; with permission.)

Airway



Indications of endotracheal intubation

- Resuscitation (CPR)
- Prevention of lung soiling
- Positive pressure ventilation (GA)
- Pulmonary toilet
- Patent airway (coma or near coma)
- Respiratory failure(CO_2 retention)

Management

I-History:

previous history of difficulty is the best predictor

Inquire about:-Nature of difficulty

-No of trials

-Ability to ventilate bet trials

-Maneuver used

-Complications

II-Snoring and sleep apnea .

III-Predictors of DMV (obese) .

LEMON

- Look for any obvious anomaly
  - Morbid obesity(BMI)
  - Skull
  - Face
  - Jaw
  - Mouth,teeth
  - Neck

Examination

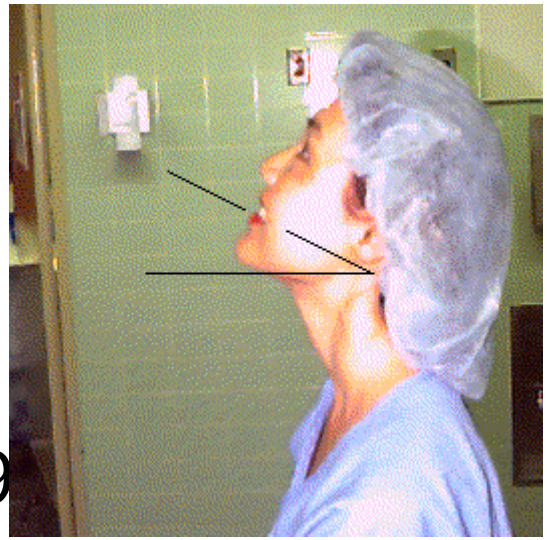
I-The 3 joints movements

- A-O joint(15-20 degrees)

Presence of a gap bet the Occiput and C1 is essential

- The cervical spine(range>9
- T.M joint:

Subluxation (1 finger)

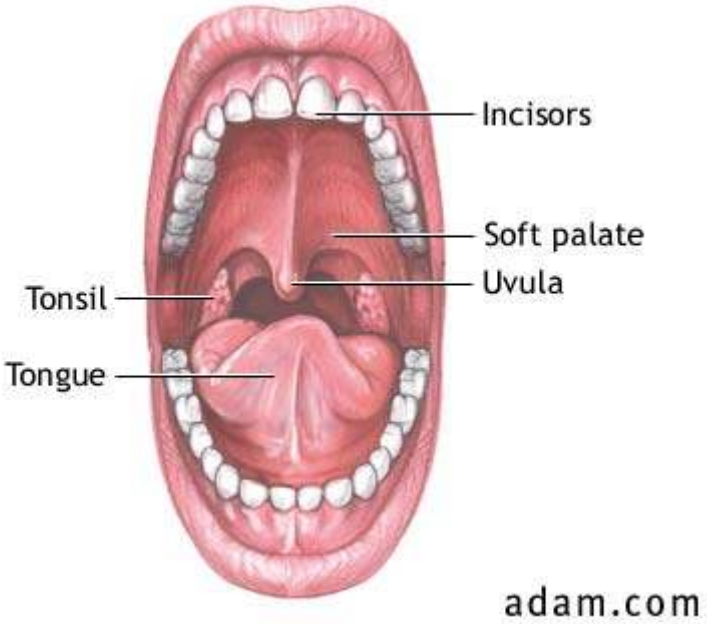


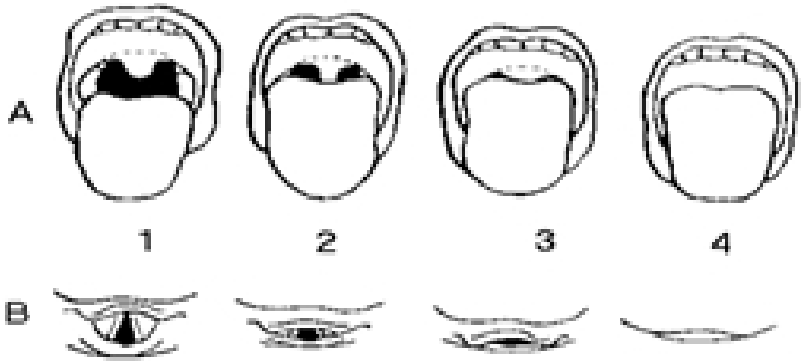
Examination

- Mouth opening: 3 fingers
- Thyromental distance: >6.5cm
- Sternomental distance >12.5cm .

Mallampatti

Mallampatti test:
Based on the hypothesis
That when the base of the
Tongue is disproportionall
Large it will overshadow th
larynx





-Simple easy test,correlates with what is seen during laryngoscopy or Cormack-Lehene grades ,but

1-moderate sensitivity and specificity(12% false +ve)

2-Inter observer variation

3-Phonation increases false negative view

Obstruction

- Apparent cause e.g. goitre
- OSA
- Noisy breathing or stridor
- Signs of upper airway obstruction
- Other causes

Neck Mobility

Prior condition

- Surgery
- Rheumatoid arthritis
- Osteoarthritis
- Short muscular neck .

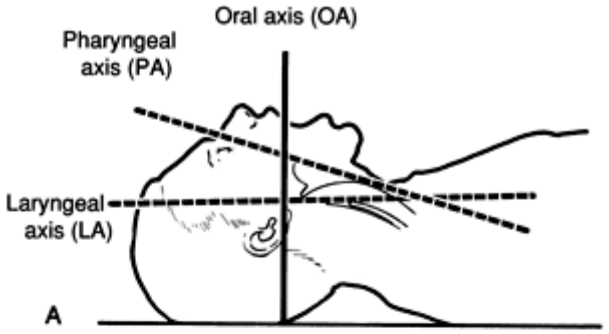
Proper Equipment

-Bag and mask,oxygen source
-Airways oro ,nasopharyngeal and LMA
-Laryngosopes different blades
-ETT proper size ?
-suction on

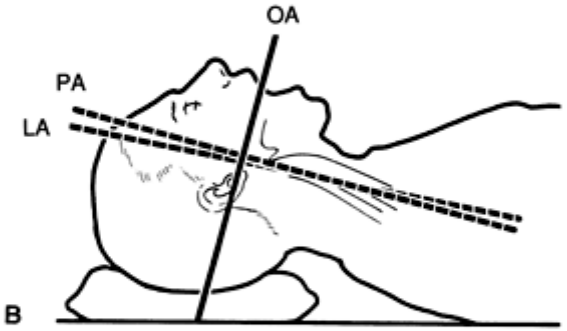
Airway gadgets

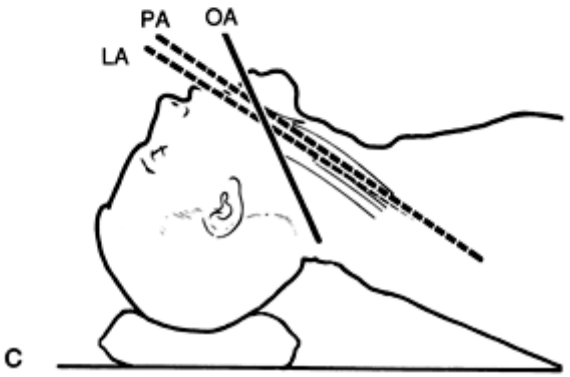
Positioning for successful intubation

Alignment of 3 axes or
Assuming sniffing position



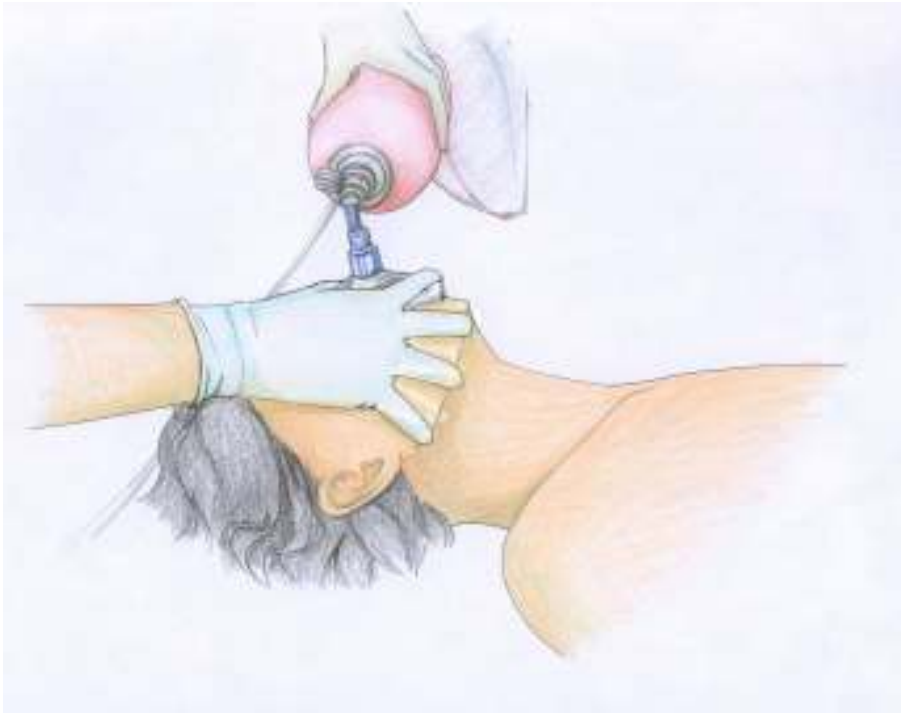
-Any anomaly in these 3 joints
A-O, T-M or C-spine can resu
In difficult intubation





Mask Ventilation

- Induction of anesthesia produces upper airway relaxation and possible collapse



Endotracheal Intubation

- Look for epiglottis
  - If initially not found insert laryngoscope further
  - If this maneuver does not work slowly pull laryngoscope back
- Once epiglottis visualized, push laryngoscope into vallecula and apply traction at 45 degree angle to “push” epiglottis up and out of the way

Confirm tube position

- Direct visualization of ETT between cords
- Continuous trace of capnography
- 3 point auscultation
- Bronchoscopy ;carina seen
- Esophageal detector device
- Other as bilateral chest movement,mist in the tube,CXR

Rapid sequence induction

- Indications
- Technique:
  - -Preoxygenation
  - -IV induction with sux
  - -Cricoid pressure
  - -Intubate, inflate the cuff ,confirm position
  - -Release cricoid and fix the tube

Cricoid pressure

Complications of intubation

1-Inadequate ventilation

2-Esophageal intubation

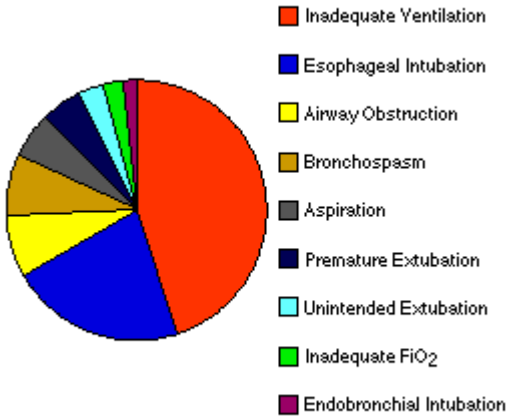
3-Airway obstruction

4-Bronchospasm

5-Aspiration

6- Trauma

7-Stress response



Problems with ETT and Cuff

- ❑ Too long – endobronchial intubation
- ❑ Too short – accidental extubation
- ❑ Too large – trauma to surrounding tissues
- ❑ Too narrow – increased airway resistance
- ❑Too soft – kinks
- ❑ Too hard – tissue damage
- ❑ Prolonged placement – vocal cord granulomas, tracheal stenosis
- ❑ Poor curvature – difficult to intubate
- ❑ Cuff insufficiently inflated – allows leaking and aspiration
- ❑ Cuff excessively inflated – pressure necrosis

Difficult airway

- Causes

-Congenital

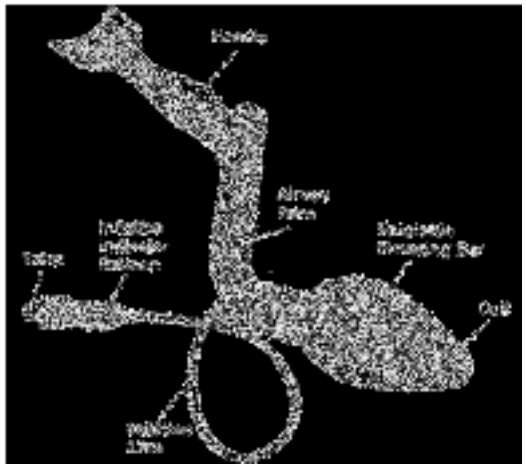
-Acquired

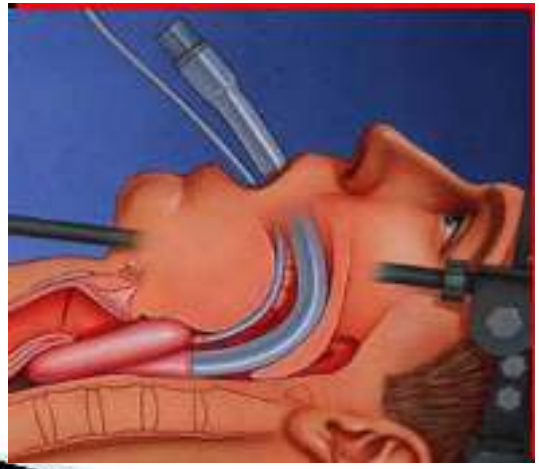
Difficult intubation

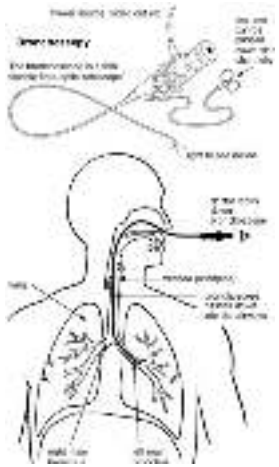
- Malampatti grade 4

Treacher-Collin syndrome

Difficult Airway gadgets







Fiberoptic

Rigid Fiberoptic Scope

Bullard

Wu Scope

Fiberoptic

Rigid Fiberoptic Scope

Upsher

GlideScope

Management of Difficult airway

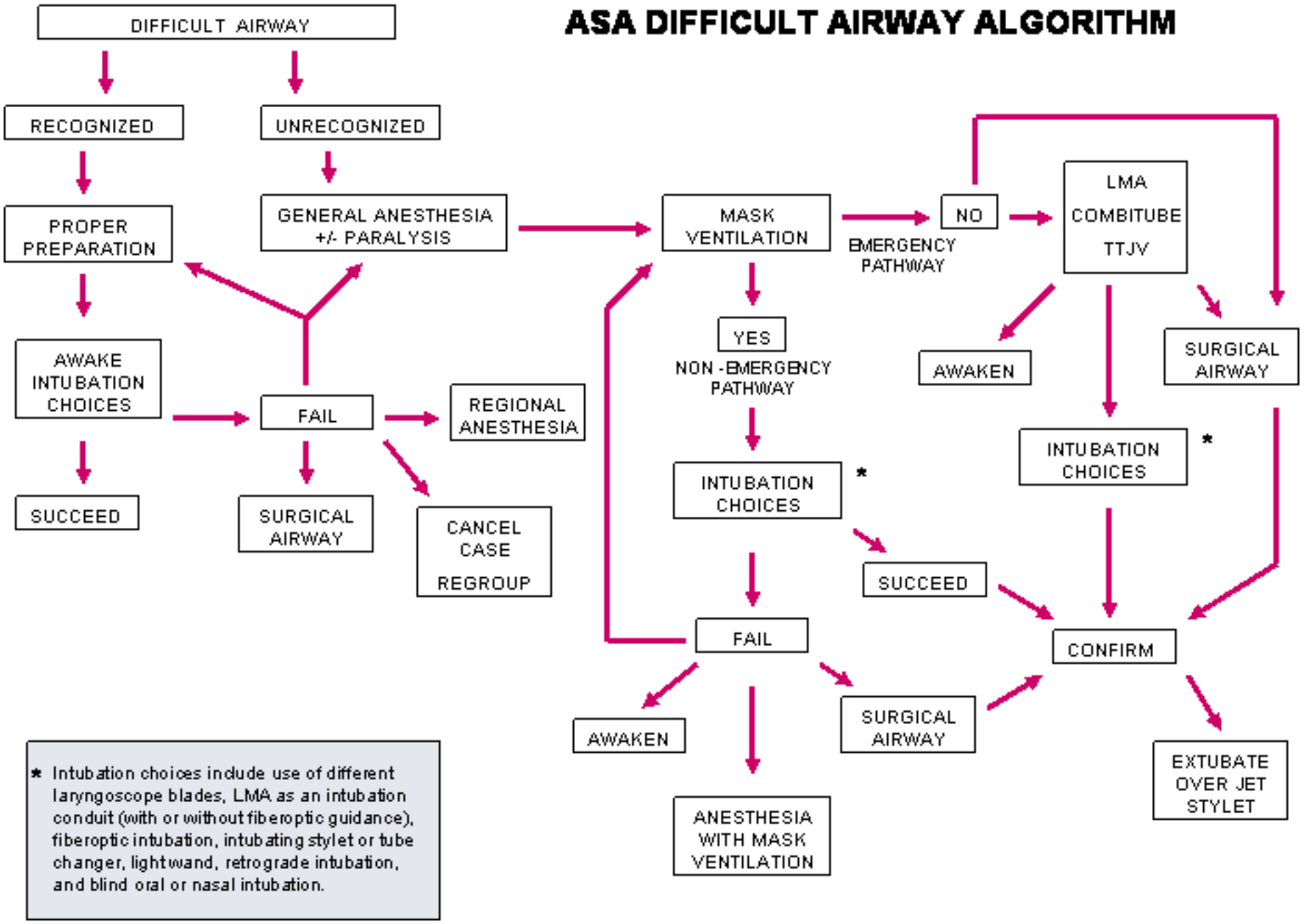
- Expected from history,examination

Secure airway while awake under LA

- Unexpected different options

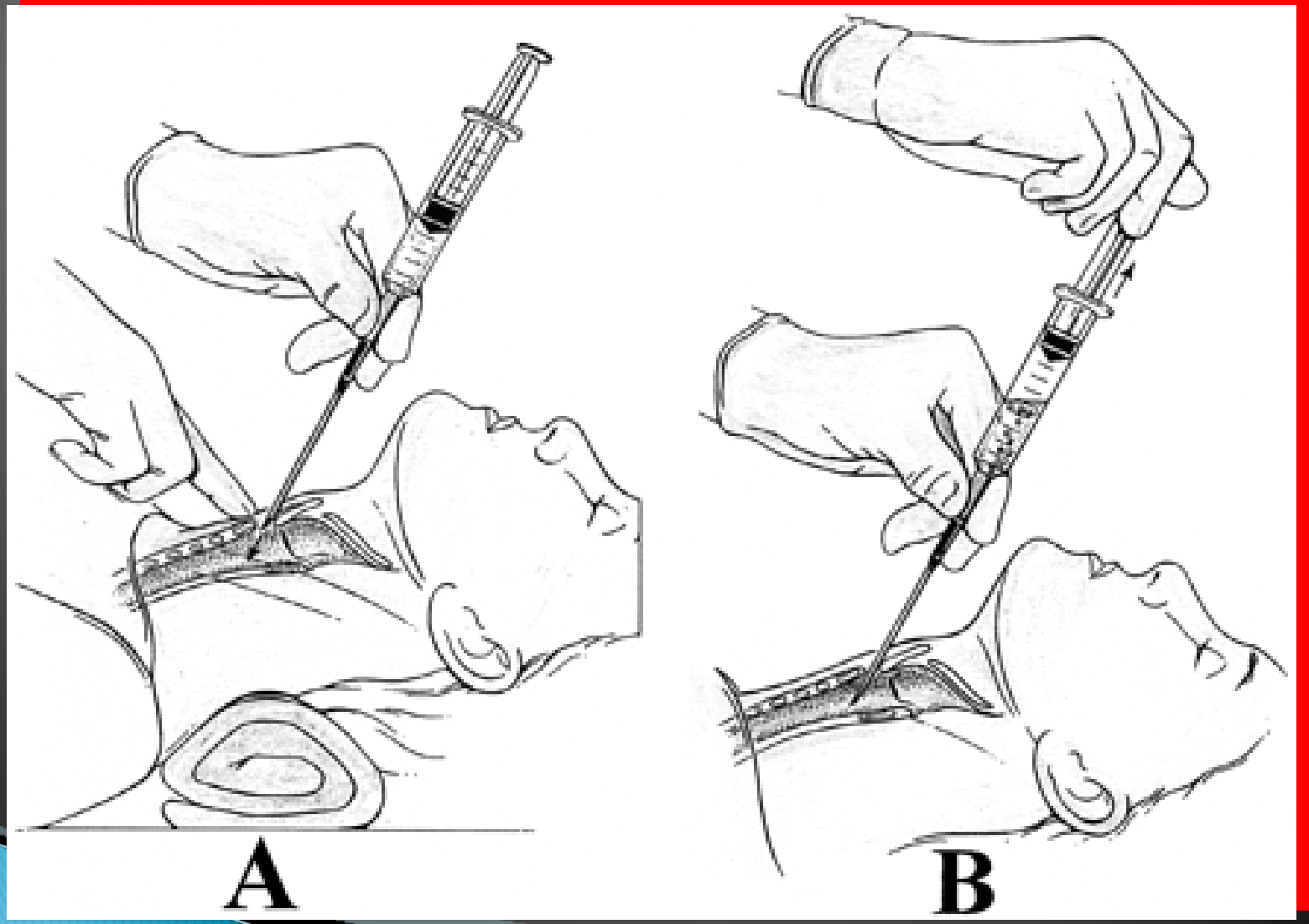
Priority for maintenance of patent airway and oxygenation

ASA DIFFICULT AIRWAY ALGORITHM



Transtracheal Jet Ventilation

TTJV



Ventilation

- Spontaneous ventilation
- Controlled ventilation

Pressure cycled and volume cycled ventilator

-Tidal volume 10 mls/kg

-Respiratory rate to maintain normocarbia

-I:E ratio

-PEEP

Recommendations

- Adequate airway assessment to pick up expected D.A to be secured awake
- Difficult intubation cart always ready
- Pre oxygenation as a routine

- Maintenance of oxygenation not the intubation should be your aim
- Use the technique you are familiar with
- Always have plan B,C,D in unexpected D.A

EXTUBATION

General guidelines:

- check that neuromuscular function and hemodynamic status is normal
- check that patient is breathing spontaneously with adequate rate and tidal volume
- allow patient to breathe 100% O2 for 3-5 minutes
- suction secretions from pharynx
- deflate cuff, remove ETT on inspiration (vocal cords abducted)
- ensure patient breathing adequately after extubation
- ensure face mask for O2 delivery available
- proper positioning of patient during transfer to recovery room, e.g. sniffing position, side lying.

Oxygen delivery systems:

- *Nasal cannulae*
  - inspired oxygen concentration is dependent on the oxygen flow rate, the nasopharyngeal volume and the patient's inspiratory flow rate.
  - Increases inspired oxygen concentration by 3-4%

.

  - Oxygen flow rates greater than 3 liters are poorly tolerated by patients due to drying and crusting of the nasal mucosa.

Nasal cannulae

I L/min:	21%to24%
2 L/min:	25% to 28%
3L/min:	29%to32%
4L/min:	33%to36%
5 L/min:	37% to 40%
6L/min:	41%to44%

- ***Face masks :***
  - Three types of facemask are available; open, Venturi, non-rebreathing.
- ***Open facemasks :***
  - Are the most simple of the designs available.
  - They do not provide good control over the oxygen concentration being delivered to the patient causing variability in oxygen treatment.
  - A 6l/min flow rate *is the minimum* necessary to prevent the possibility of rebreathing.
  - Maximum inspired oxygen concentration ~ 50-60%.

Venturi facemasks

- They should be used in patients with COPD/emphysema where accurate oxygen therapy is needed.
- Arterial blood gases can then be drawn so correlation between oxygen therapy for hypoxemia and potential risk of CO2 retention can be made.
- Masks are available for delivering 24%, 28%, 35%, 40%, 50%.

- Non-rebreathing facemasks
  - have an attached reservoir bag and one-way valves on the sides of the facemask.
  - With flow rates of 10 liters an oxygen concentration of 95% can be achieved.
  - These masks provide the highest inspired oxygen concentration for non-intubated patients.

Reference book and the relevant page numbers..

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