Airway Management

Teeradej Kuptanon, MD

Outline

- Anatomy
- Detect difficult airway
- Rapid sequence intubation
- Difficult ventilation
- Difficult intubation
- Surgical airway access

ICU setting

Intubation

Difficult Intubation

Exit procedure

Pulmonary hemorrhage

Neck mass

Resuscitation

A Airway

B Breathing

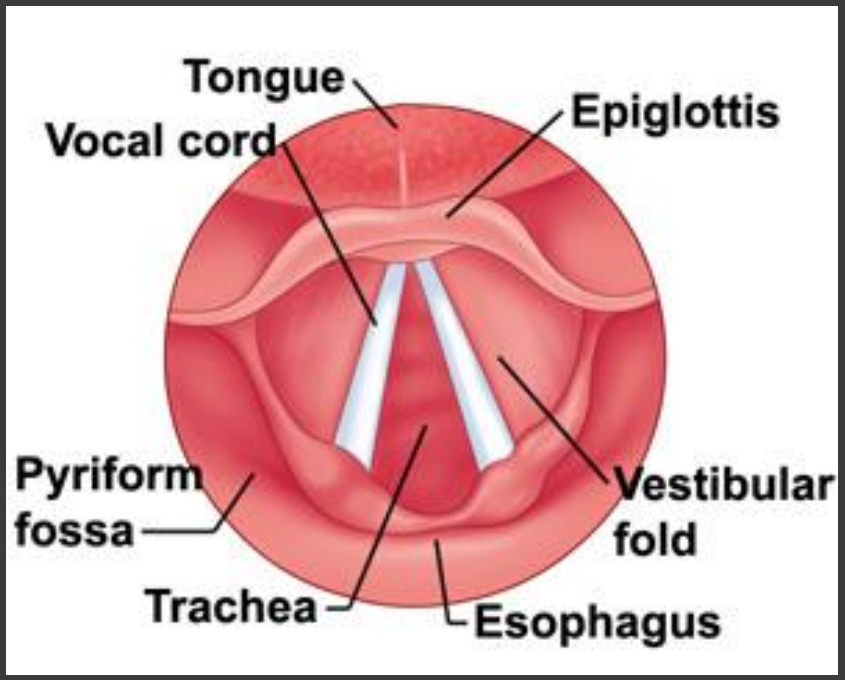
C Circulation

C Circulation

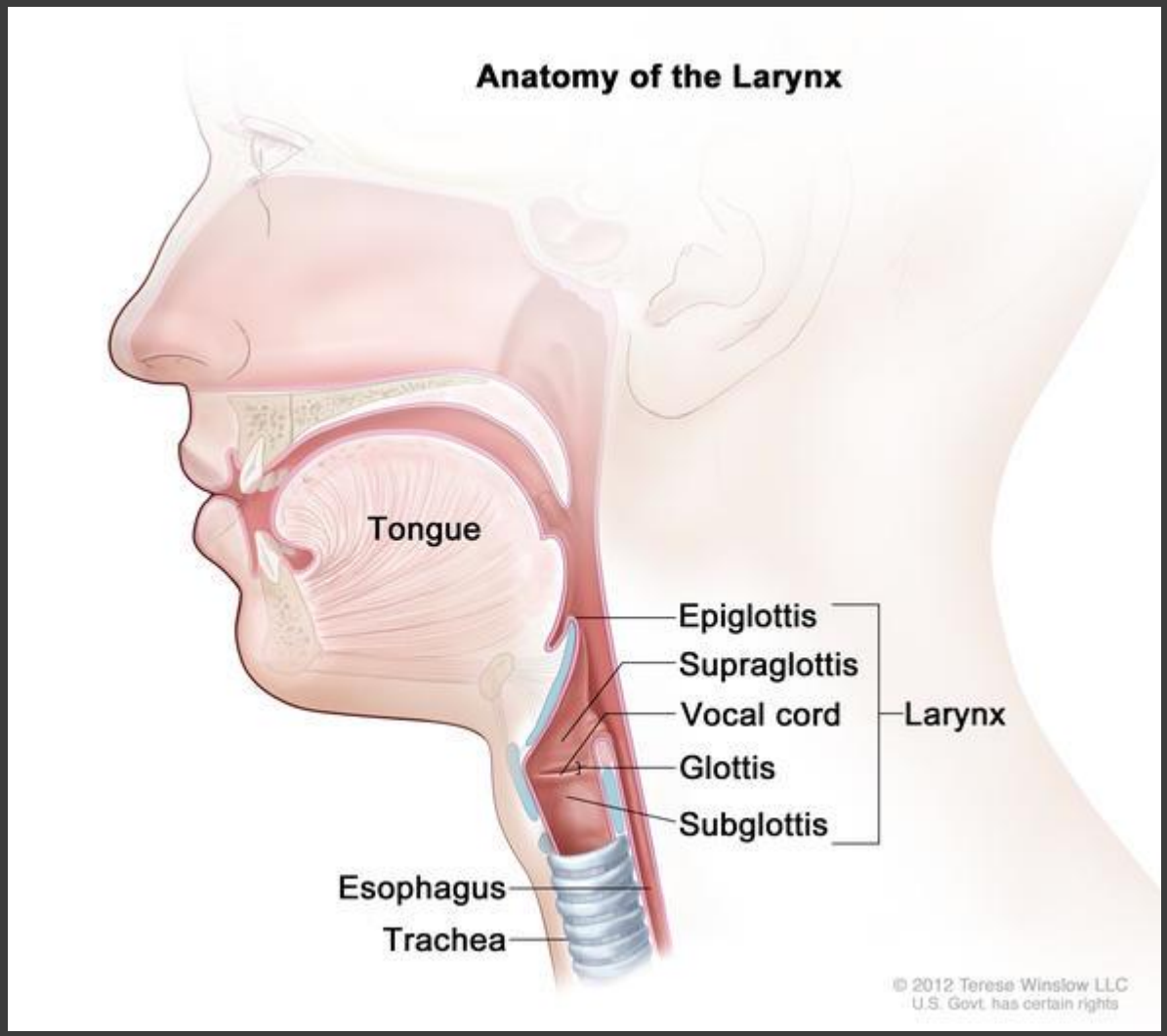
A Airway

B Breathing

Anatomy


Tongue
Epiglottis
Vocal cord
Pyriform fossa
Vestibular fold
Trachea
Esophagus

Anatomy


Anatomy of the Larynx
Tongue
Epiglottis
Supraglottis
Vocal cord
Glottis
Subglottis
Larynx
Esophagus
Trachea
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Assess

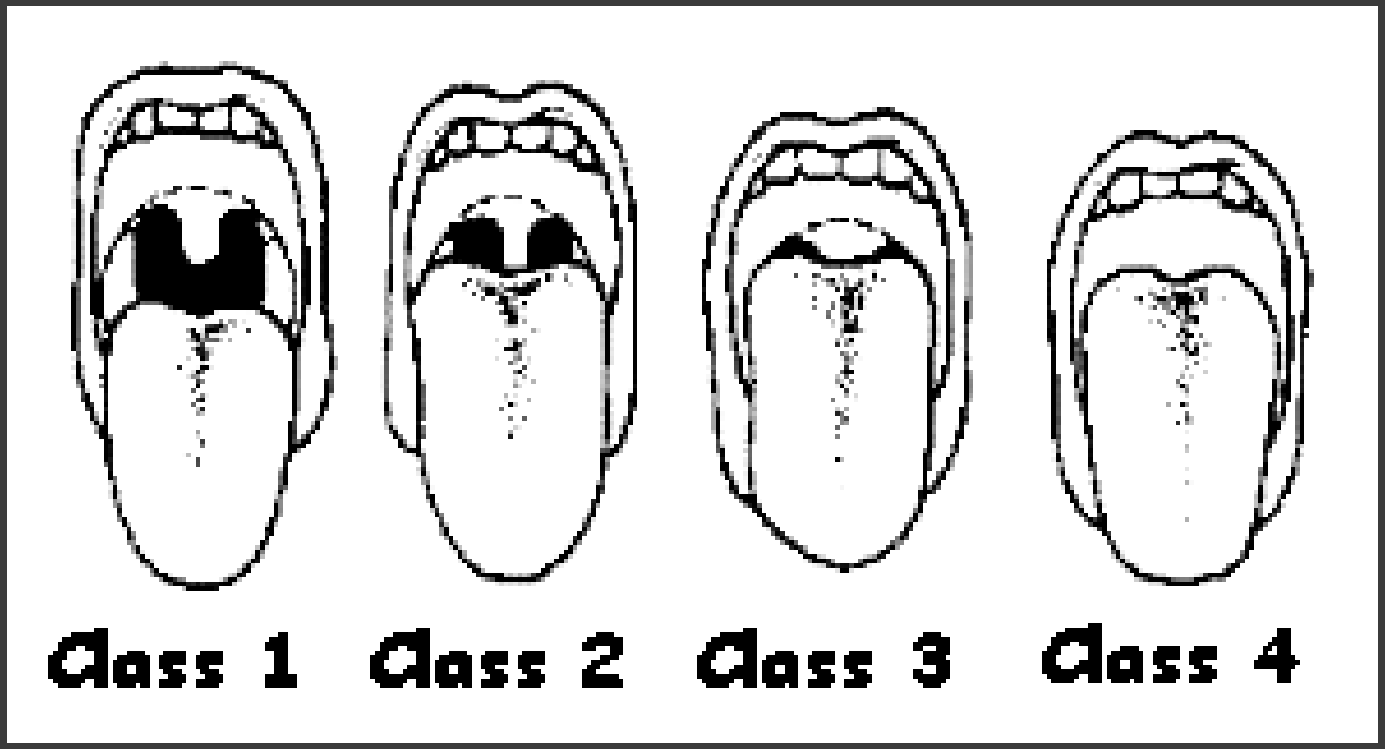
History

Physical Examination

Film airway

(Pediatricradiology.com)

Mallampati Airway classification



3 times

10 minutes

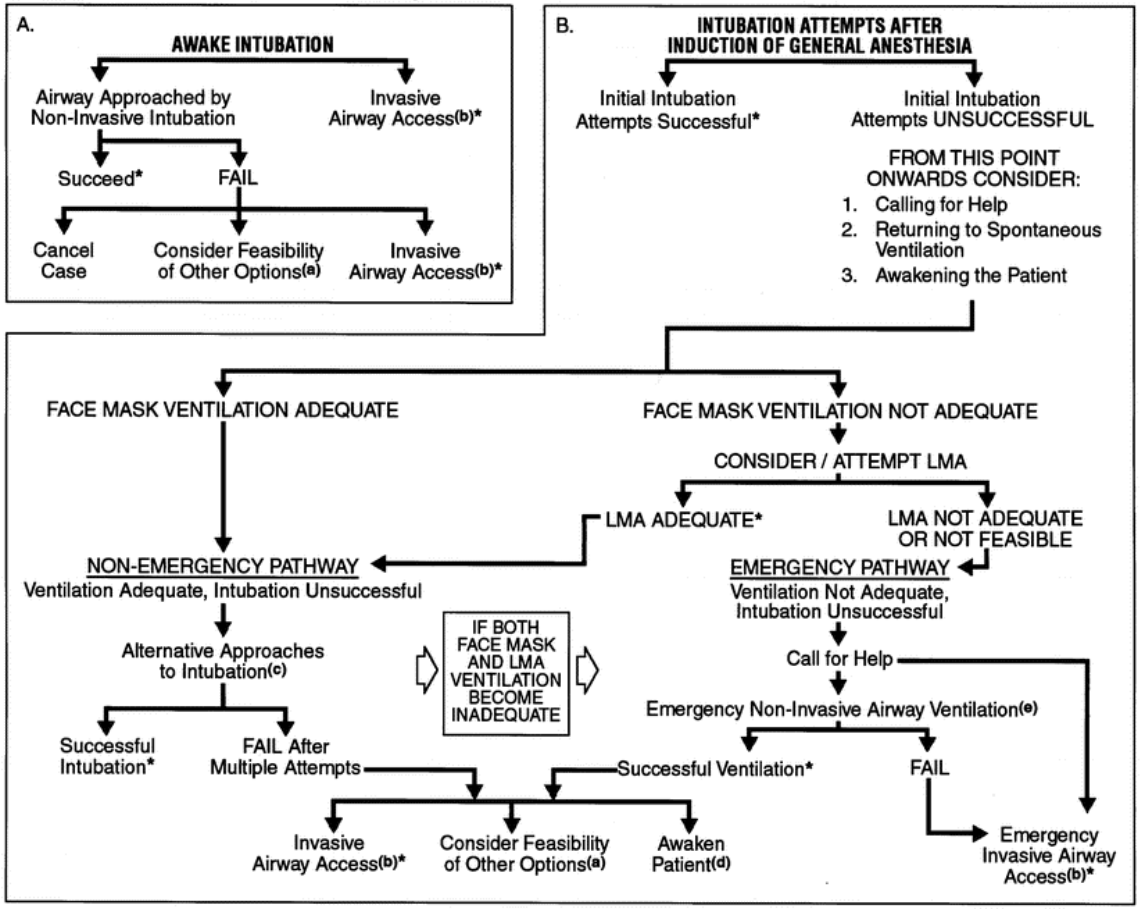
AMERICAN SOCIETY OF ANESTHESIOLOGISTS

DIFFICULT AIRWAY ALGORITHM

1. Assess the likelihood and clinical impact of basic management problems:
   - A. Difficult Ventilation
   - B. Difficult Intubation
   - C. Difficulty with Patient Cooperation or Consent
   - D. Difficult Tracheostomy
2. Actively pursue opportunities to deliver supplemental oxygen throughout the process of difficult airway management
3. Consider the relative merits and feasibility of basic management choices:

A.	Awake Intubation	vs.	Intubation Attempts After Induction of General Anesthesia
B.	Non-Invasive Technique for Initial Approach to Intubation	vs.	Invasive Technique for Initial Approach to Intubation
C.	Preservation of Spontaneous Ventilation	vs.	Ablation of Spontaneous Ventilation

4. Develop primary and alternative strategies:



Airway management

Position

Oropharyngeal Airway

Nasopharyngeal airway

Endotracheal tube

Tracheostomy tube

Airway management

Head tilt, Chin lift

Triple maneuver

Head tilt

Jaw thrust

Open mouth

C-spine injury

Supplement oxygen

Head tilt, Chin lift

Triple maneuver

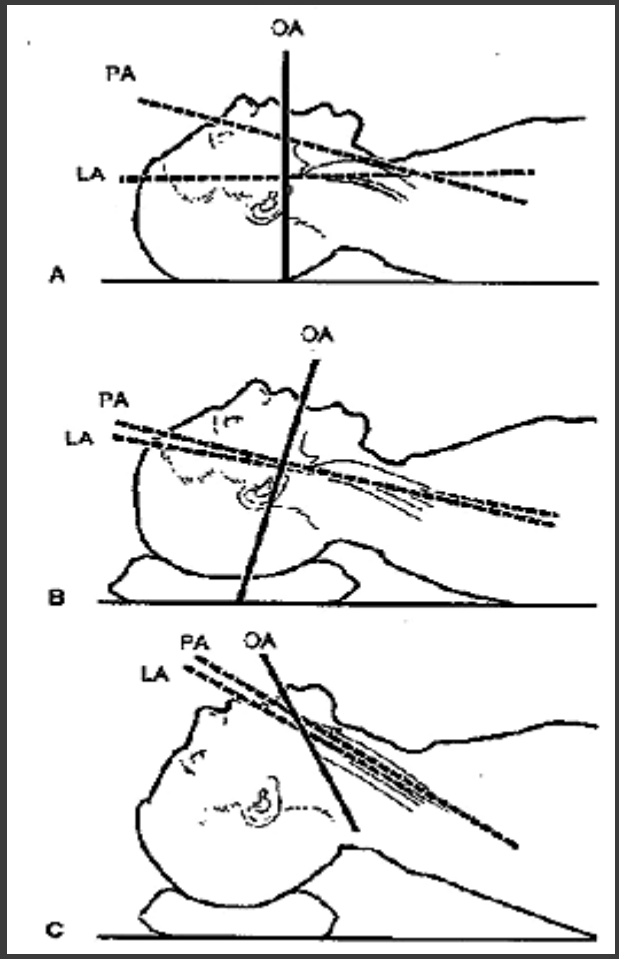
C spine injury

Sniffing position

Oropharynx

Pharynx

Larynx



Oropharyngeal Airway

Nasopharyngeal airway

Indication for intubation

RCA Retraction, Respiratory rate
Conscious change, Cyanosis
Air entry, Apnea

Endotracheal Intubation

Put ETT (Uncuff, cuff, Tech)

Uncuff Age/4 + 4

Cuff Age/4 + 3.5

Check

Off ETT

Endotracheal Intubation

Position

Blades

Stylet

Sellick’s maneuver

Alternative airway management devices

• Laryngoscopes •

Handles

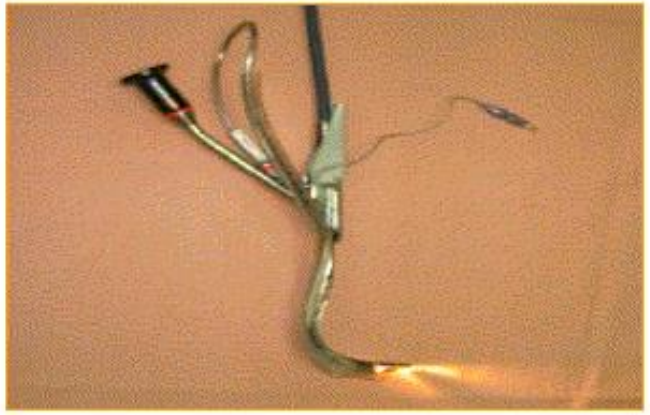
Blades

McCoy laryngoscope

Alternative airway management devices

• Laryngoscopes •

Flexiblade

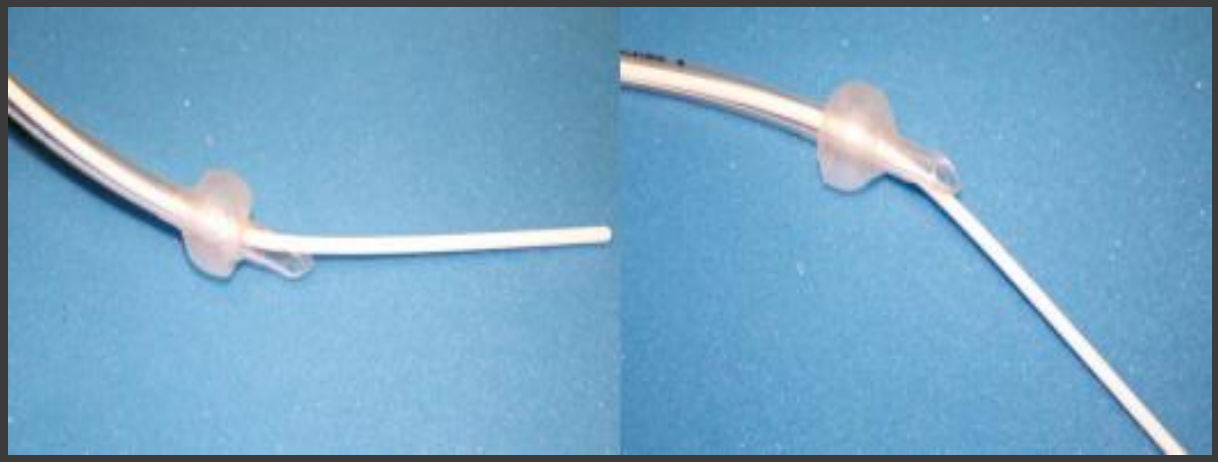


Bullard laryngoscope

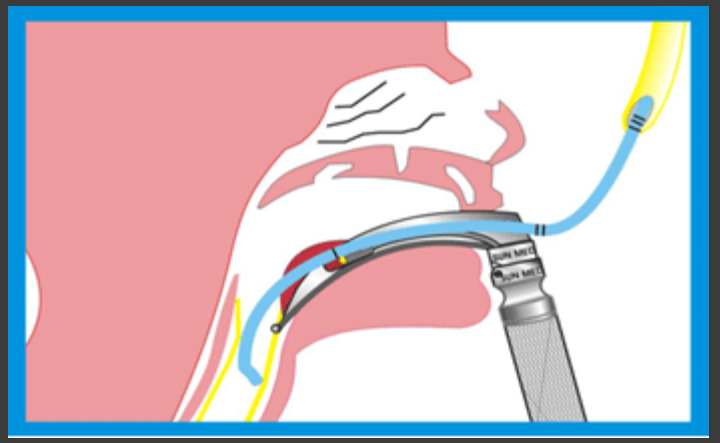
Wu scope

Upsher laryngoscope

Endotracheal tube exchanger



Bougie
Stylet

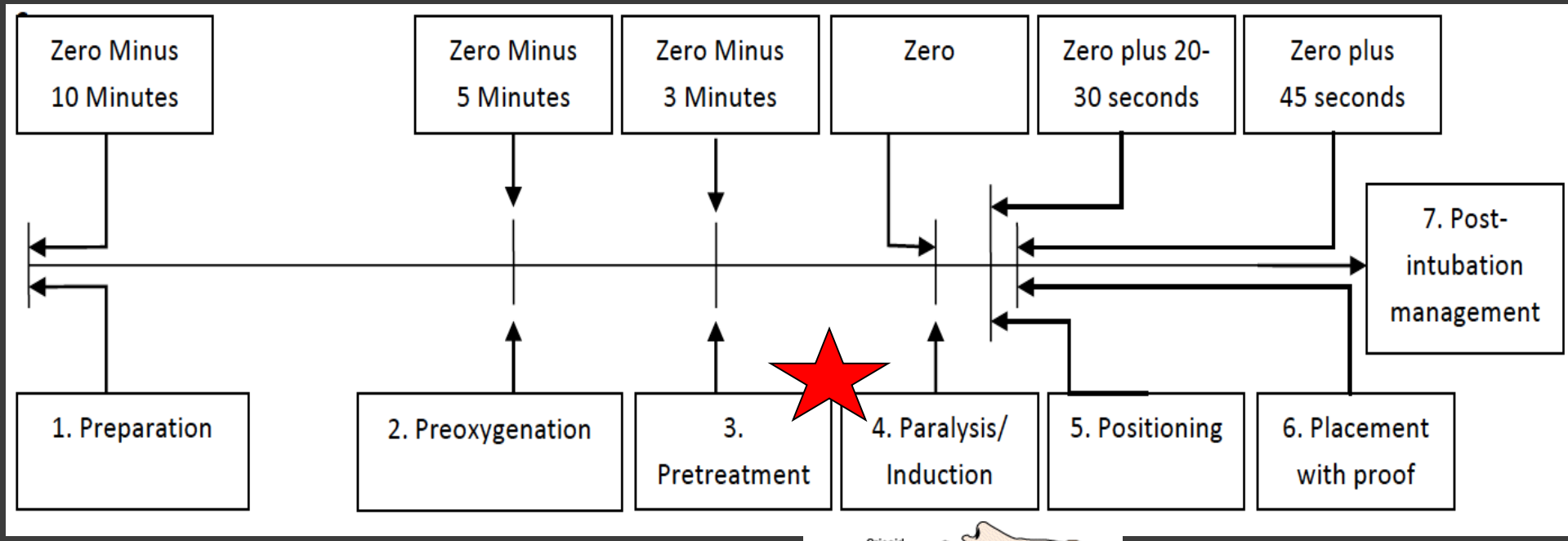


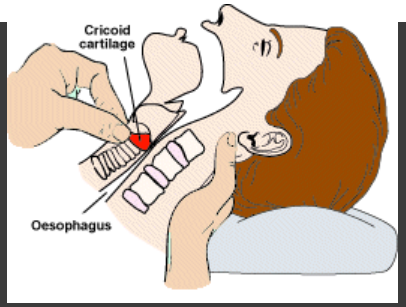
Sellick’s maneuver

Rapid sequence intubation

- The induction of a state of unconsciousness with complete neuromuscular paralysis to achieve intubation
- Minimize risks of gastric aspiration

Rapid Sequence intubation (RSI) = “7P”



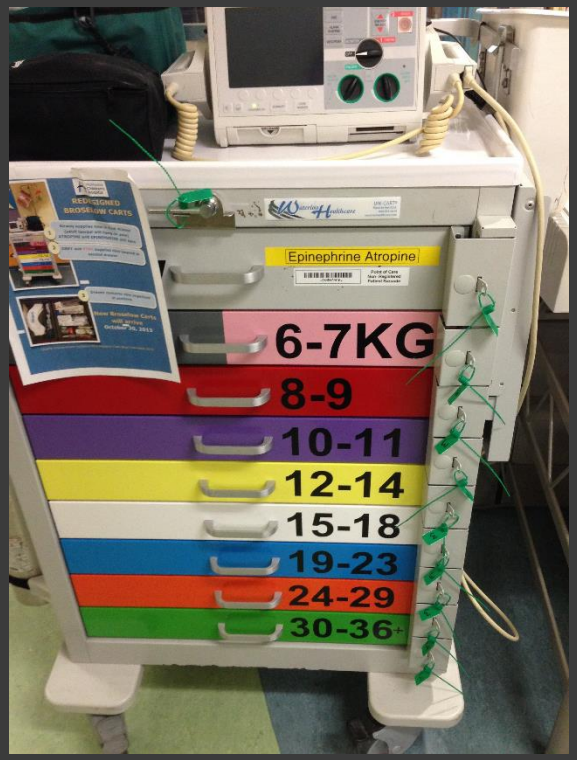


Prepare for Intubation

Pre intubation check “SOAPME”

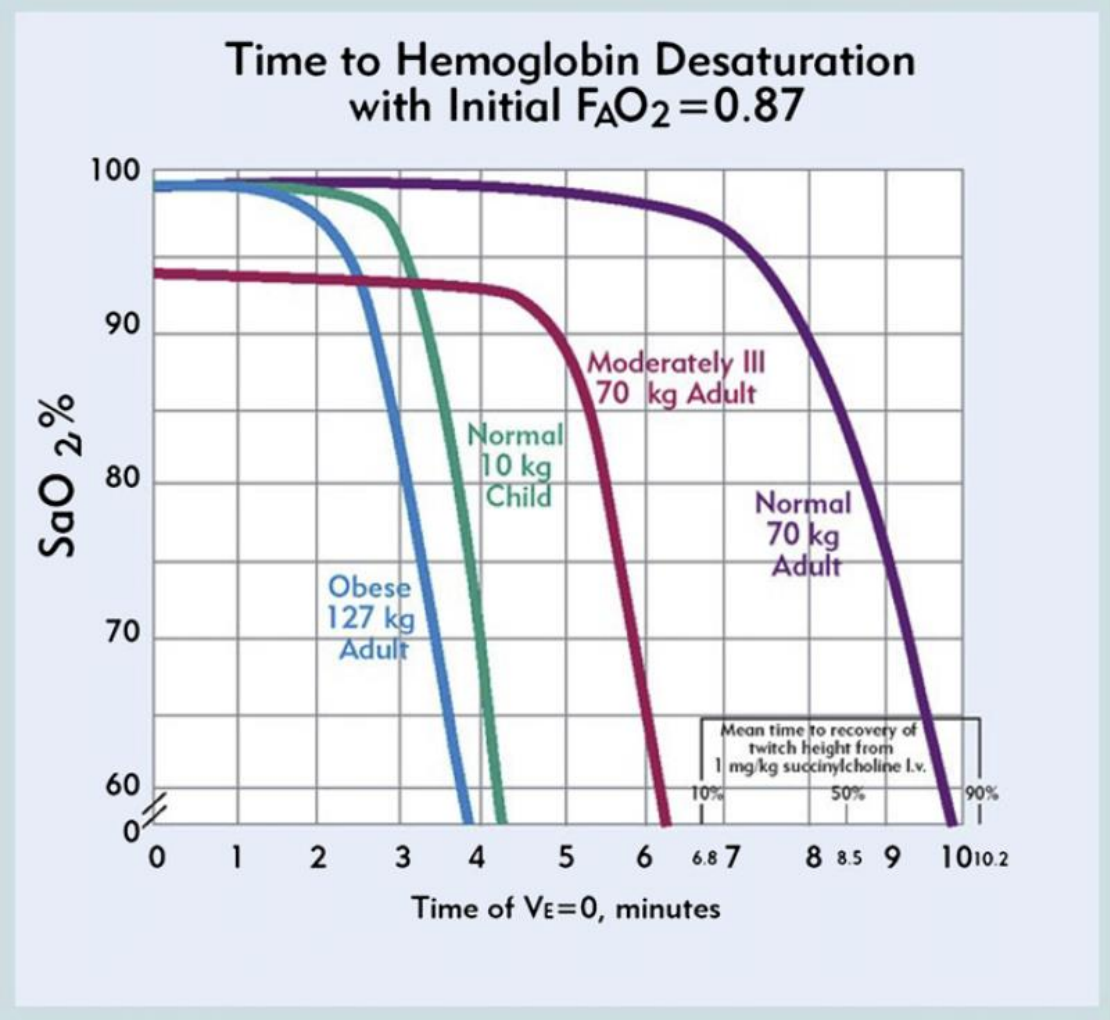
- Suction
- Oxygen
- Airway
- Pharmacy/Personnel
- Monitoring
- Equipment

Expedient intubation requires preparation



- Direct laryngoscope (all sizes, types)
- Magill forceps
- Endotracheal tube (all sizes)
- Ambu bag, Suction, stylet, O2 source)
- Facemask, nasopharyngeal/oropharyngeal airway
- Supraglottic airway device
- Videolaryngoscope
- Emergency surgical airway kits
- Emergency resusciation medications

Preoxygenation



- After 2 minute; 95% of nitrogen replaced by O_2 → increasing O_2 reserve

- Avoid!! PPV in patient who is spontaneously breathing

Pretreatment

Medications	Dose	Indication	Consideration
Lidocaine	1-2 mg/kg/dose	Head injury, TBI, elevated ICP	Can protect IICP during intubation
Atropine	0.02 mg/kg/dose min 0.1 mg, max 1 mg	<1yr old, 1to5yr who receive succinylcholine, and anyone with risk of bradycardia	Prevent reflex bradycardia

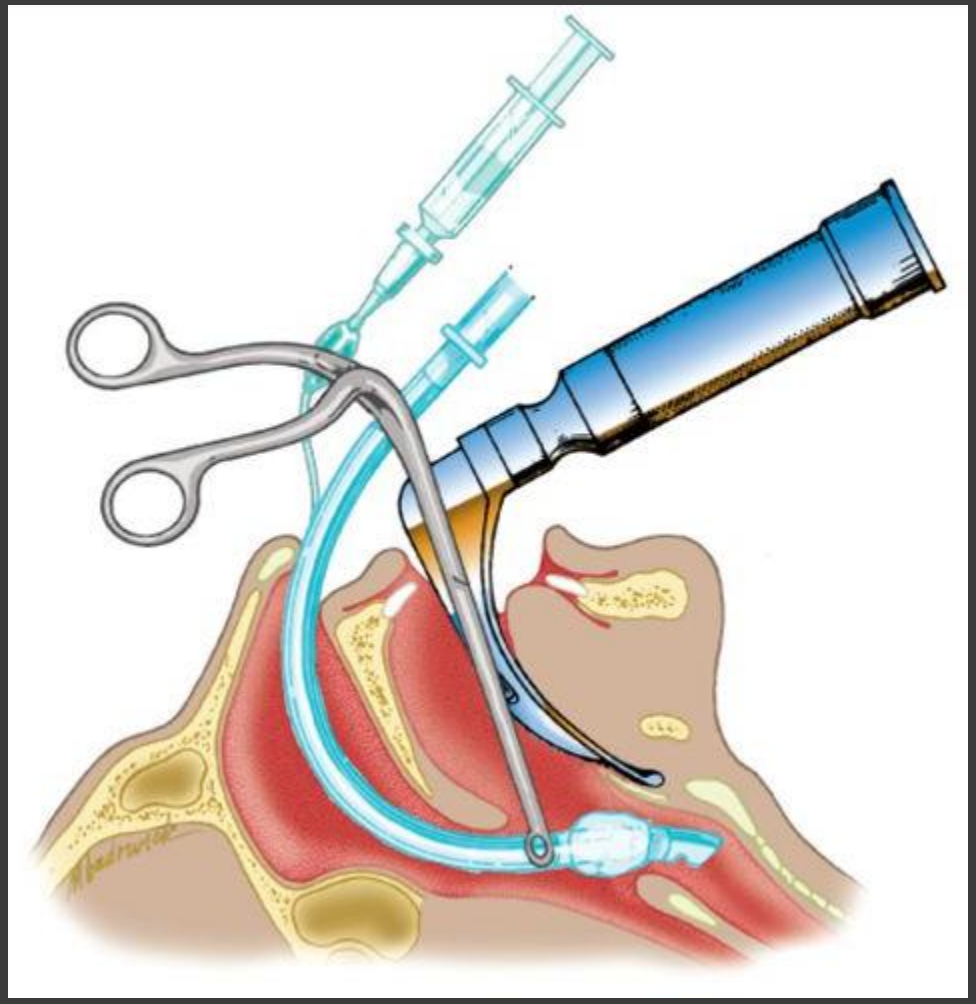
Induction medications

Medications	Dose	Advantage	Disadvantage
Fentanyl	1-4 mcg/kg	Easily reversible and short acting	Risk of chest wall rigidity
Midazolam	0.1-0.4 mg/kg	Status epilepticus	Hypotension
Etomidate	0.2-0.4 mg/kg	TBI, hypotension	Adrenal insuff. May precipitate seizure
Ketamine	0.5-2 mg/kg	Hypotension, asthma	Increased ICP, hypersecretion, glaucoma
Propofol	1-2 mg/kg	Rapid onset, status epilepticus	Hypotension Hypersensitivity to soy/egg

Paralysis medications

Medication	Dose (mg/kg)	Advantage	Disadvantage
Succinylcholine	1-2 (<10 kg) 1-1.5 (>10 kg)	Rapid onset, short duration, IM use	Bradycardia, hypotension, arrhythmias, pulm edema, rhabdomyolysis
Rocuronium	0.6-1	Quick onset, stable No significant contraindication	Increased HR

Nasotracheal intubation



Tracheostomy tube

Technique for difficult Ventilation

Oral/ Nasal Airway

Two-person mask ventilation

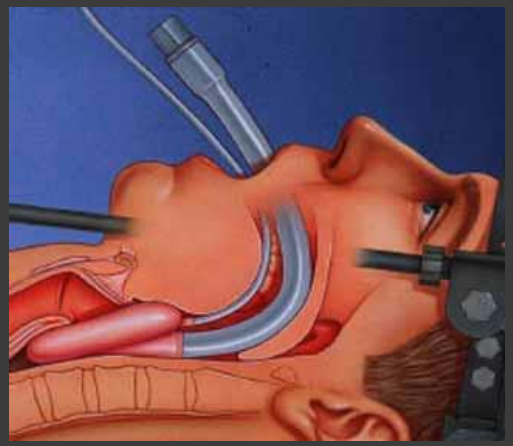
Laryngeal Mask Airway (LMA)

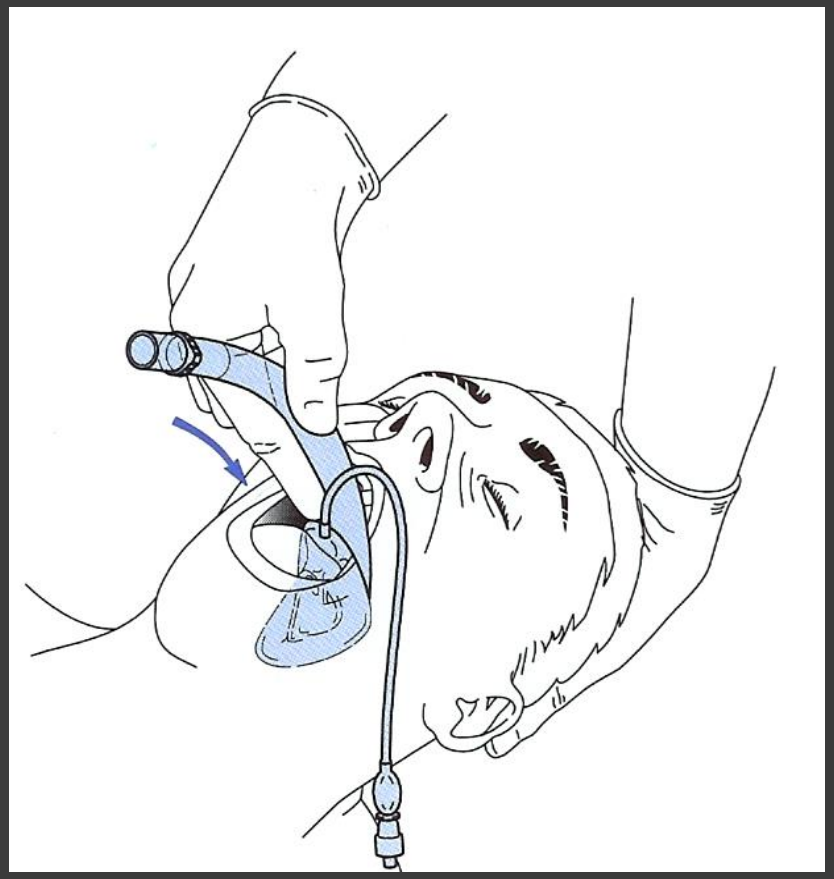
Esophageal-tracheal combitube

Surgical airway access

2 person mask ventilation

Laryngeal Mask Airway (LMA)



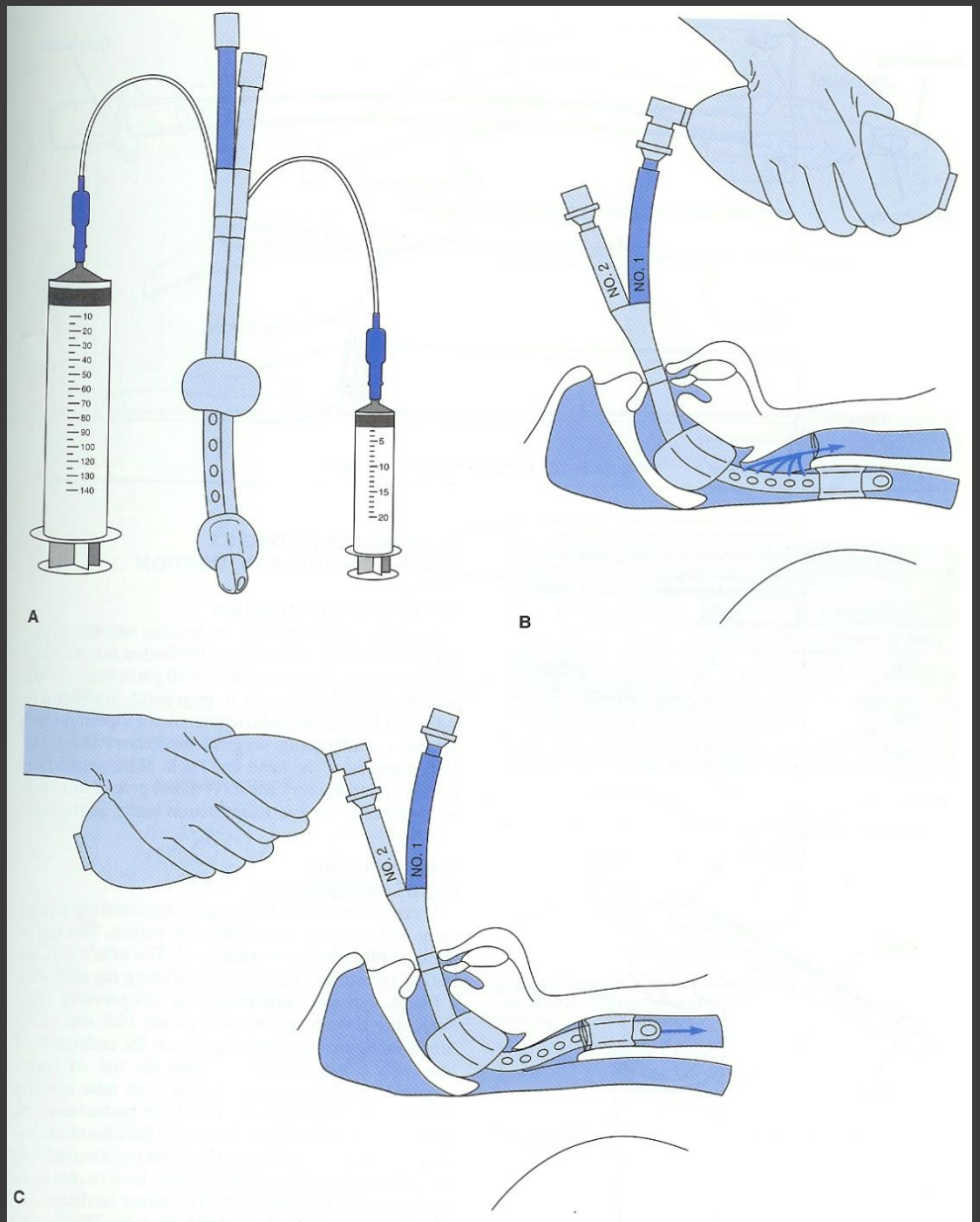


Laryngeal mask airway size

Size	Recommended Patient Weight in Textbook (kg)[1]	Range of Patient Weight Based on Our Formula (kg)
1	<5	−5
1.5	5–10	5–11.25
2	10–20	11.25–20
2.5	20–30	20–31.25
3	30–50	31.25–45
4	50–70	45–80
5	>70	80–125

Anesthesiology 2000;92:631

Combitube



Difficult intubation

- Position ดี ?
- ยก blade ถูกต้อง ?
- External laryngeal manipulation ?
- Jaw thrust ?

Technique for Difficult Intubation

Fiberoptic intubation

Blind intubation

Alternative laryngoscope (Mc Coy)

Video-assisted laryngoscope

Illuminating stylet

Retrograde intubation

Surgical airway access

Fiberoptic tracheal intubation

Indication

History of difficult intubation

Compromise airway

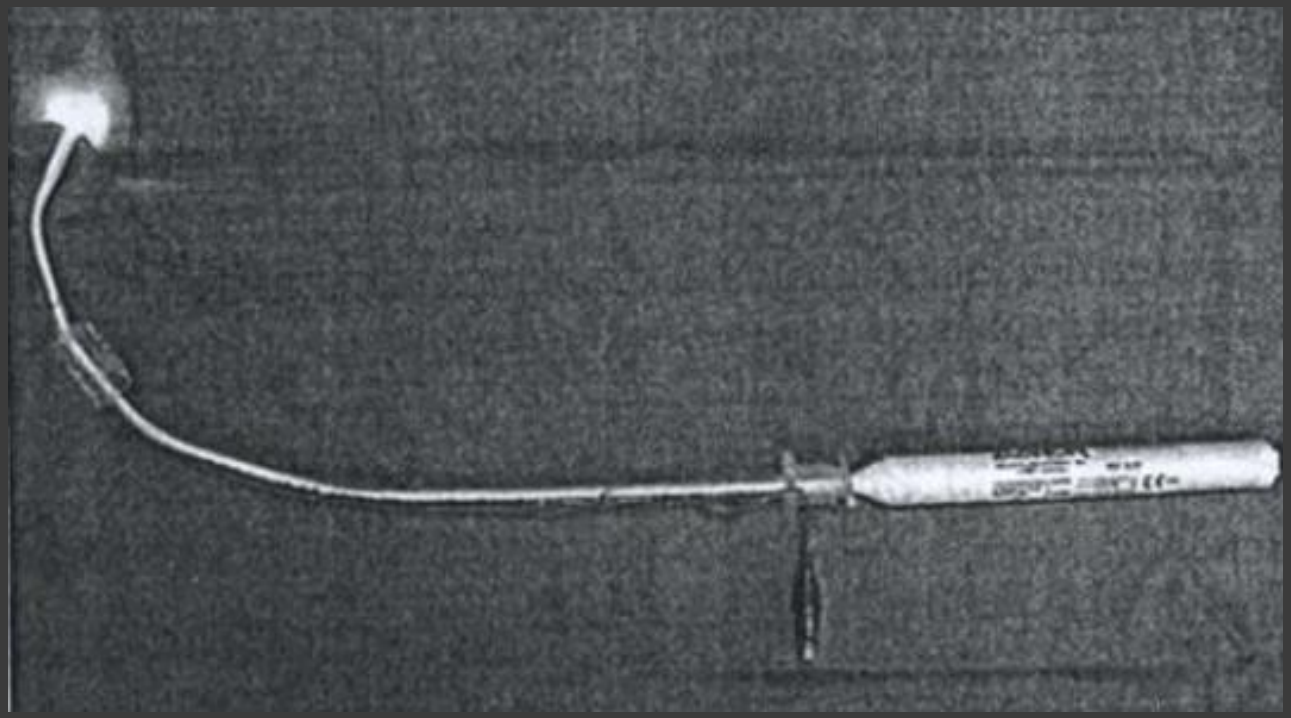
Extension of the neck is not possible

Awake intubation with tropical anesthesia

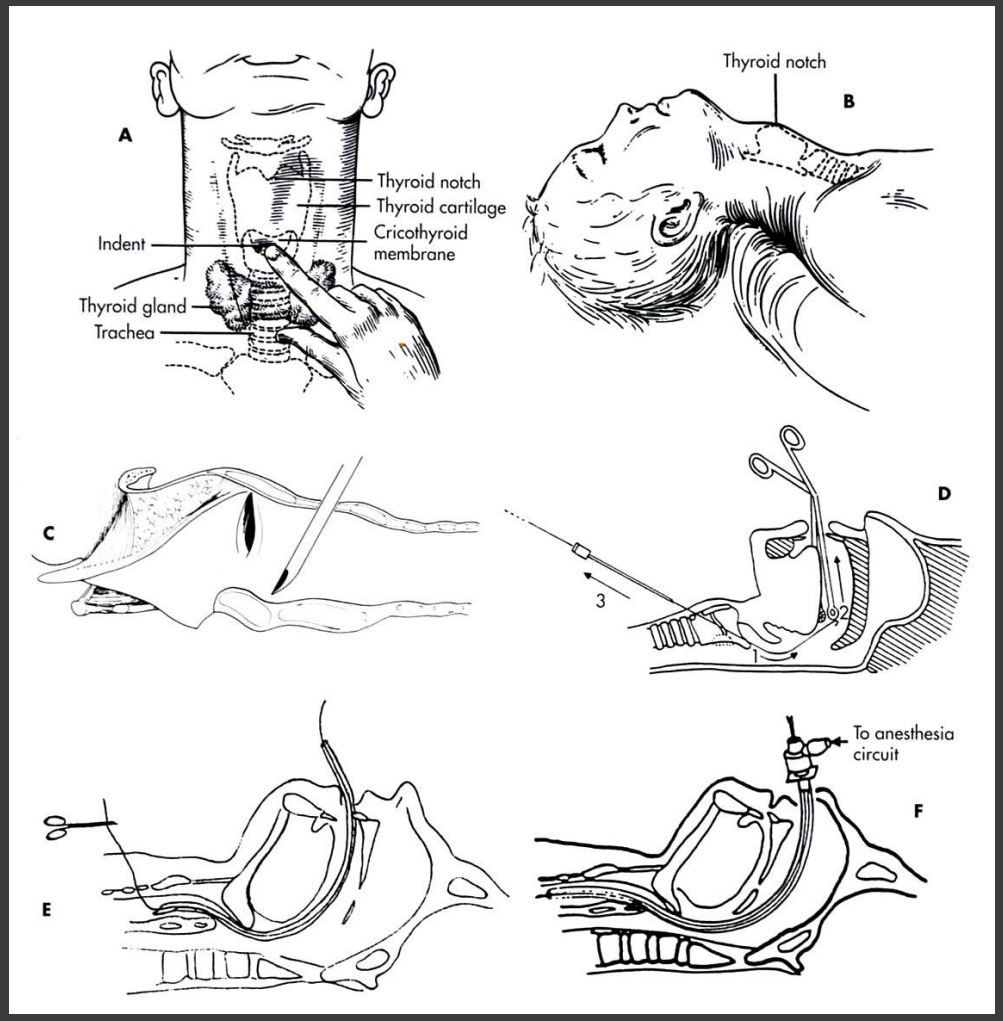
Video-assisted laryngoscope

Good laryngeal view; glottis is seen in the center of the upper third of video display

Illuminated stylet



Retrograde intubation



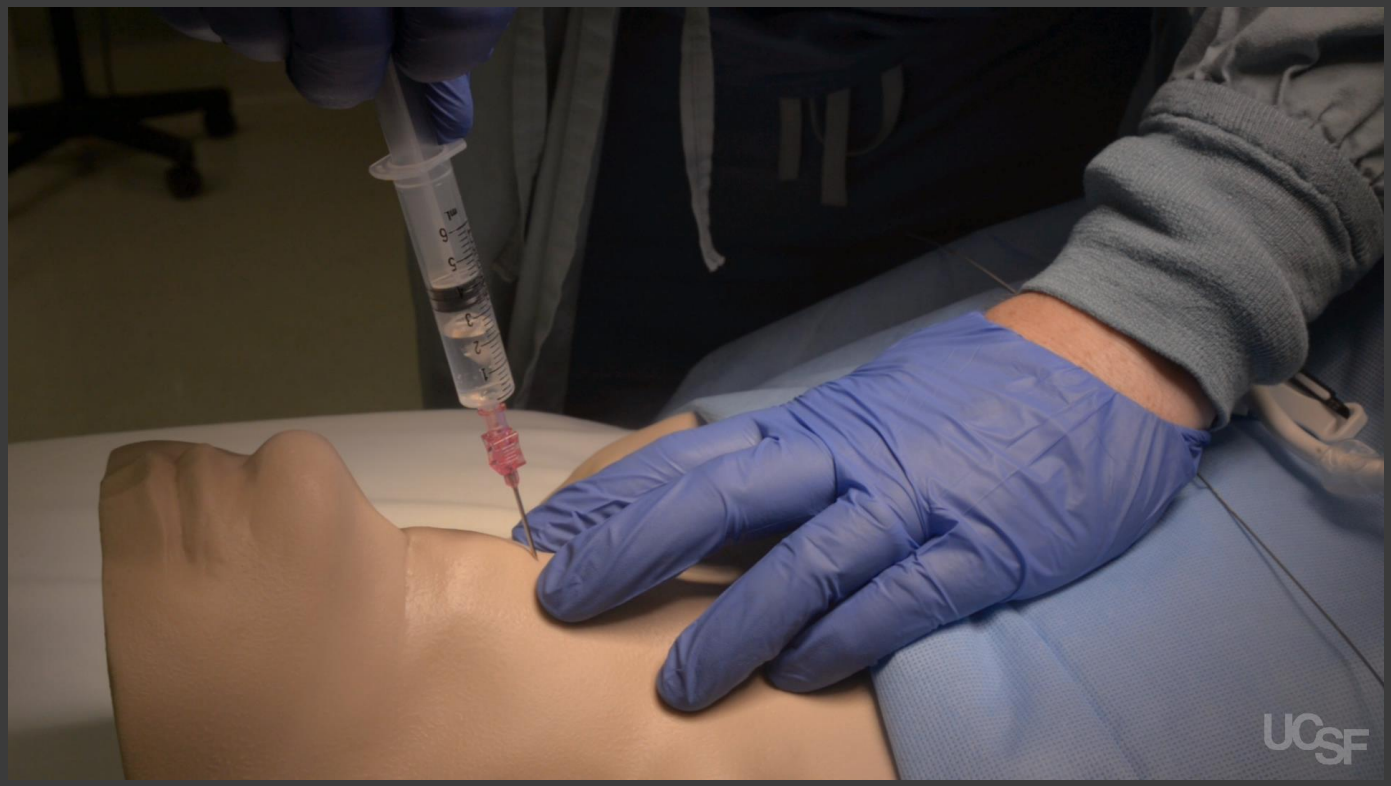
Surgical Airway Access

Cricothyroidotomy

Tracheostomy

Cricothyroidotomy

When attempts at intubation or ventilation have failed, cricothyrroidotomy is considered the procedure of choice.

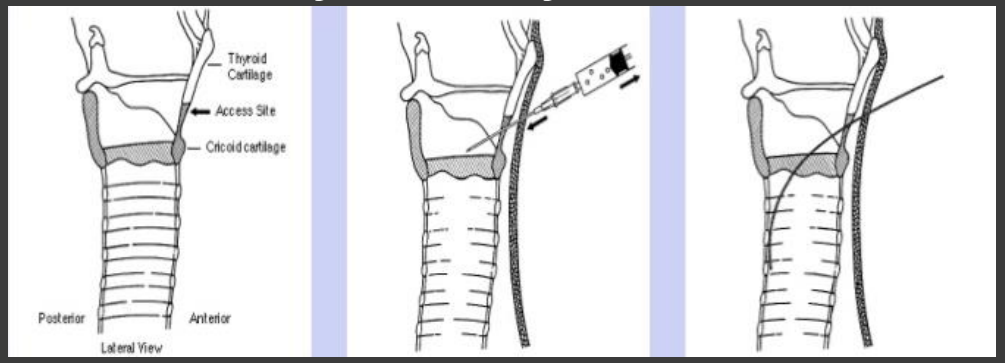


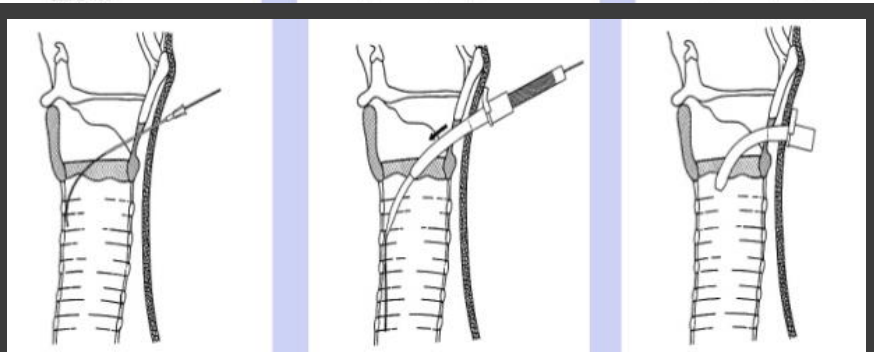
Emergency cricothyrotomy

Mini-tracheostomy

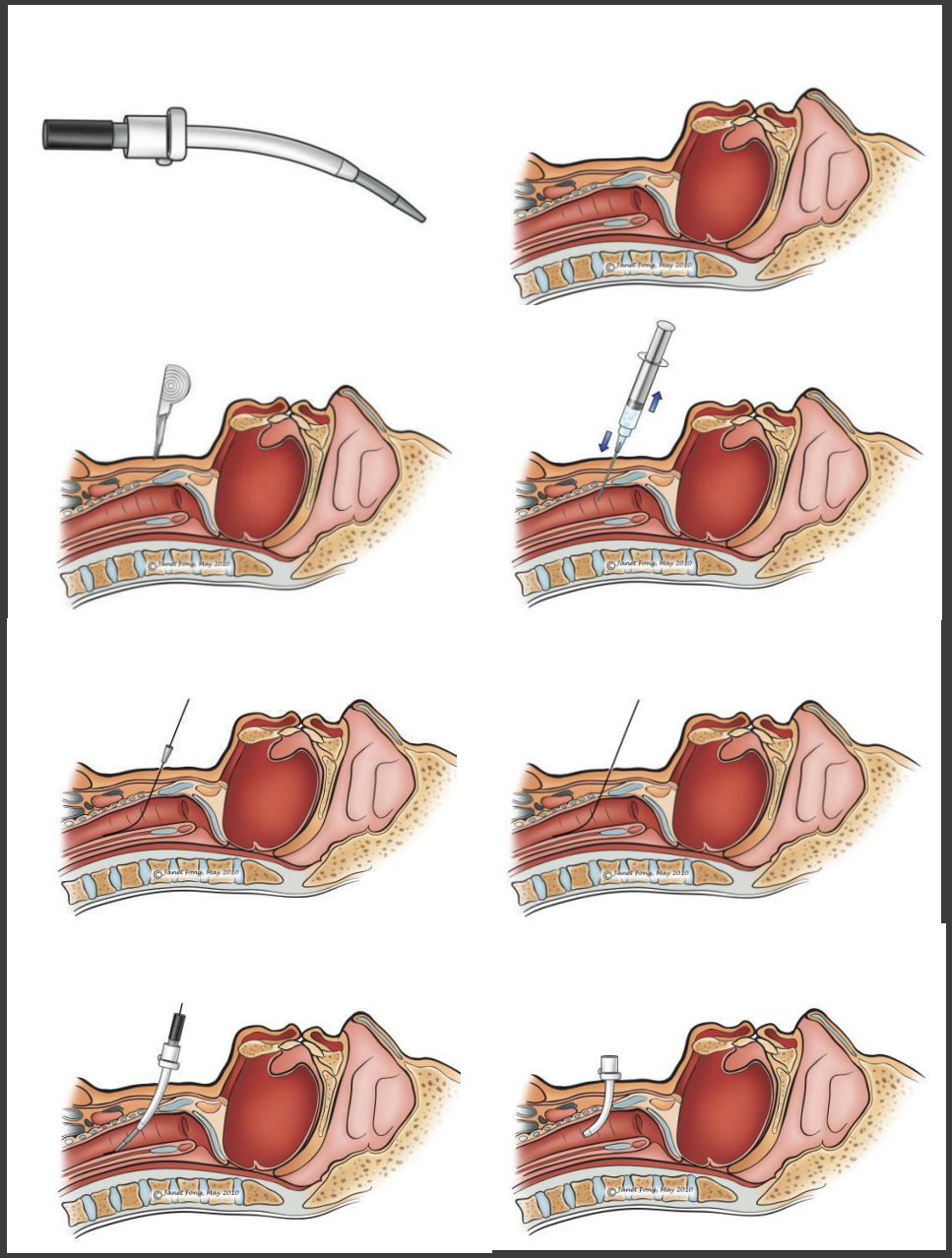
Seldinger technique (safer than blind)

- Aspirate air with the needle and syringe to check placement, cut with scalpel
- Remove syringe, insert wire into needle, remove needle
- Thread dilator with airway already loaded onto wire
- Remove wire






suction catheter in cases of upper airway
to Atelectasis.
d'un cathéter d'aspiration en cas d'obstruction
supérieures peut entraîner une Atélectasie.
Verwendung eines Absaugkatheters im Fall einer
Luftwege kann zu Atelektase führen.
de un catéter de succión en caso de obstrucción
puede provocar la Atelectasia.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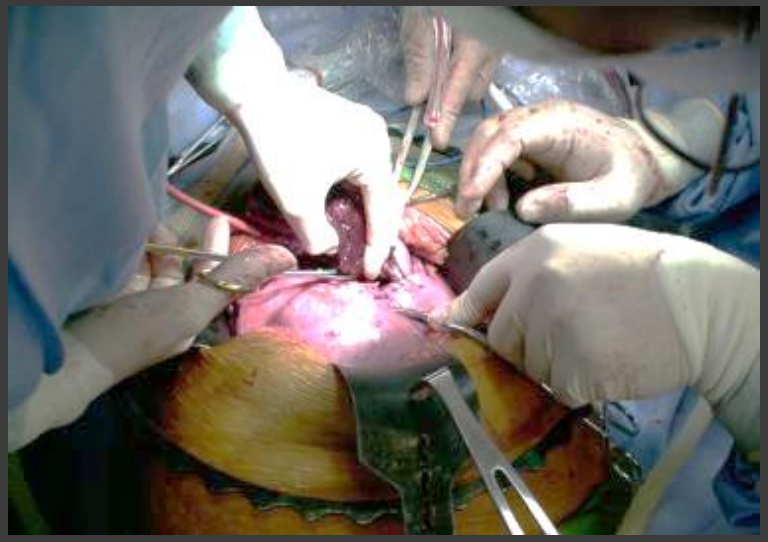
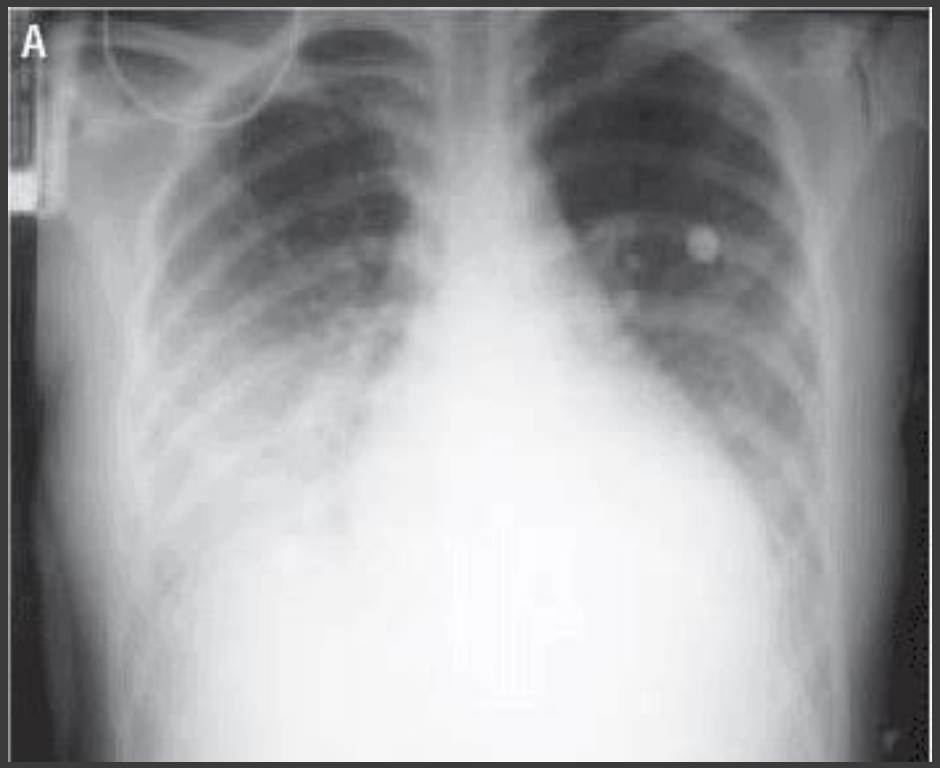
Exit Procedure



Pulmonary hemorrhage



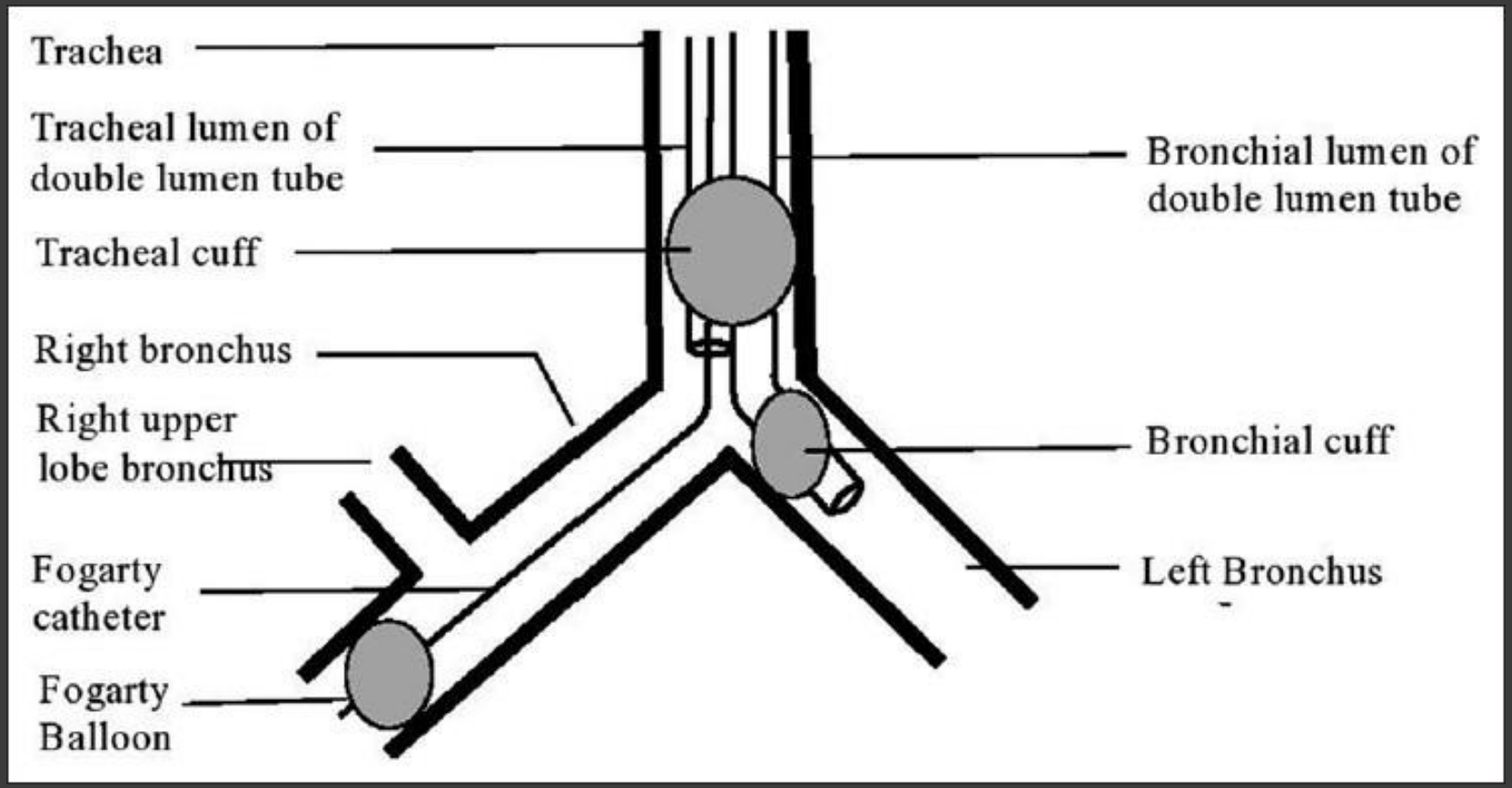
Treatment

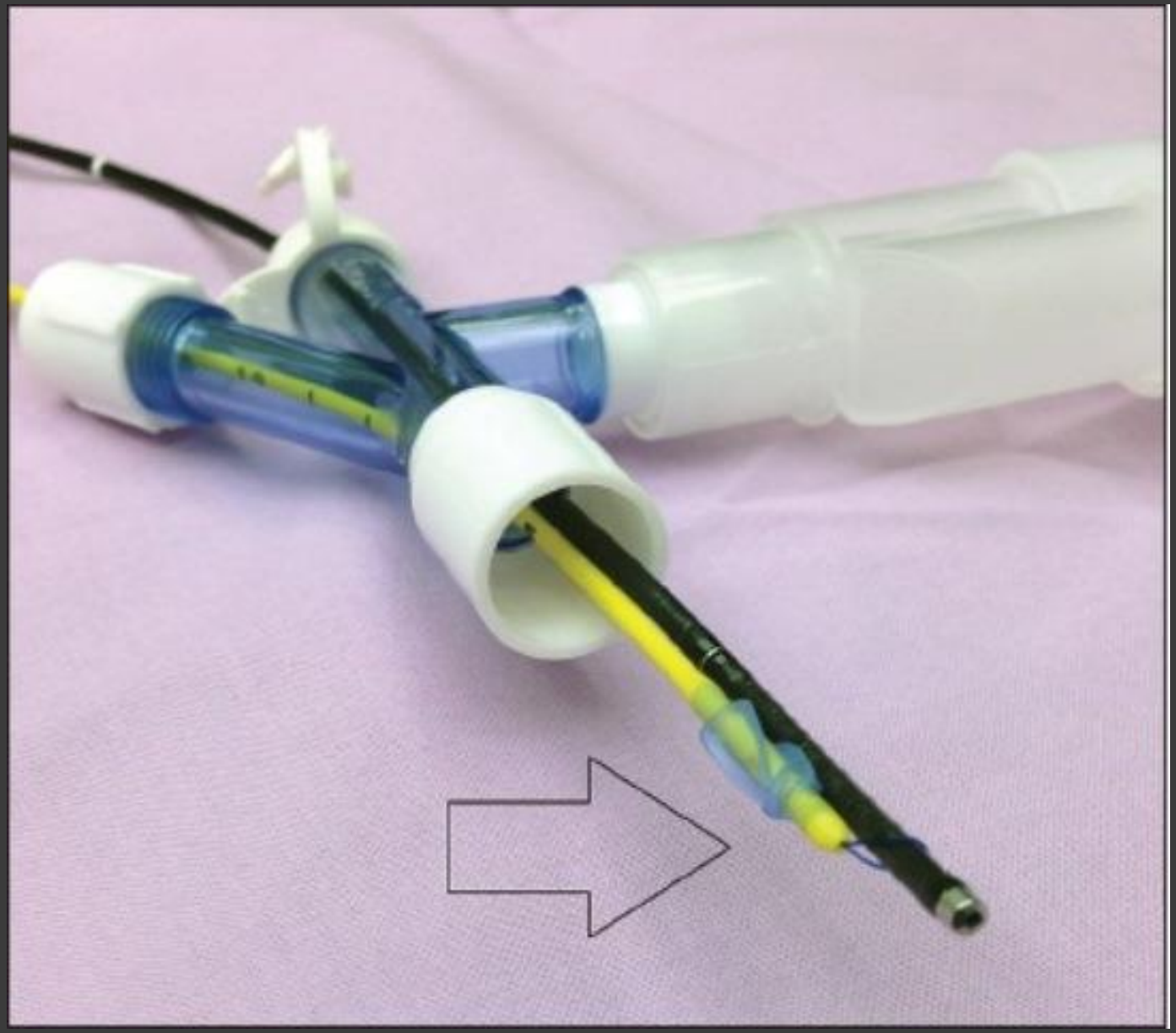
- Specific treatment cause of bleeding
- Correct bleeding tendency and coagulopathy
- Paralyze patient with muscle relaxant and sedative drug
- Ventilator support to maintain oxygenation and ventilation

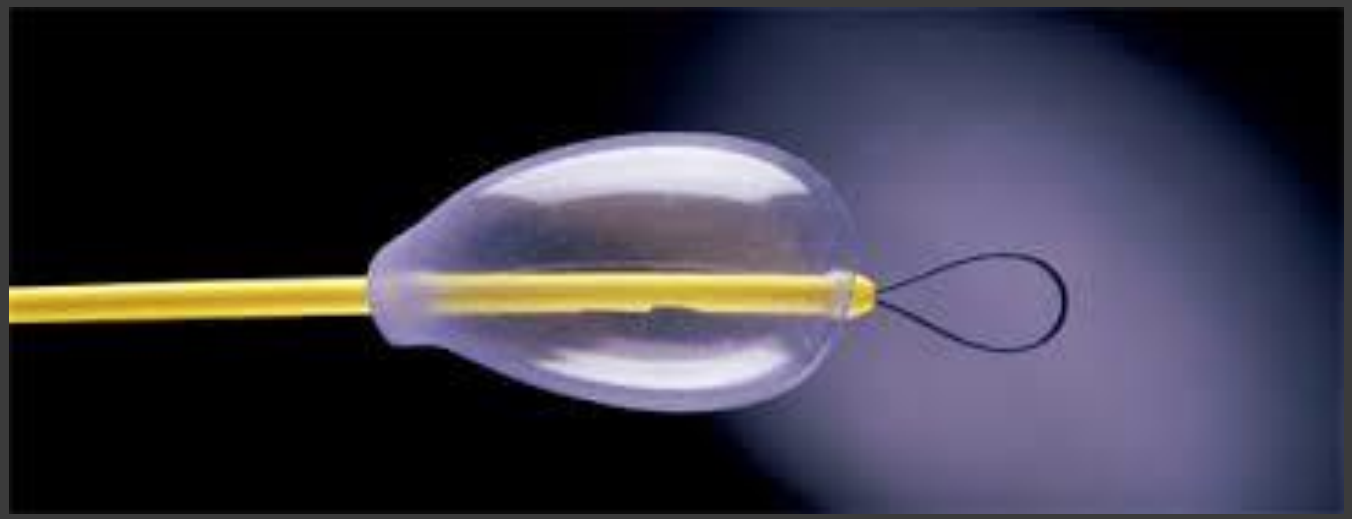
Treatment

Emergency management for massive hemoptysis

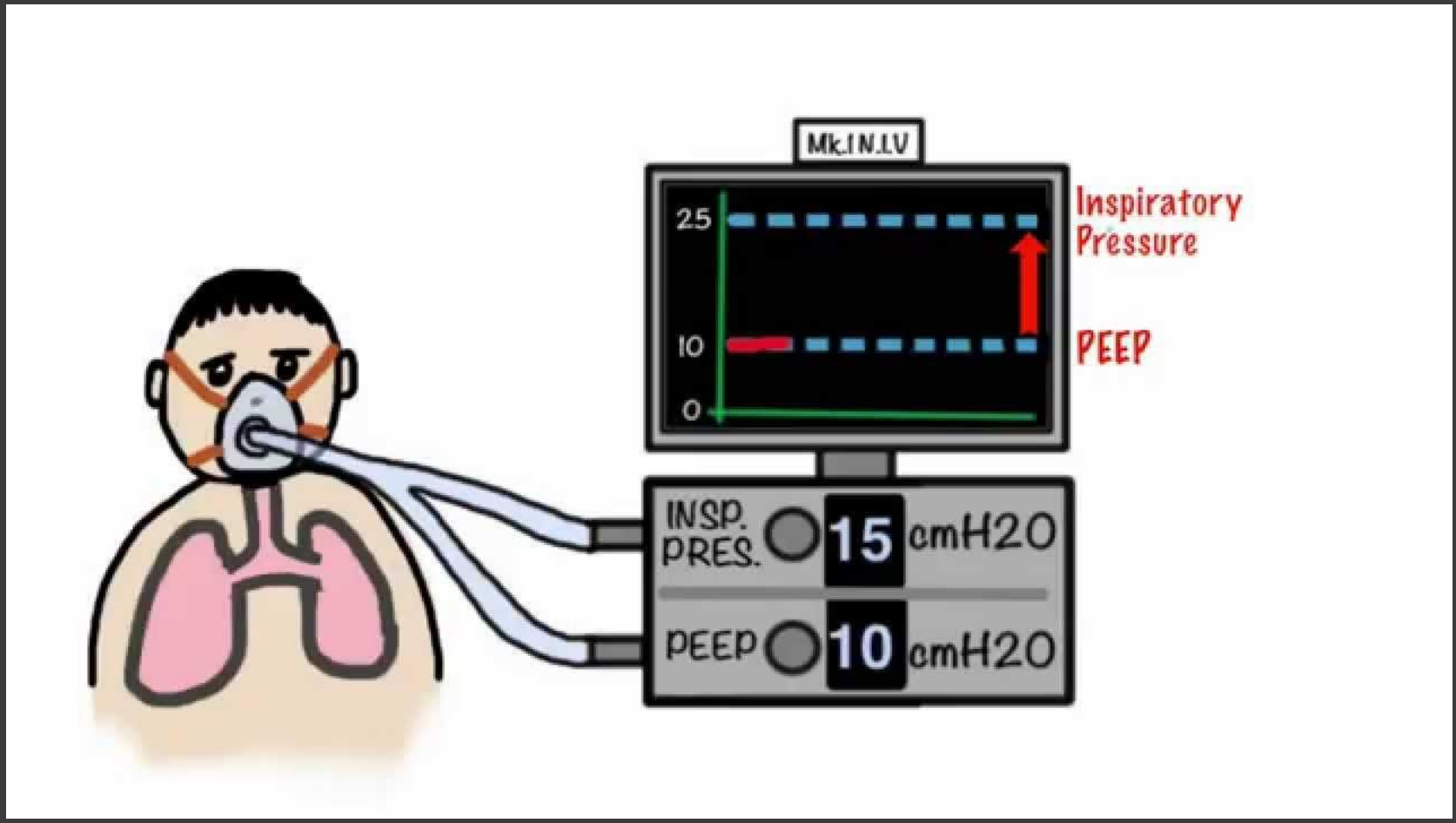
- Unilateral intubation or Double lumen ETT
- Rigid bronchoscope with epinephrine
- Vasopressin drip
- Selective bronchial arteriography with embolization
- Lobectomy

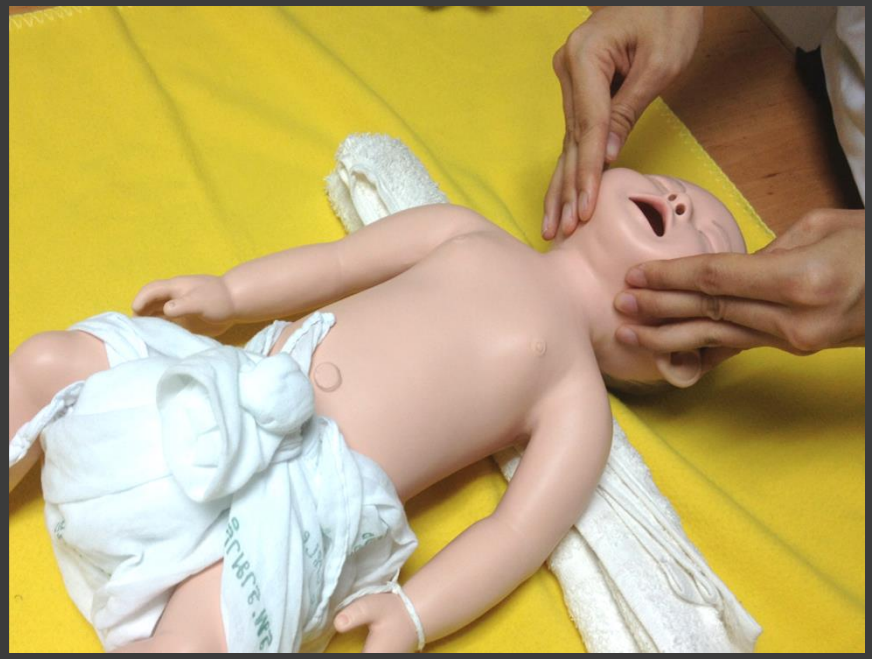

Trachea
Tracheal lumen of double lumen tube
Tracheal cuff
Right bronchus
Right upper lobe bronchus
Fogarty catheter
Fogarty Balloon
Bronchial lumen of double lumen tube
Bronchial cuff
Left Bronchus





Neck mass Lymphoma


Mk.I N.I.V
25
10
0
Inspiratory Pressure
PEEP
INSP. PRES.
15
cmH2O
PEEP
10
cmH2O



Thank you for your attention