

# AIRWAY MANAGEMENT

พญ.โสภิต เหล่าชัย

วิสัญญีแพทย์

9 มี.ค.64





# INDICATIONS FOR ENDOTRACHEAL INTUBATION

- **4 P**

1. **P**ositive pressure ventilation

- Unconsciousness, inadequate ventilation and oxygenation, general anesthesia

2. **P**atent airway

- Airway obstruction cannot solve by positioning or opened airway maneuver

3. **P**rotect airway

- Prevent aspiration due to unconsciousness, loss of airway reflex

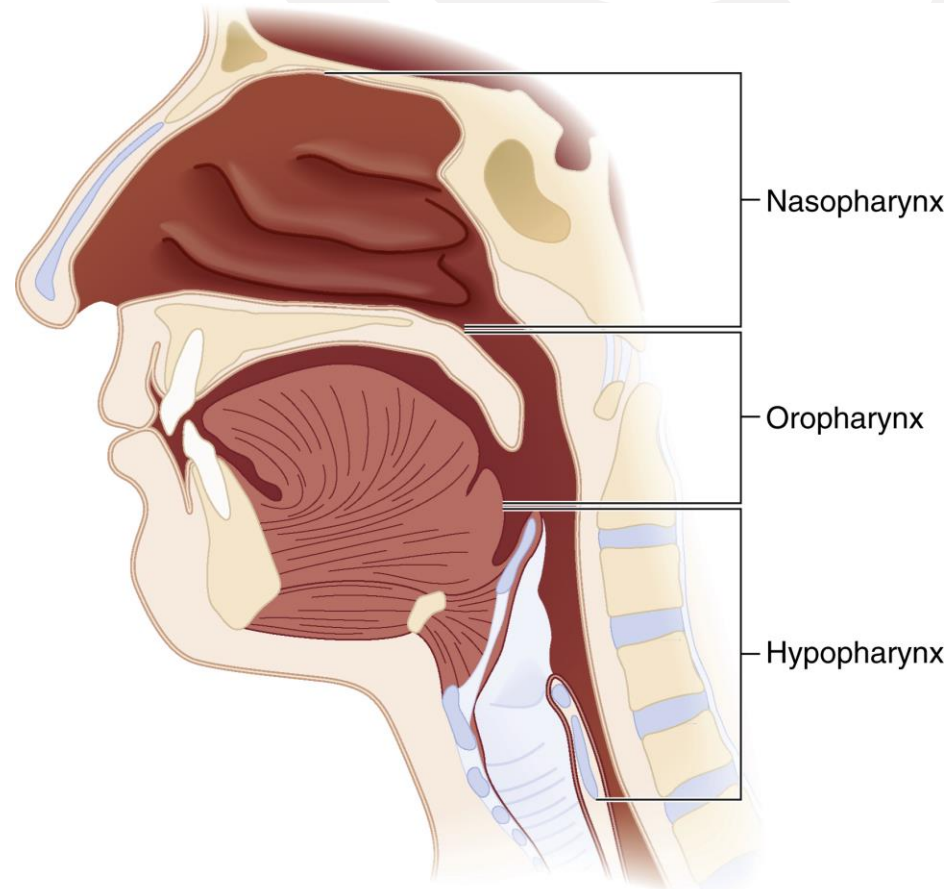
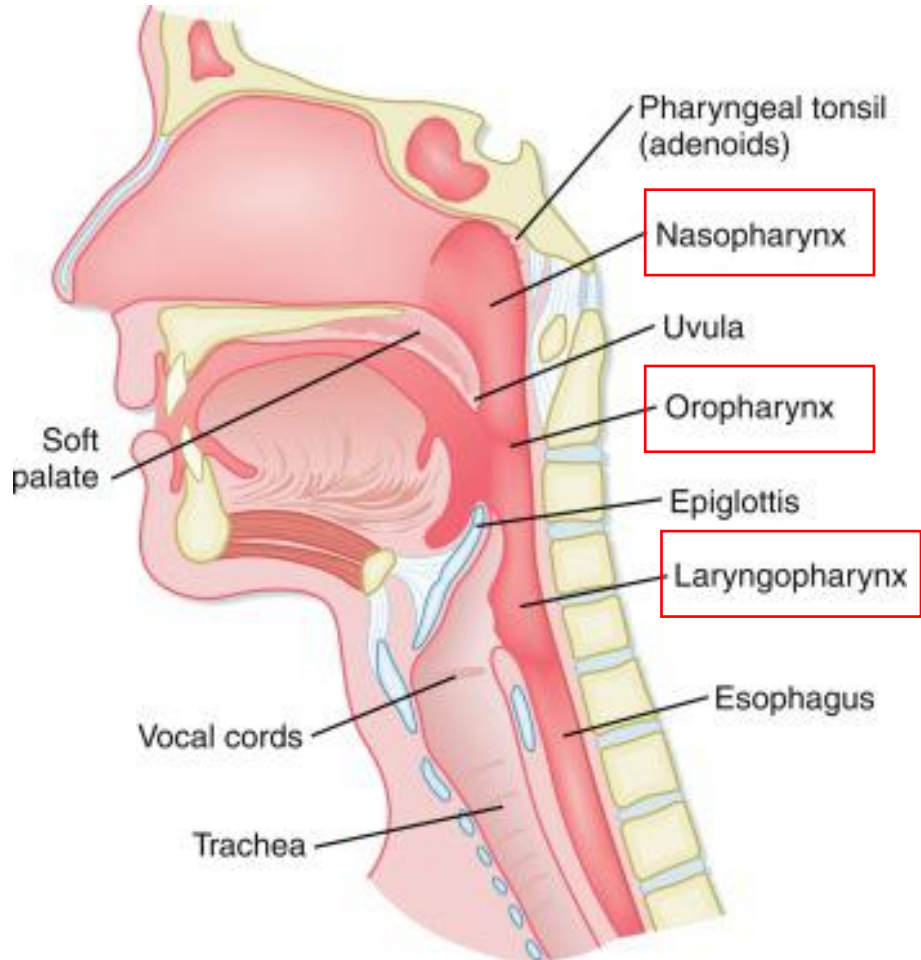
4. **P**ulmonary toilet

- Promote : Suction secretion

# AIRWAY MANAGEMENT

- 1. Manual Airway Maneuvers
  - Head-tilt/Chin-lift maneuver
  - Jaw-thrust maneuver
  - Patient Positioning
    - “sniffing position”
- 2. Adjunct Airways
  - Oropharyngeal Airway
  - Nasopharyngeal Airway
- 3. Bag-mask ventilation
- 4. Extraglottic airway devices
  - Laryngeal Mask Airways (LMA)
  - Esophageal-tracheal Combi-tube
- 5. Endotracheal tube intubation
- 6. Rapid Sequence Intubation (RSI)
- 7. Difficult Airways
- 8. Failed Airway

# AIRWAY ANATOMY



# AIRWAY ANATOMY

Palatopharyngeal fold  
(posterior pillar)

Palatoglossal fold  
(anterior pillar)

Tonsil

Hard  
palate

Soft  
palate

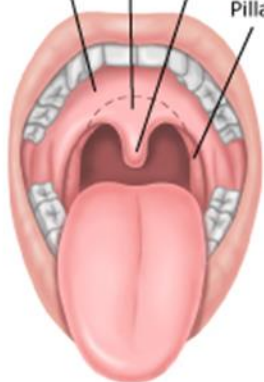
Uvula

Hard  
palate

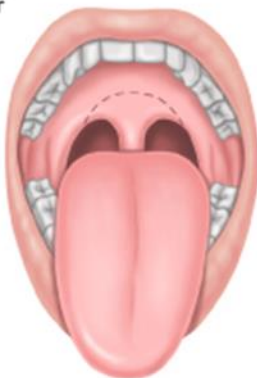
Soft  
palate

Uvula

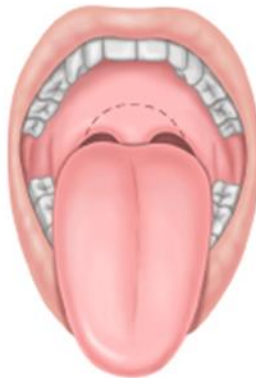
Pillar



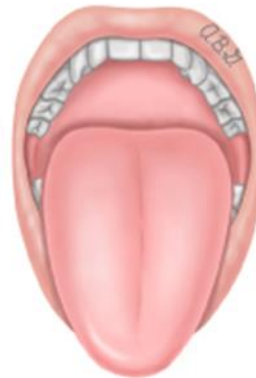
Class I



Class II



Class III



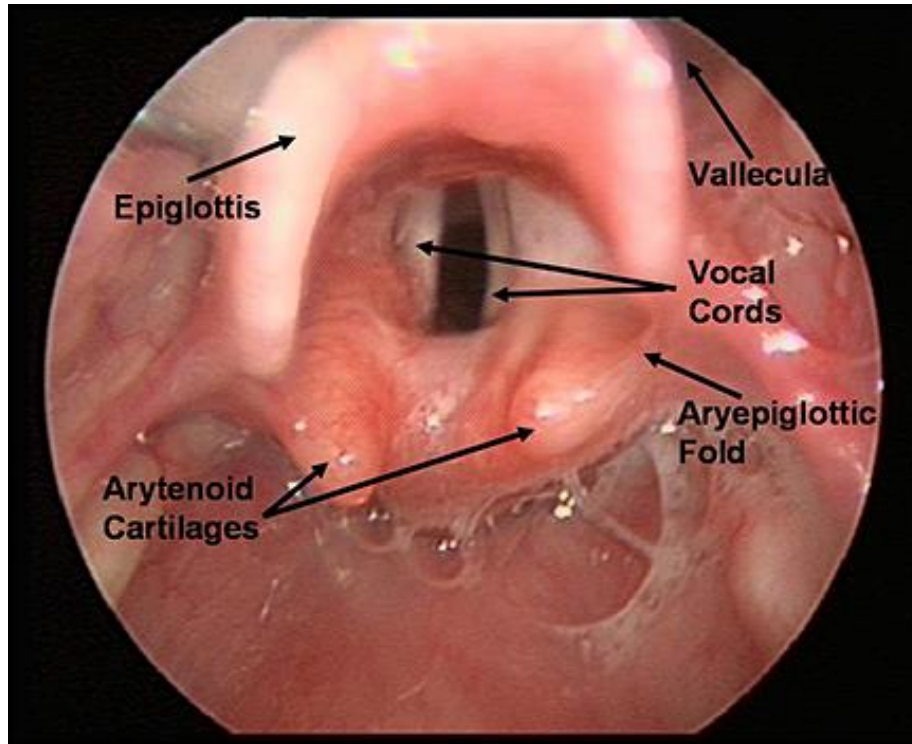
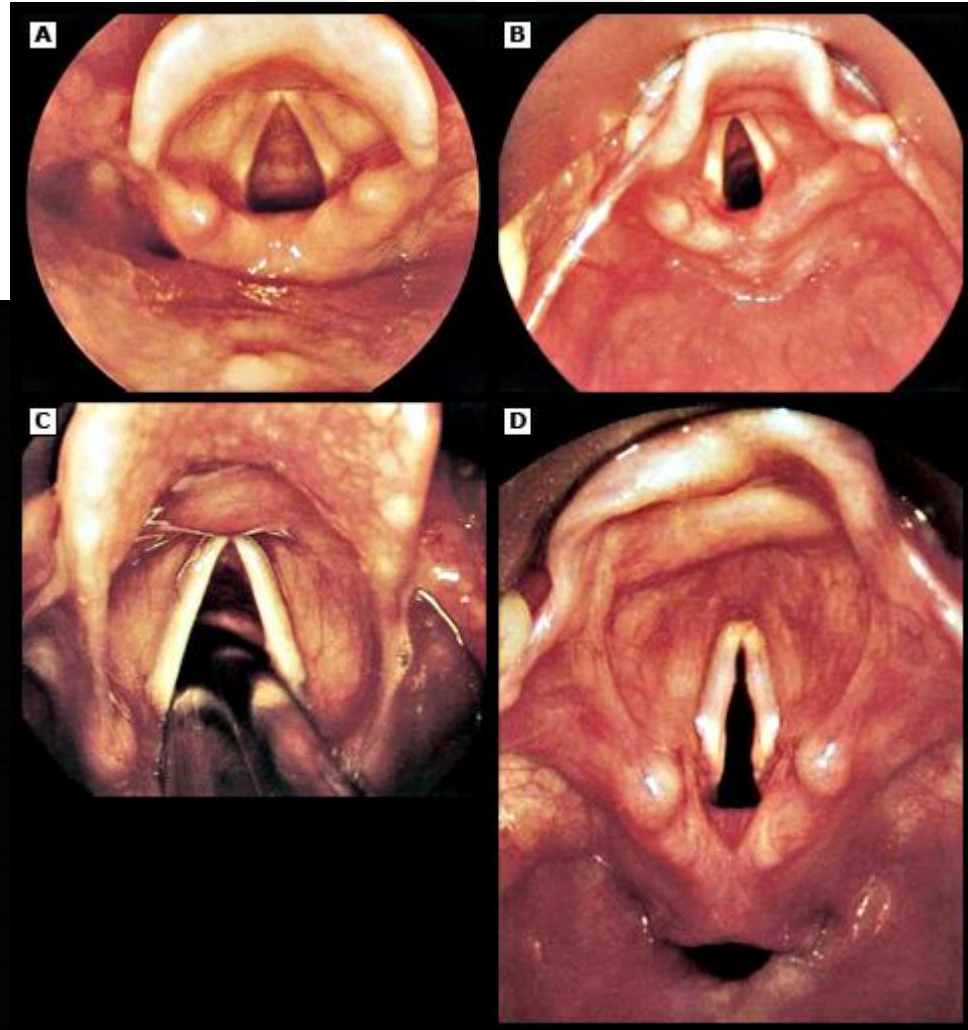
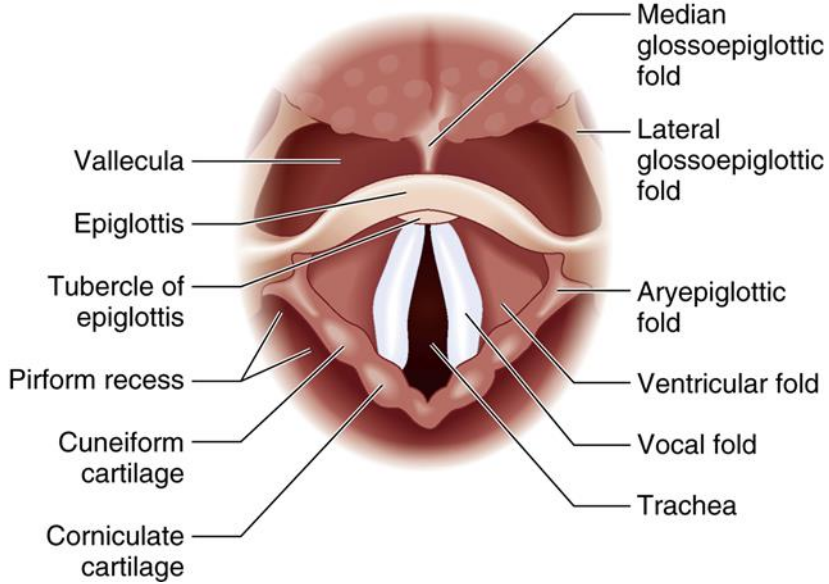
Class IV

## Mallampati classification

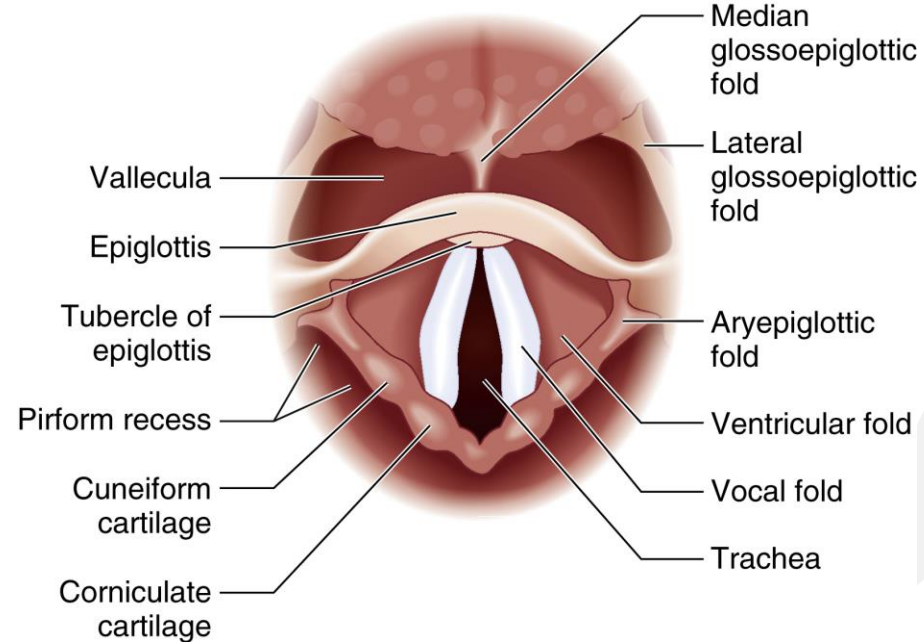
- relates the amount of mouth opening to the size of the tongue
- provides an estimate of space for oral intubation by direct laryngoscopy



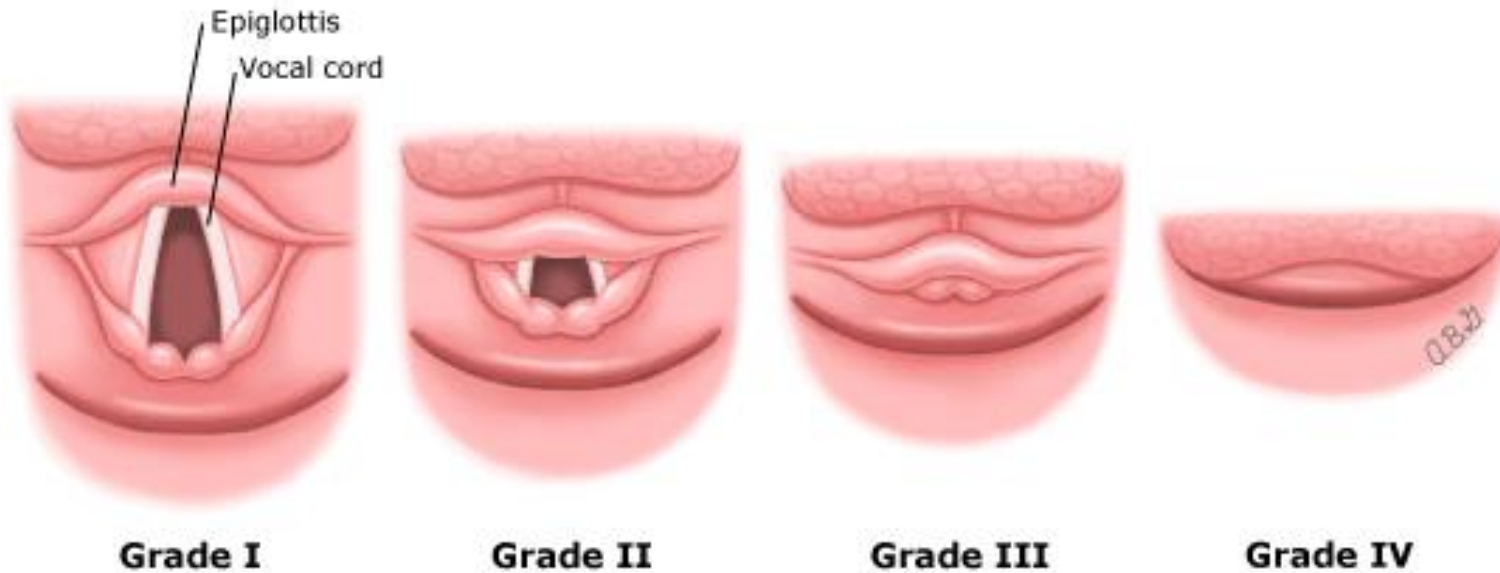
# AIRWAY ANATOMY



# AIRWAY ANATOMY

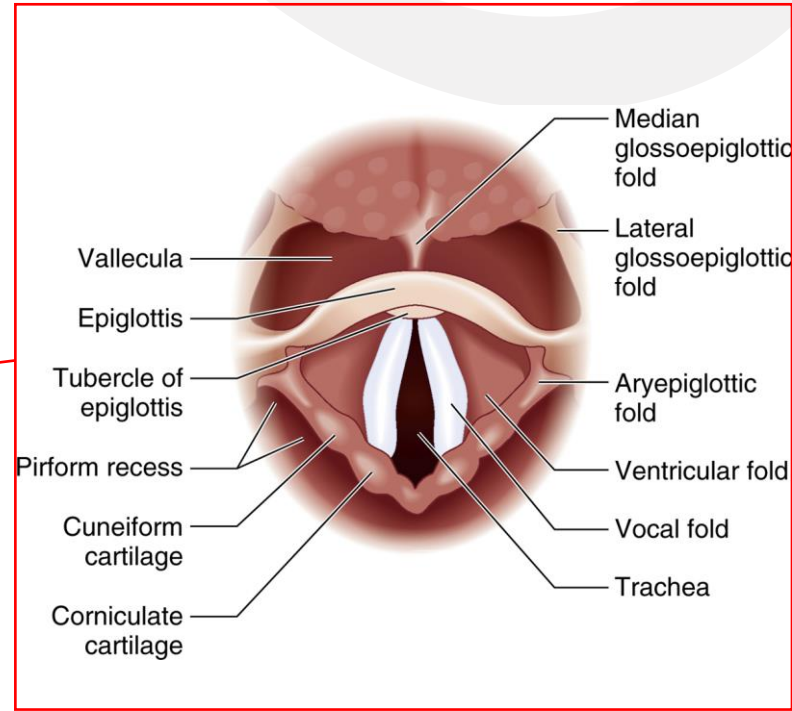
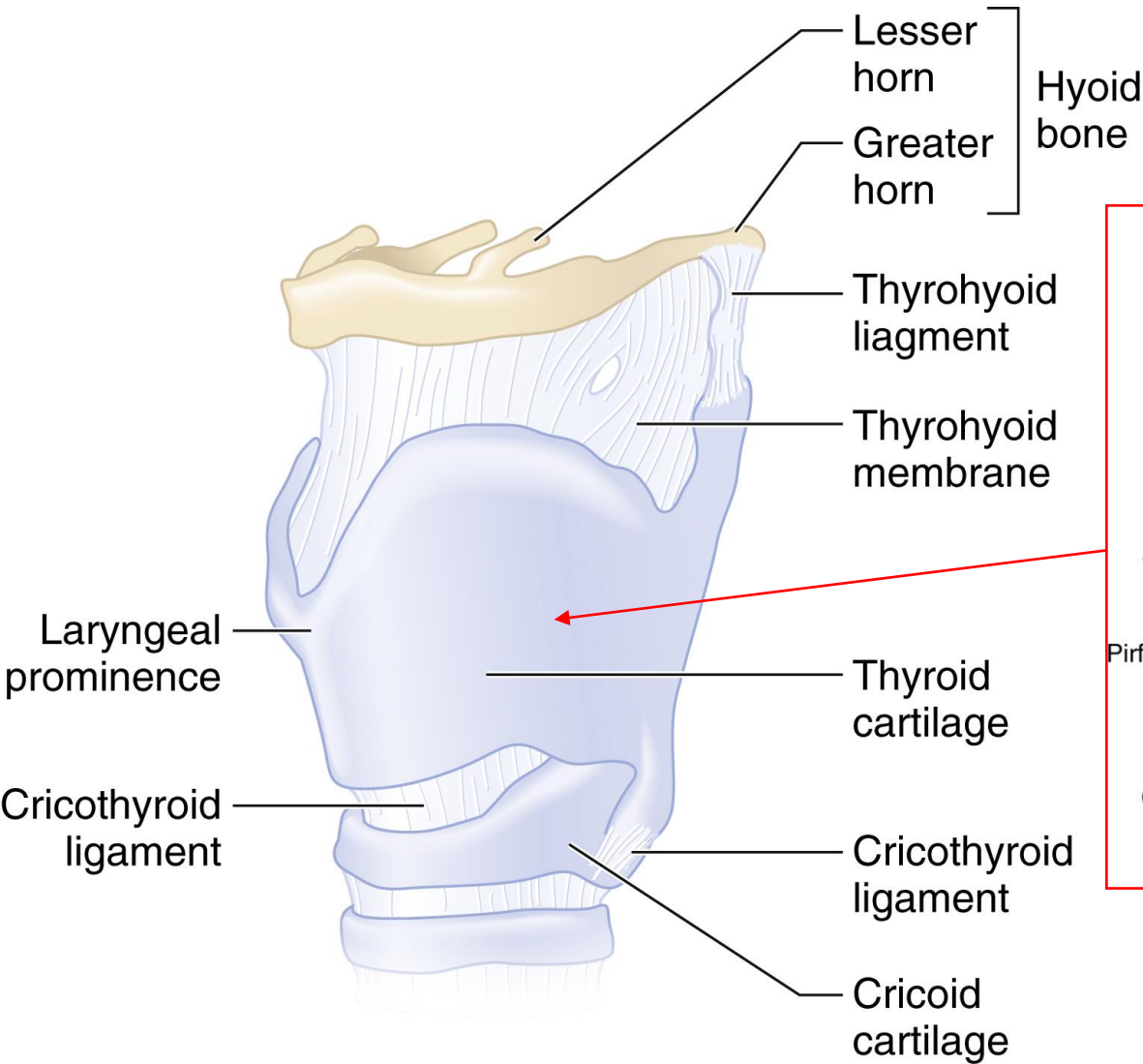


## Cormack-Lehane grading scheme for laryngoscopy

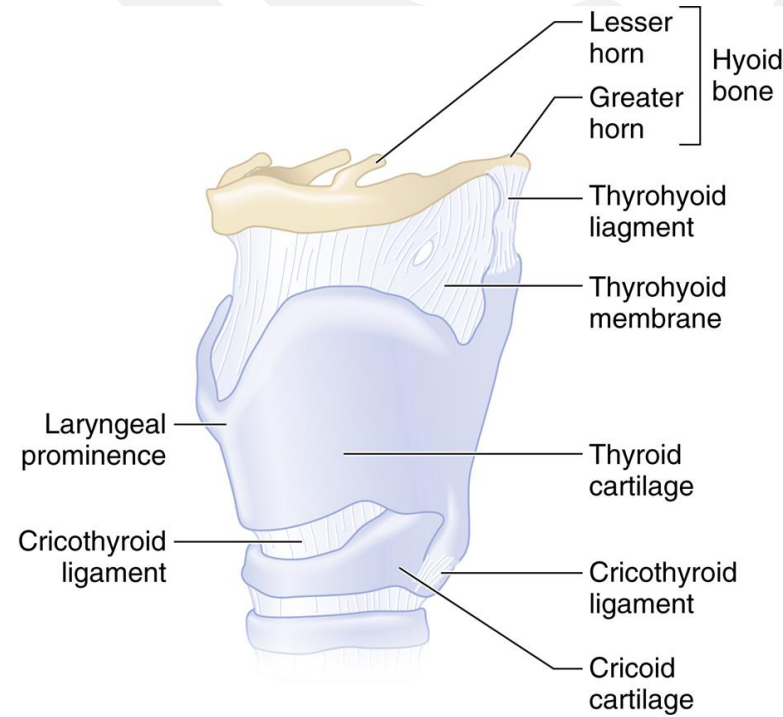
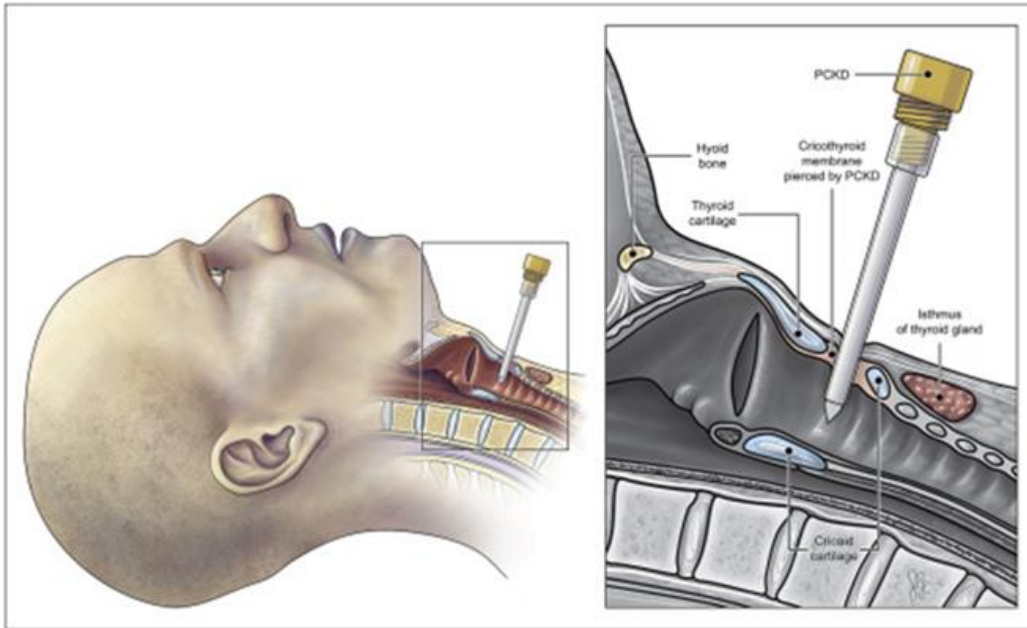




# AIRWAY ANATOMY



# AIRWAY ANATOMY



# IDENTIFYING THE DIFFICULT AIRWAY

- **LEMON** mnemonic
- **L** : Look externally
- **E** : Evaluate 3-3-2
- **M** : Mallampati
- **O** : Obstruction/Obesity
- **N** : Neck mobility



# IDENTIFYING THE DIFFICULT AIRWAY

- **LEMON** mnemonic
- **L** : Look externally
- **E** : Evaluate 3-3-2
- **M** : Mallampati
- **O** : Obstruction/Obesity
- **N** : Neck mobility

- Abnormal facies
- Unusual anatomy
- Facial trauma



# IDENTIFYING THE DIFFICULT AIRWAY

- **LEMON** mnemonic
- **L** : Look externally
- **E** : Evaluate 3-3-2 →
- **M** : Mallampati
- **O** : Obstruction/Obesity
- **N** : Neck mobility



(A) Incisor distance:  
**3 FB**  
Assessment : the ease of access to the airway



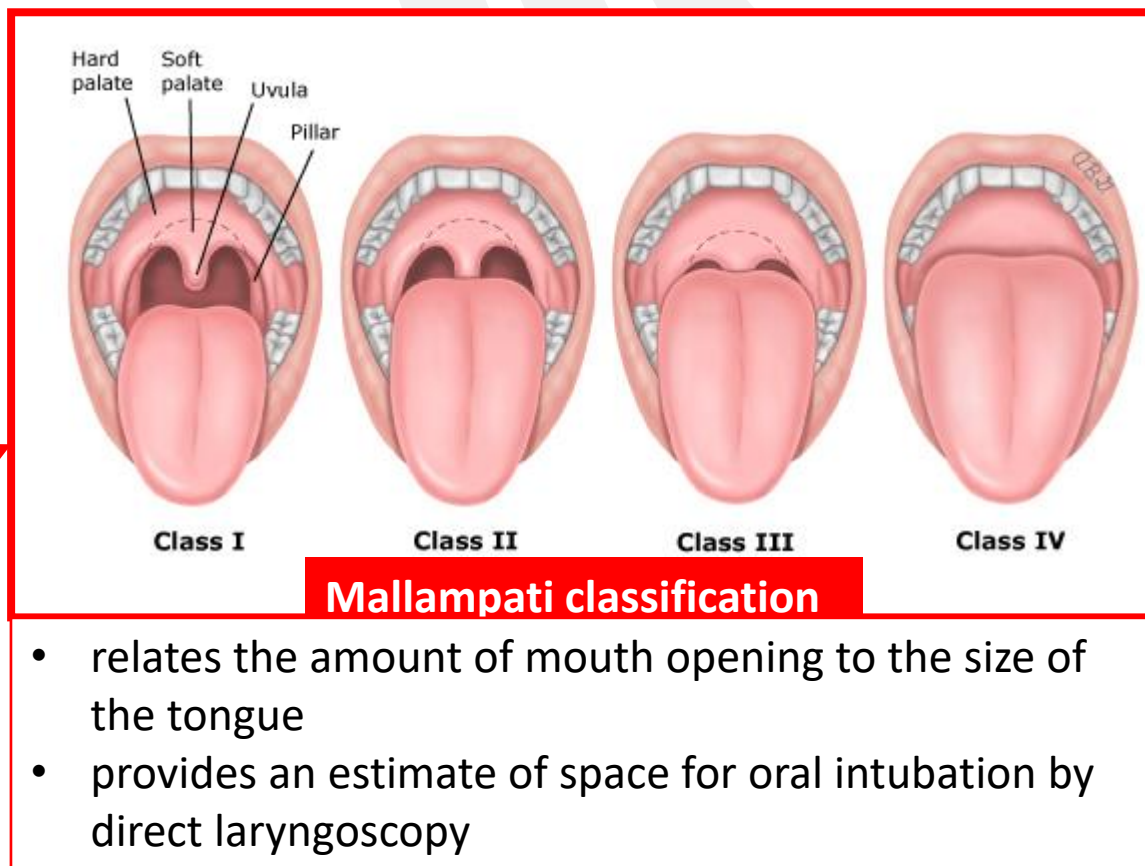
(B) Hyomental distance :  
**3 FB**  
Estimate of the volume of the submandibular space



(C) Thyroid to floor of mouth distance :  
**2 FB**  
Identifies the location of the larynx relative to the base of the tongue

# IDENTIFYING THE DIFFICULT AIRWAY

- **LEMON** mnemonic
- **L** : Look externally
- **E** : Evaluate 3-3-2
- **M** : Mallampati
- **O** : Obstruction  
/Obesity
- **N** : Neck mobility

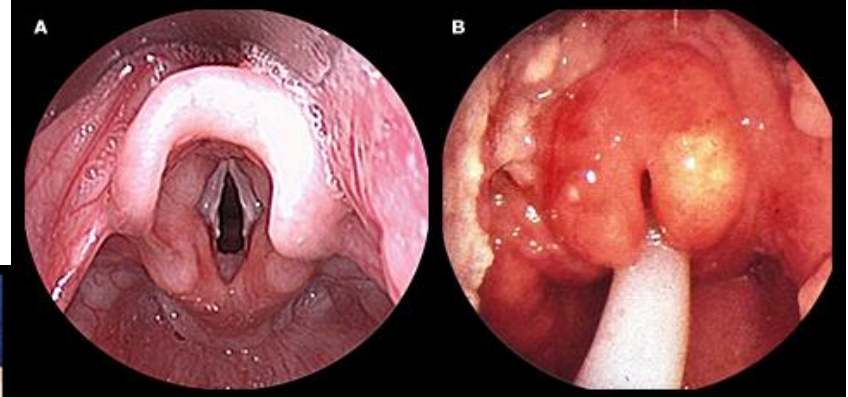
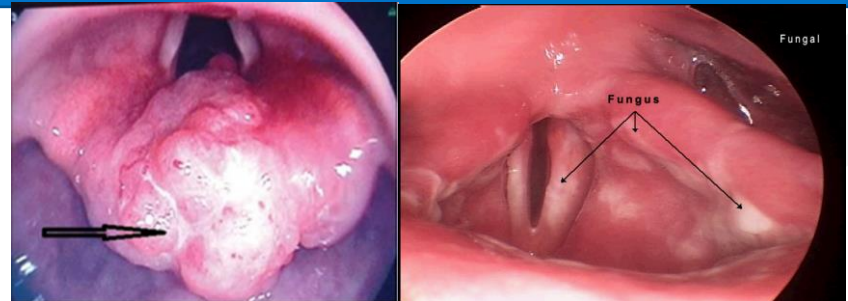




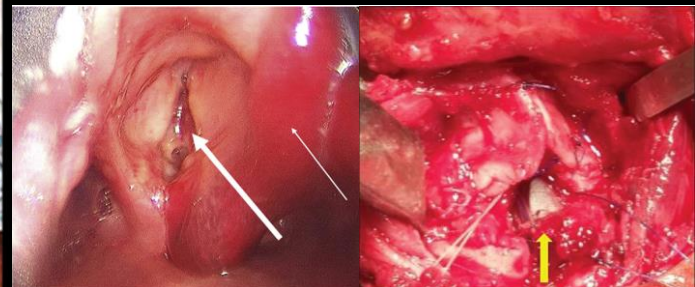
# IDENTIFYING THE DIFFICULT AIRWAY

- **LEMON** mnemonic
- **L** : Look externally
- **E** : Evaluate 3-3-2
- **M** : Mallampati
- **O** : Obstruction/Obesity
- **N** : Neck mobility

- The presence of upper airway obstruction
  - Trauma, Tumor, Infection



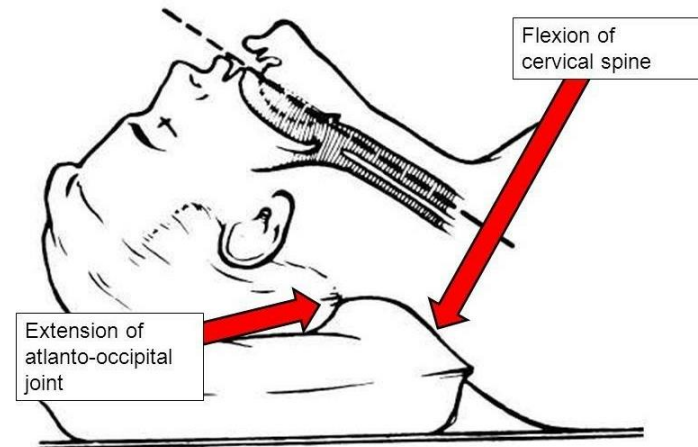
- The obese patient



# IDENTIFYING THE DIFFICULT AIRWAY

- **LEMON** mnemonic
- **L** : Look externally
- **E** : Evaluate 3-3-2
- **M** : Mallampati
- **O** : Obstruction/Obesity
- **N** : Neck mobility

The sniffing position for intubation



- Psoriatic or rheumatoid arthritis
- Ankylosing spondylitis
- Degenerative joint disease : c-spondylosis
- Trauma : C-spine injury

# 1. MANUAL AIRWAY MANEUVERS : HEAD-TILT/CHIN-LIFT MANEUVER



Blocked Airway



Open Airway



# 1. MANUAL AIRWAY MANEUVERS : JAW-THRUST MANEUVER



# 1. MANUAL AIRWAY MANEUVERS : C-SPINE INJURY PATIENT

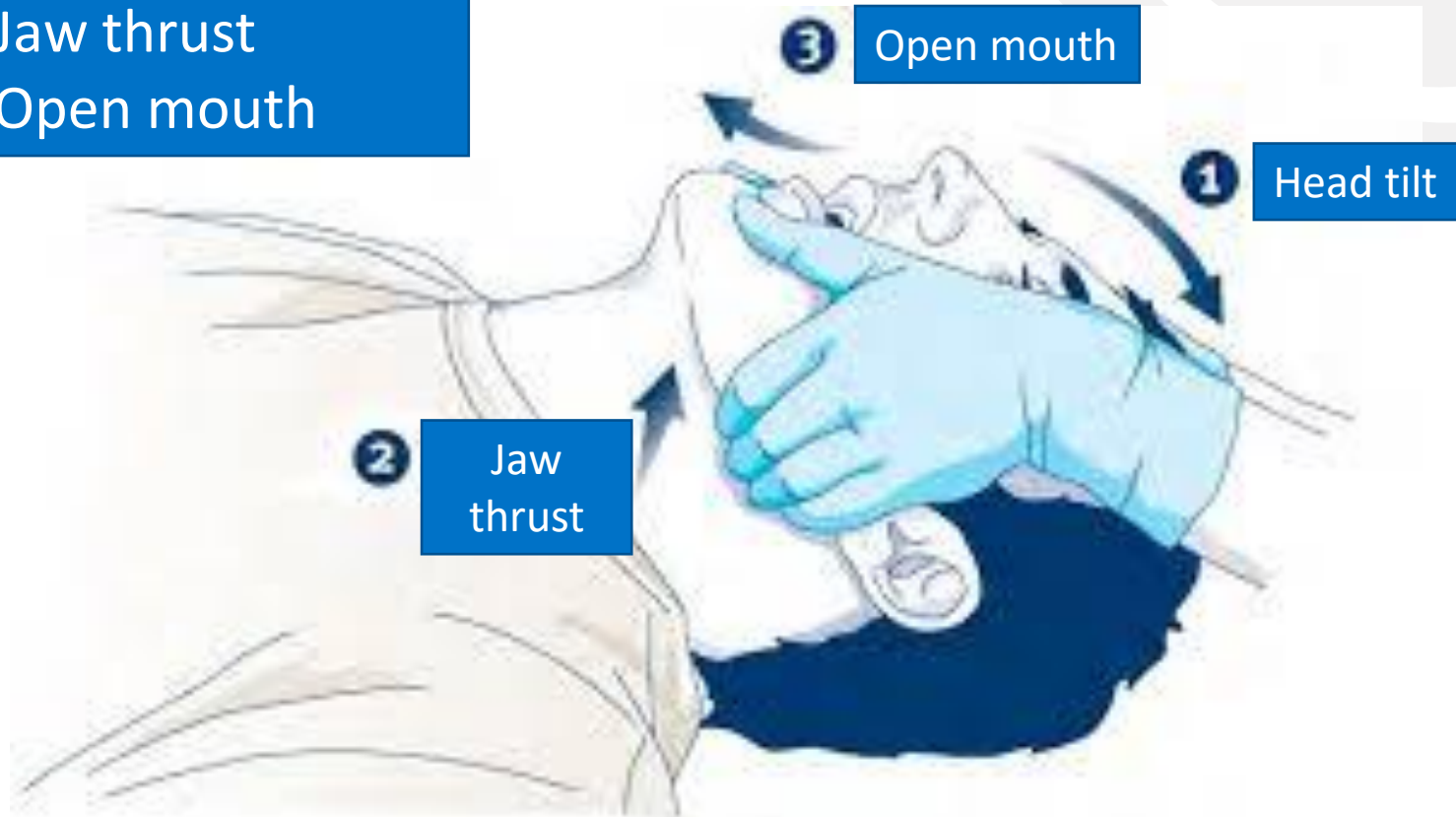
Jaw thrust



trauma chin-lift

# 1. MANUAL AIRWAY MANEUVERS : TRIPLE AIRWAY MANEUVER

1. Head tilt
2. Jaw thrust
3. Open mouth

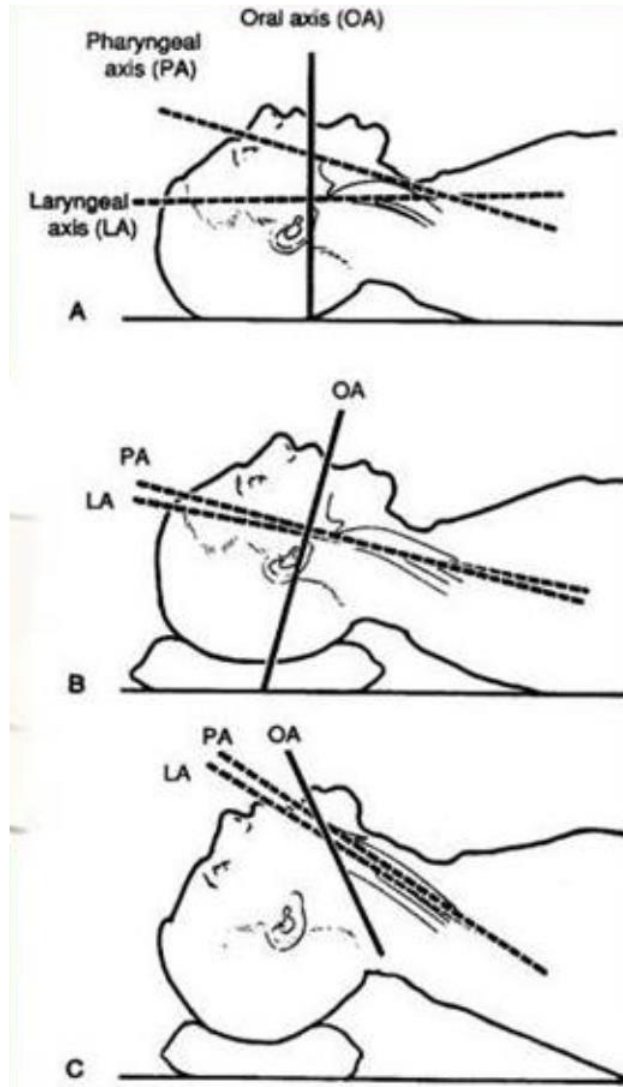
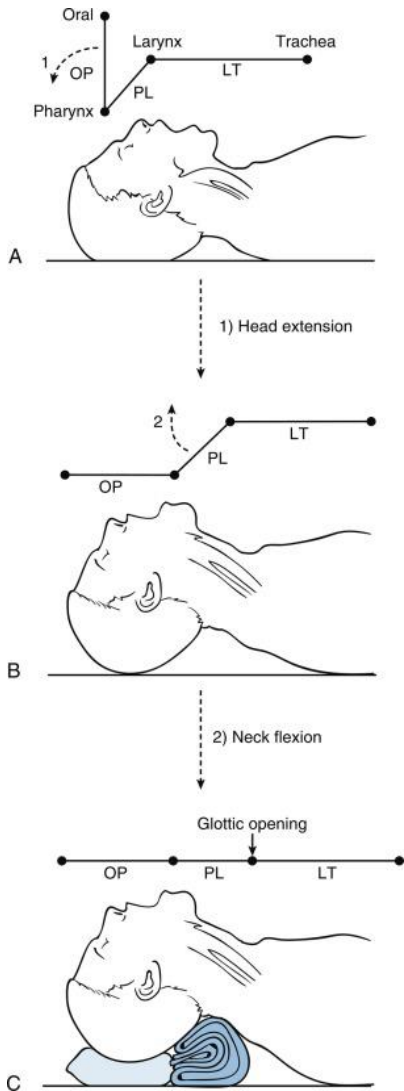




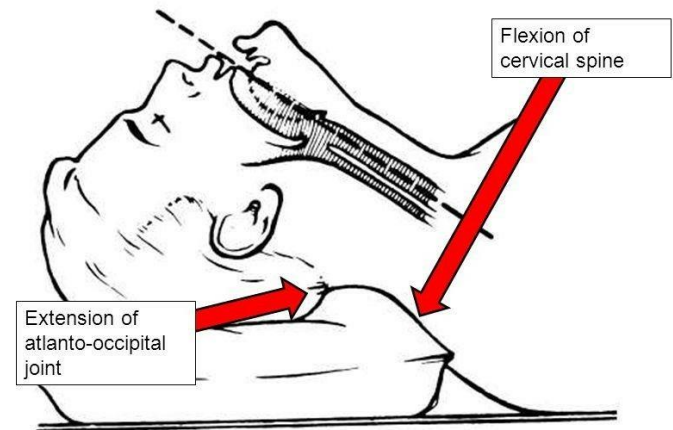
# 1. MANUAL AIRWAY MANEUVERS

## :PATIENT POSITIONING

- “sniffing position”
  - A combination of
    - Head extension
    - Neck flexion



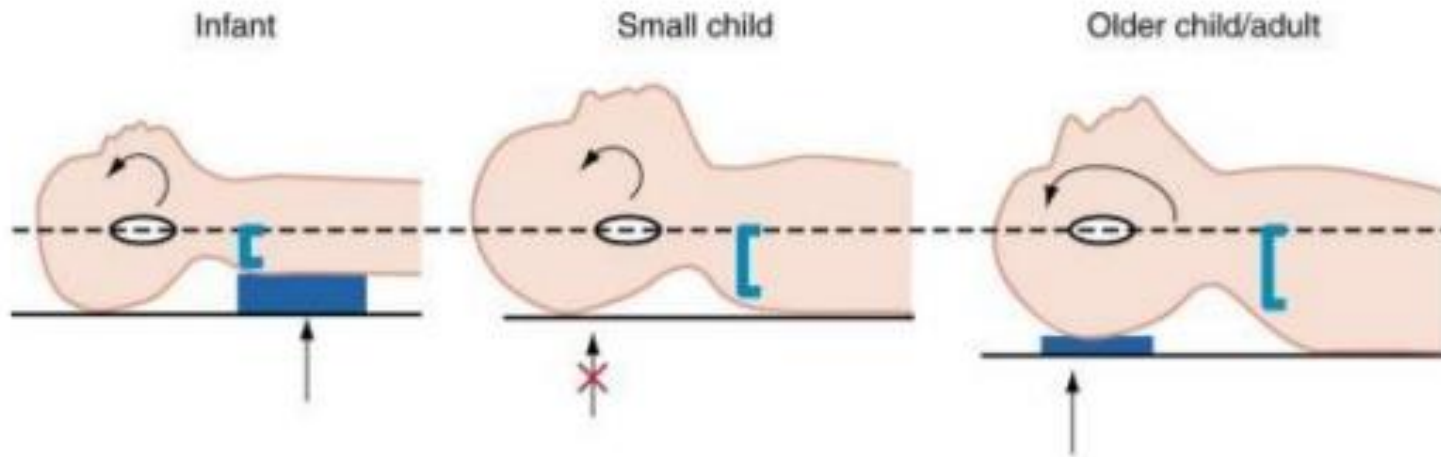
Sniffing Position



OA : Oral axis  
 PA : Pharyngeal axis  
 LA : Laryngeal axis

# 1. MANUAL AIRWAY MANEUVERS :PATIENT POSITIONING

## Sniffing Position or “Ear to Sternal Notch”



---○--- Key to optimal individual patient position—Line traversing external auditory canal crossing anterior to the shoulders

■ Support for the occiput in the older child/adult and the shoulders in the infant

↪ Extension of the head in the infant and small child

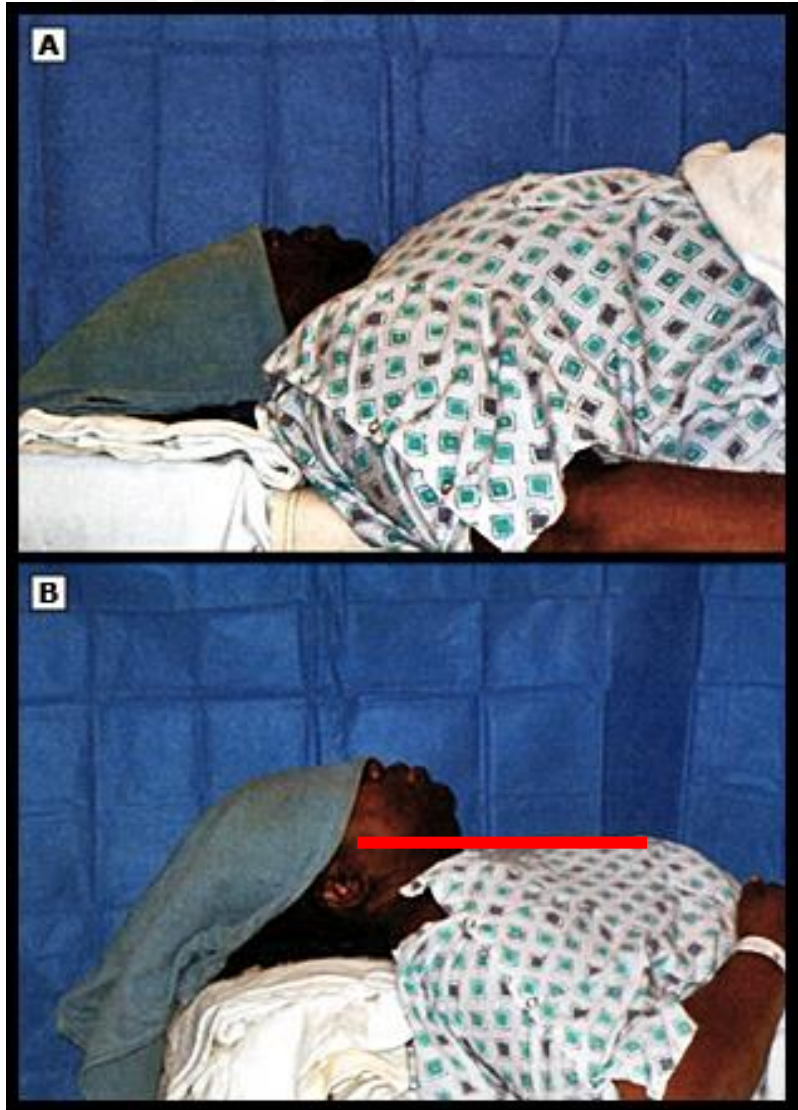
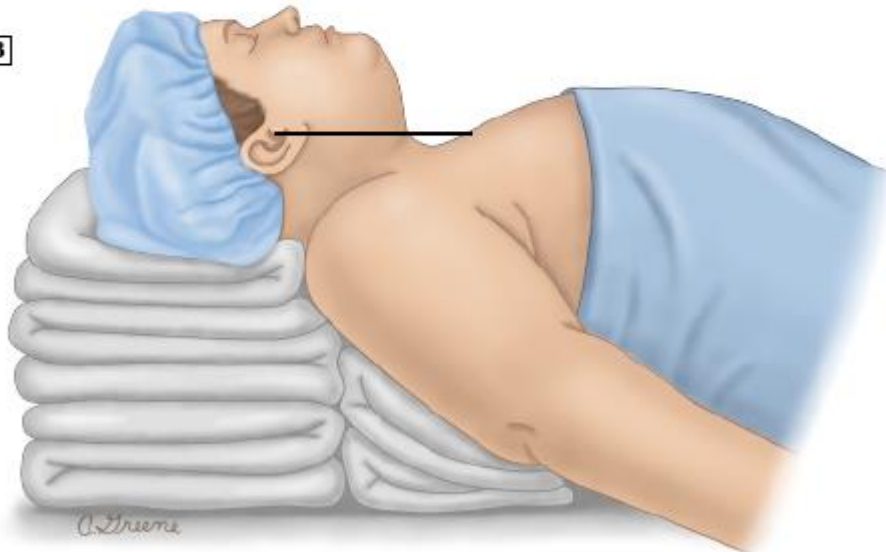
↪ Hyperextension of the head in the older child or adult

# RAMP POSITION

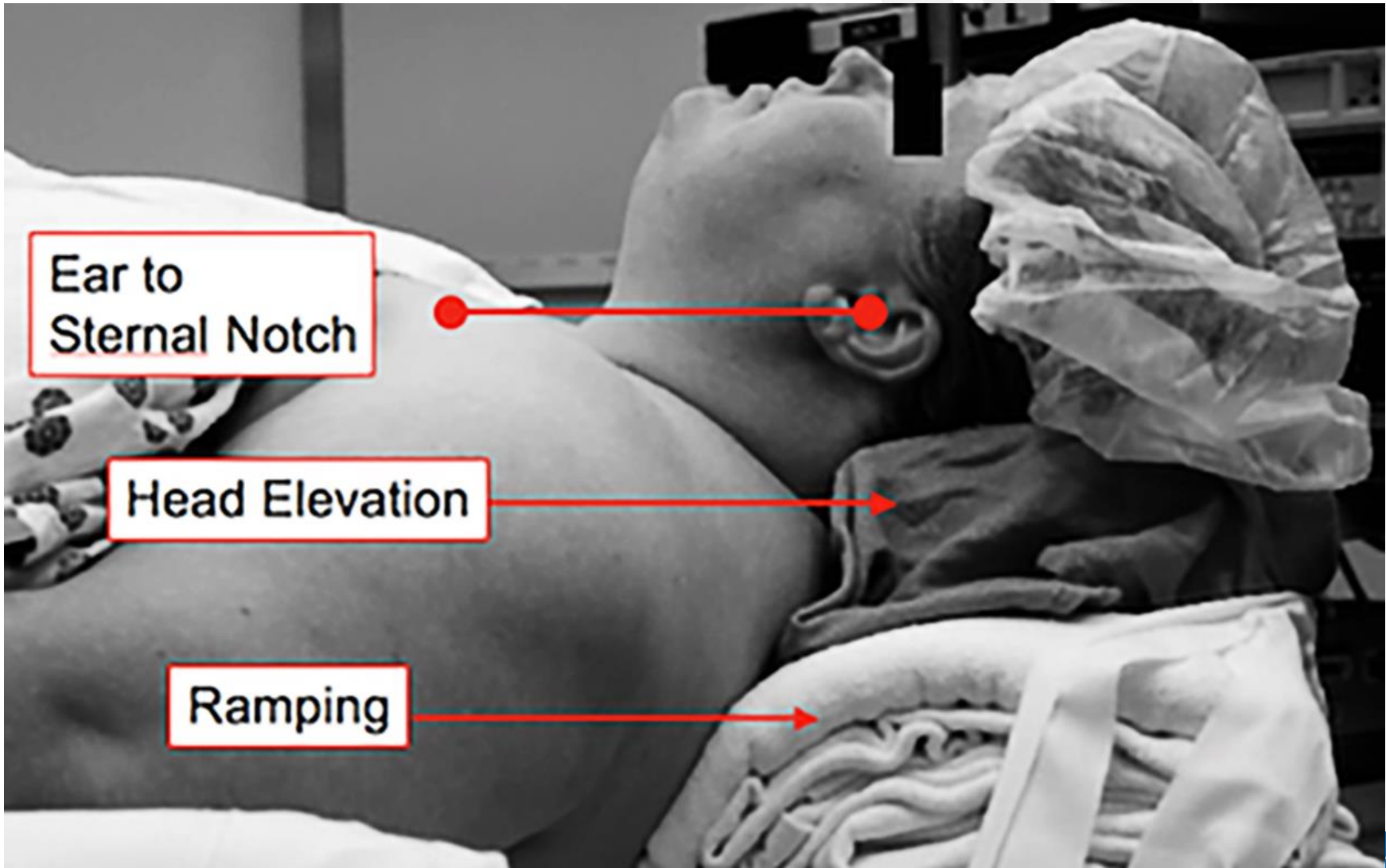
A



B



# RAMP POSITION





# 1. MANUAL AIRWAY MANEUVERS : SUCTIONING

- rigid suction



## 2. ADJUNCT AIRWAYS : OROPHARYNGEAL AIRWAY



## 2. ADJUNCT AIRWAYS : OROPHARYNGEAL AIRWAY



### Indications :

- To maintain open airway
- Prevent ET tube occlusion
- Prevent tongue bite
- Facilitate suction
- Conduit for passing devices into oropharynx
- Obtain a better mask fit

### Contraindications :

- Intact gag reflex

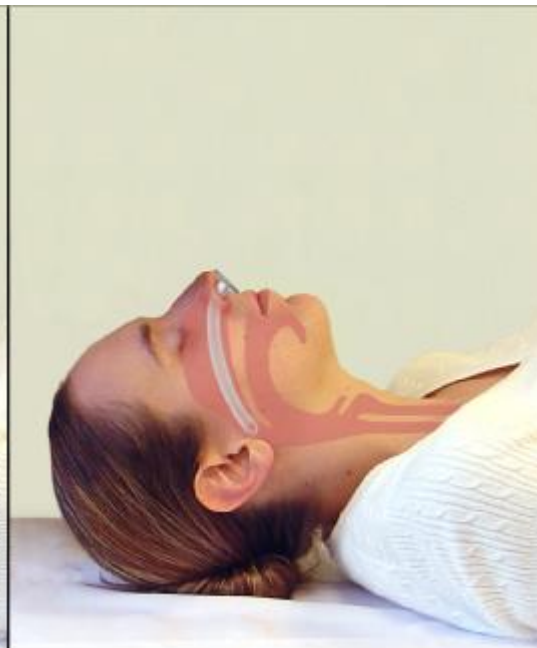
### Complications :

- N/V
- Laryngospasm
- Airway obstruction due to improper size



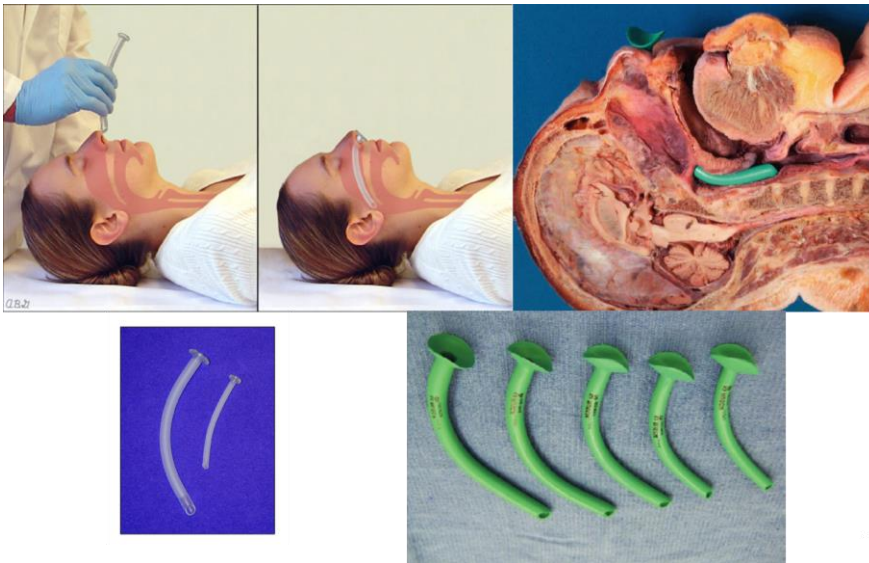


## 2. ADJUNCT AIRWAYS : NASOPHARYNGEAL AIRWAY





## 2. ADJUNCT AIRWAYS : NASOPHARYNGEAL AIRWAY



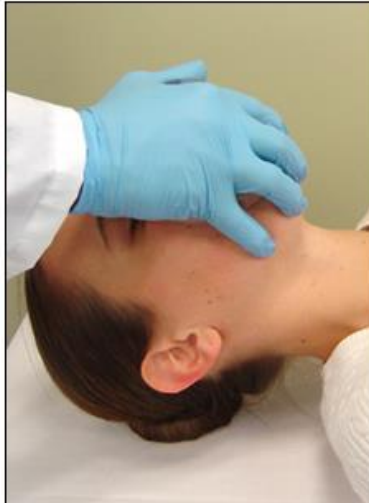
Female size : ID 6 mm

Male size : ID 7 mm

- Indications :
  - Consciousness but cannot open mouth
  - Altered mental status with an intact gag reflex
- Contraindications:
  - Patient intolerance
  - Facial fracture or skull fracture
- Advantages:
  - Suctioned through
  - Patent airway
  - Tolerated by responsive patients
  - Can be place “blindly”
  - No requirement for the mouth to be open
- Disadvantages :
  - Improper technique may result in severe bleeding
  - Does not protect from aspiration

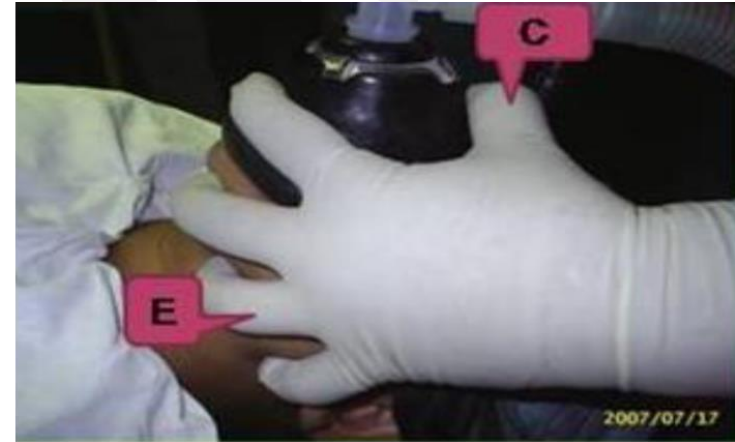
# 3. BAG-MASK VENTILATION

## C-E technique



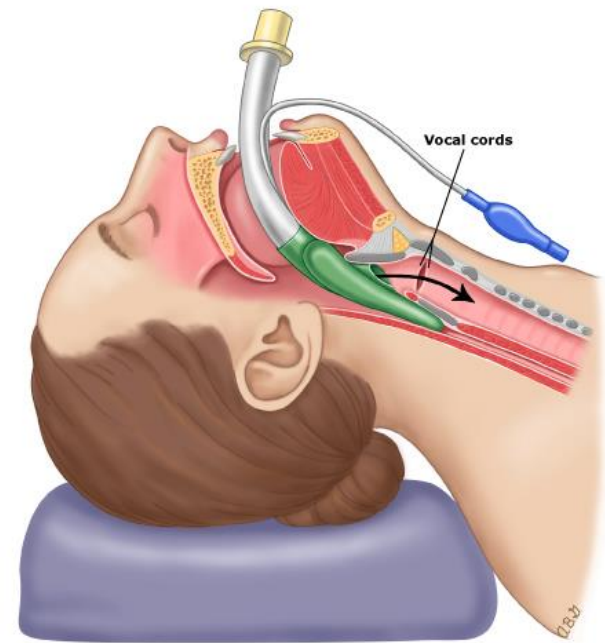
### 3. BAG-MASK VENTILATION : DIFFICULT BAG-MASK VENTILATION

- **ROMAN** mnemonic
  - **R**adiation (head and neck)/**R**estriction (poor lung compliance)
  - **O**besity/**O**bstruction (upper airway)/**O**bstructive sleep apnea
  - **M**ask seal/**M**allampati/**M**ale
  - **A**ge over 55 years
  - **N**o teeth



# 4. EXTRAGLOTTIC AIRWAY DEVICES

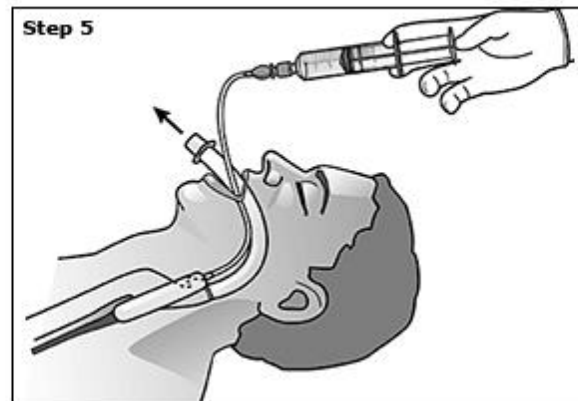
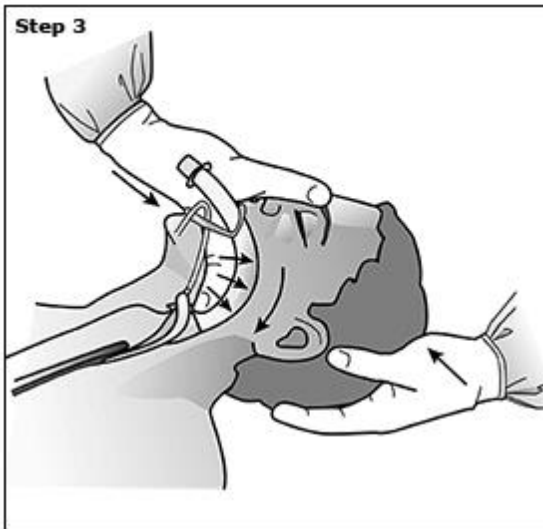
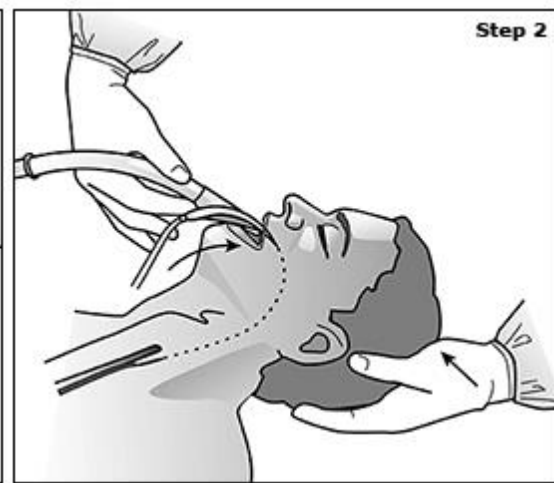
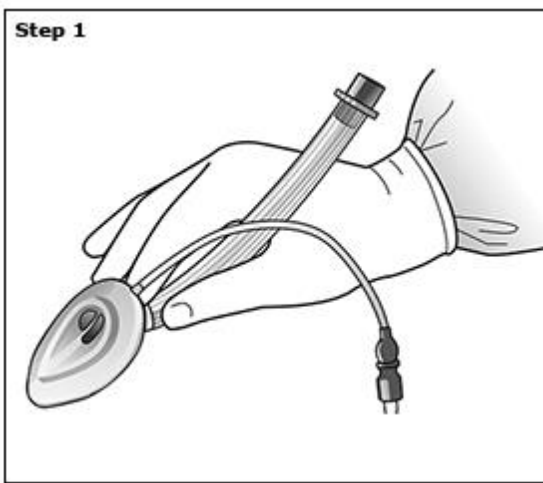
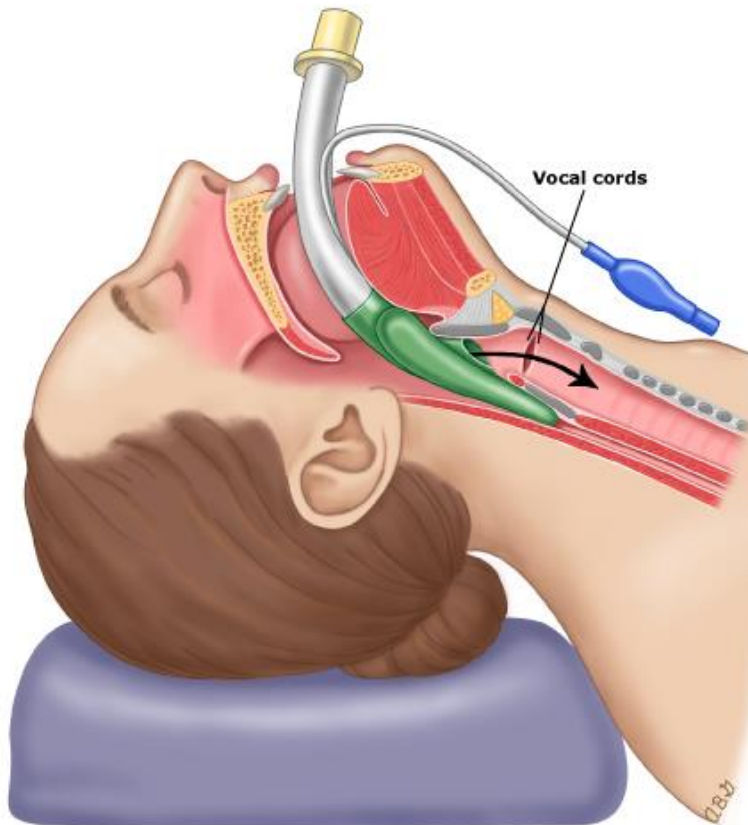
- Laryngeal Mask Airways (LMA)



น้ำหนัก(kg)	ขนาดของ LMA	Cuff volume สูงสุด (ml)
<5	1	4
5-10	1.5	7
10-20	2	10
20-30	2.5	14
30-50	3	20
50-70	4	30
70-100	5	40
>100	6	50

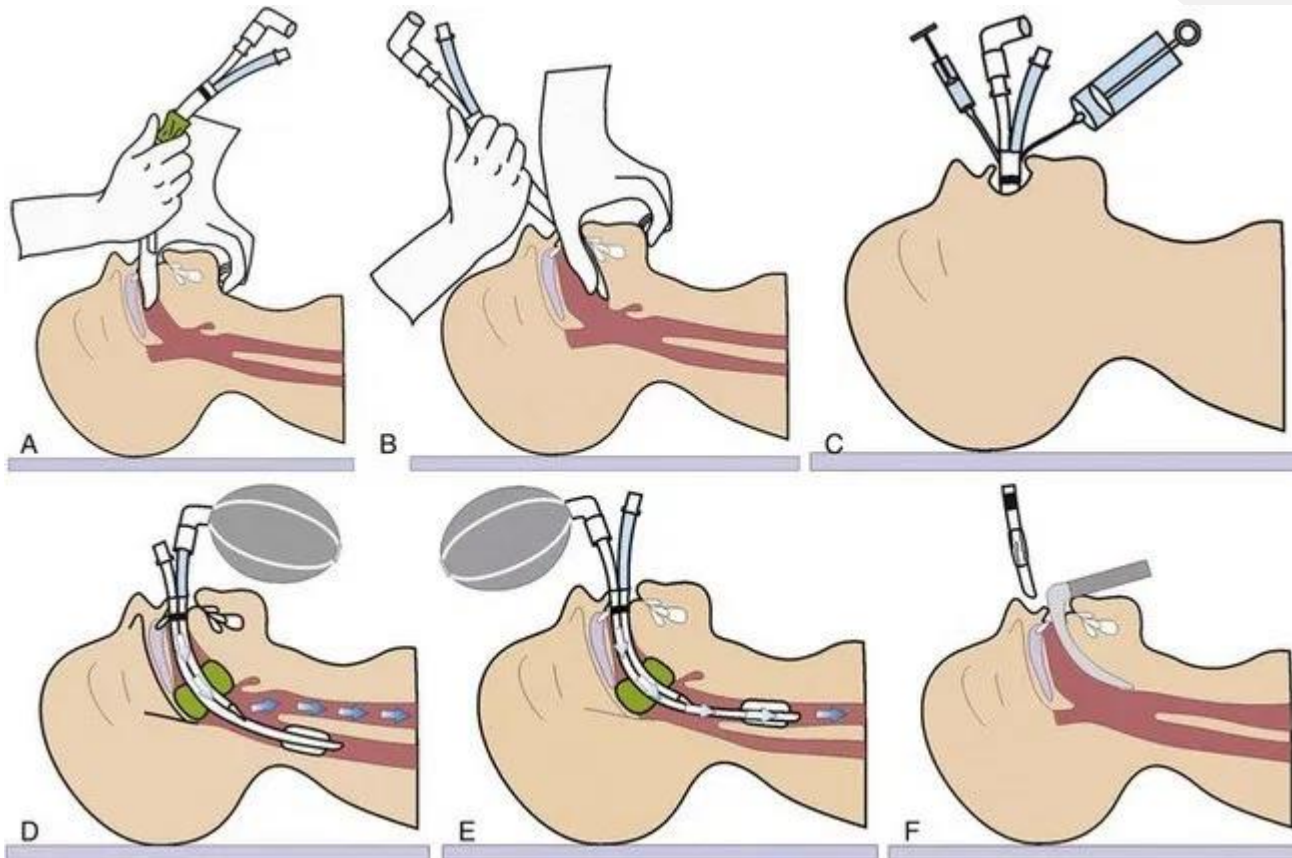


# 4. EXTRAGLOTTIC AIRWAY DEVICES



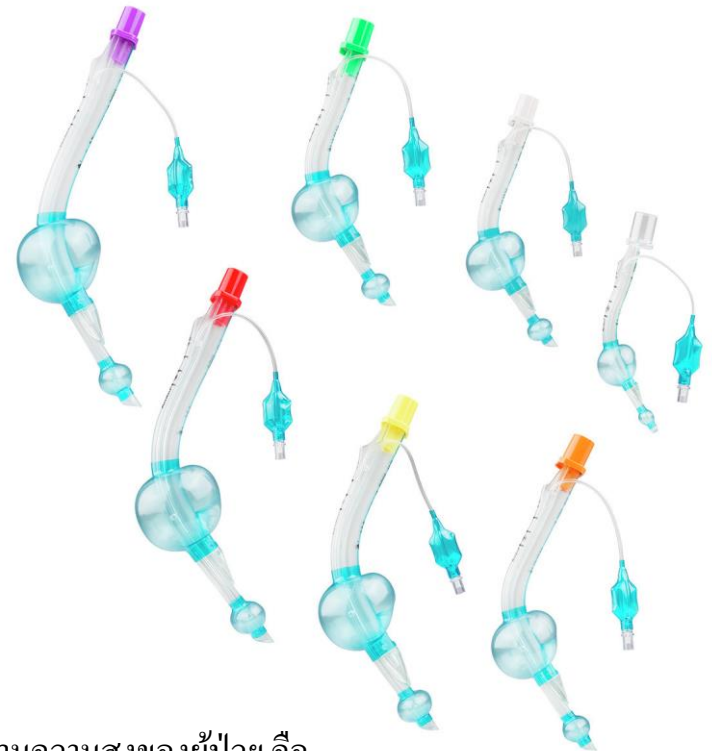
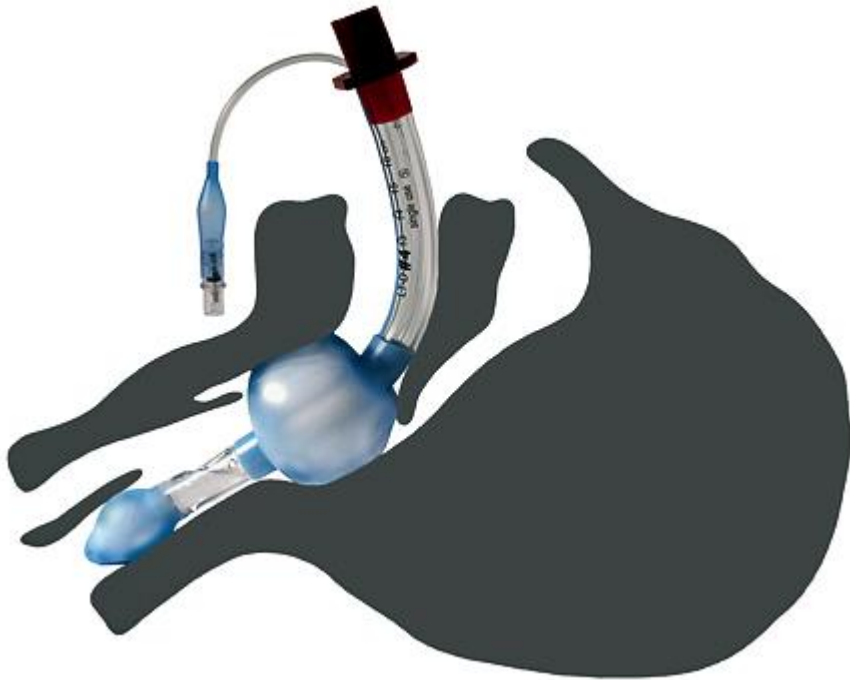
# 4. EXTRAGLOTTIC AIRWAY DEVICES

- Esophageal-tracheal Combi-tube



## 4. EXTRAGLOTTIC AIRWAY DEVICES

- King laryngeal tube (King LT™)

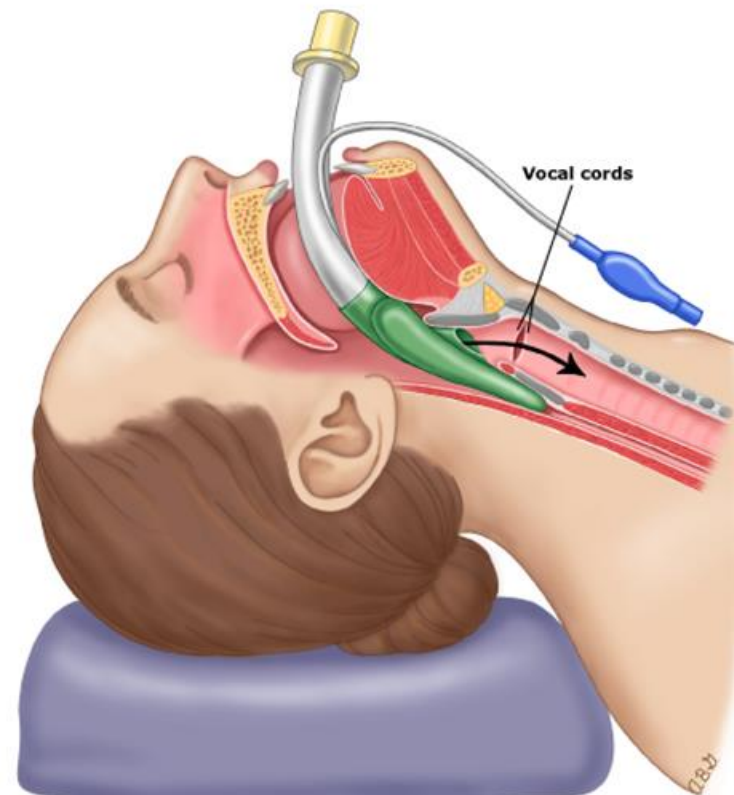


เลือกขนาดที่ใส่ตามความสูงของผู้ป่วย คือ

- ส่วนสูง 4-5 ฟุต ใช้ size 3 สีเหลือง
- ส่วนสูง 5-6 ฟุต ใช้ size 4 สีแดง
- ส่วนสูง > 6 ฟุต ใช้ size 5 สีม่วง

# DIFFICULT EXTRAGLOTTIC DEVICES

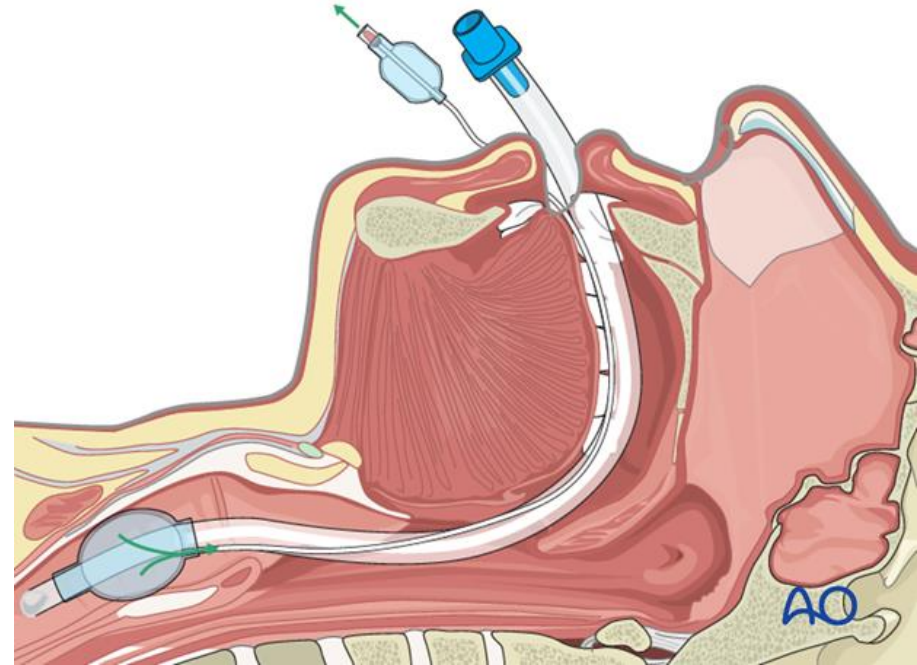
- **RODS** mnemonic
  - **R**estricted **l**ungs (poor compliance) or **m**outh opening
  - **O**bstruction
  - **D**isrupted or distorted airway
  - **S**hort thyromental distance



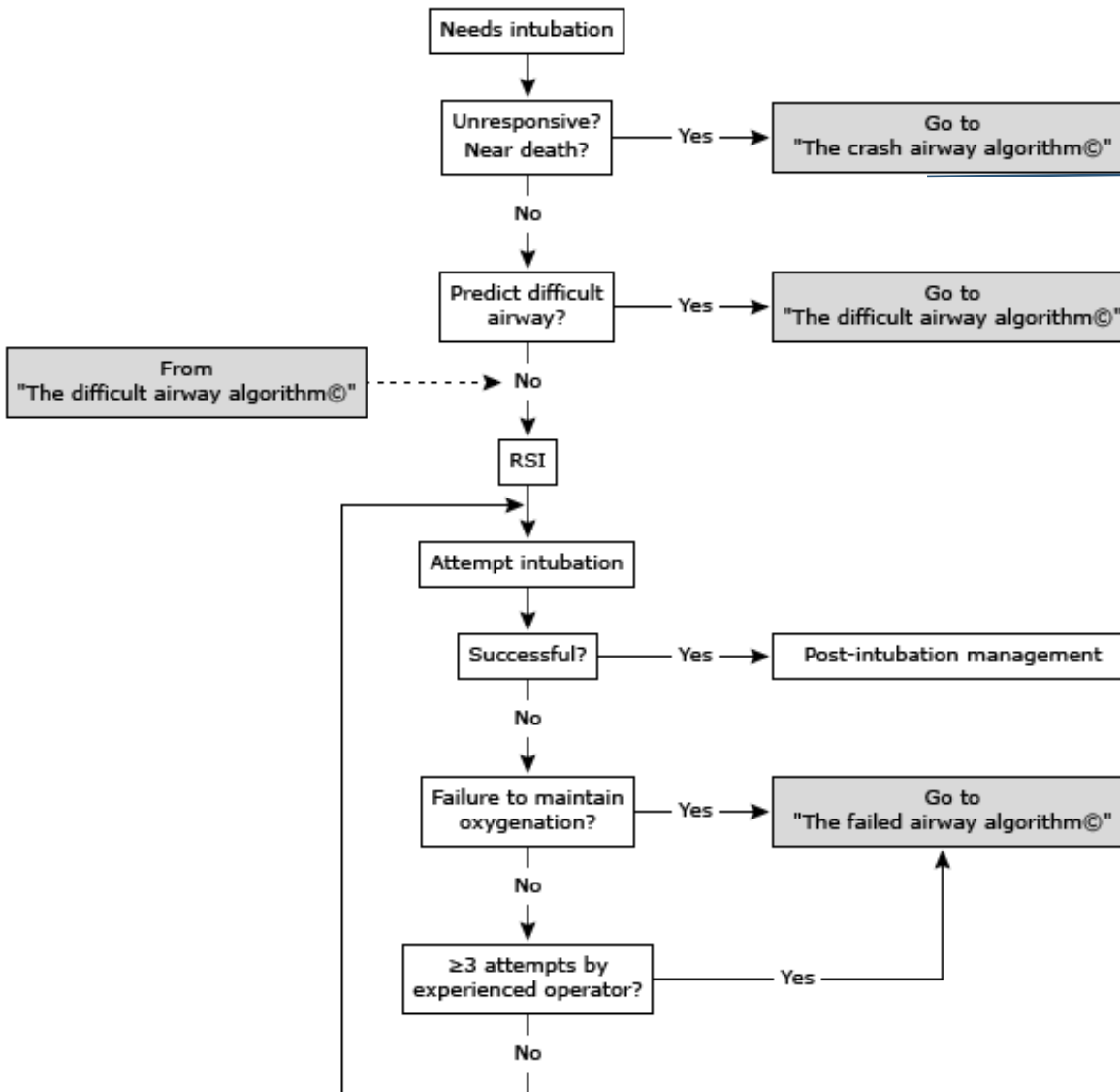


# 5. ENDOTRACHEAL TUBE INTUBATION

- Indications for endotracheal intubation
- **4 P**
  1. **P**ositive pressure ventilation
    - Unconsciousness, inadequate ventilation and oxygenation, general anesthesia
  2. **P**atent airway
    - Airway obstruction cannot solve by positioning or opened airway maneuver
  3. **P**rotect airway
    - Prevent aspiration due to unconsciousness, loss of airway reflex
  4. **P**ulmonary toilet
    - Promote : Suction secretion



# 5. ENDOTRACHEAL TUBE INTUBATION



## • The crash airway

- ลักษณะทางเดินหายใจในผู้ป่วยที่ไม่ตอบสนอง
- ผู้ป่วยเสี่ยงต่อภาวะหัวใจหยุดเต้นหรือเสียชีวิต
- ซึ่งต้องทำการใส่ท่อช่วยหายใจอย่างค่อนข้างเร่งด่วน

# 6. RAPID SEQUENCE INTUBATION (RSI)

- 1. **P**reparation
- 2. **P**re-oxygenation :
  - O<sub>2</sub> 100% 10 L/M, 3 -5 min or Deep breath 8 time/min, Keep SpO<sub>2</sub> >90%
- 3. **P**retreatment
  - Lidocaine 1.5 mg/kg IV : blunted airway reflex, decrease ICP
  - Fentanyl 3 µg/kg IV : prevent tachycardia in CAD
  - Atropine 0.02 mg/kg IV : prevent bradycardia
- 4. **P**aralysis with induction
- 5. **P**ositioning
- 6. **P**lacement with proof
  - Clinical assessment to confirm tube placement
  - Devices to confirm tube placement
    - Exhaled CO<sub>2</sub> Detectors
    - Ultrasonography
- 7. **P**ost intubation management

7P

Time
<b><u>Preparation</u></b> 10 minutes before intubation
<b><u>Preoxygenation</u></b> 5 minutes before intubation
<b><u>Pretreatment</u></b> 3 minutes before intubation (may be longer depending on necessary interventions and time available)
<b><u>Paralysis with induction</u></b>
<b><u>Positioning</u></b> 30 seconds after induction
<b><u>Placement with proof</u></b> 45 seconds after induction
<b><u>Post intubation management</u></b> 60 seconds after induction

# RSI : 1. PREPARATION





# Mnemonic for tracheal intubation preparation

## STOP MAID

**S:** Suction

**T:** Tools for intubation (laryngoscope blades, handle, video laryngoscope and other preferred devices)

**O:** Oxygen source for preoxygenation and ongoing ventilation

**P:** Positioning

**M:** Monitors, including ECG, pulse oximetry, blood pressure, EtCO<sub>2</sub>, and esophageal detectors

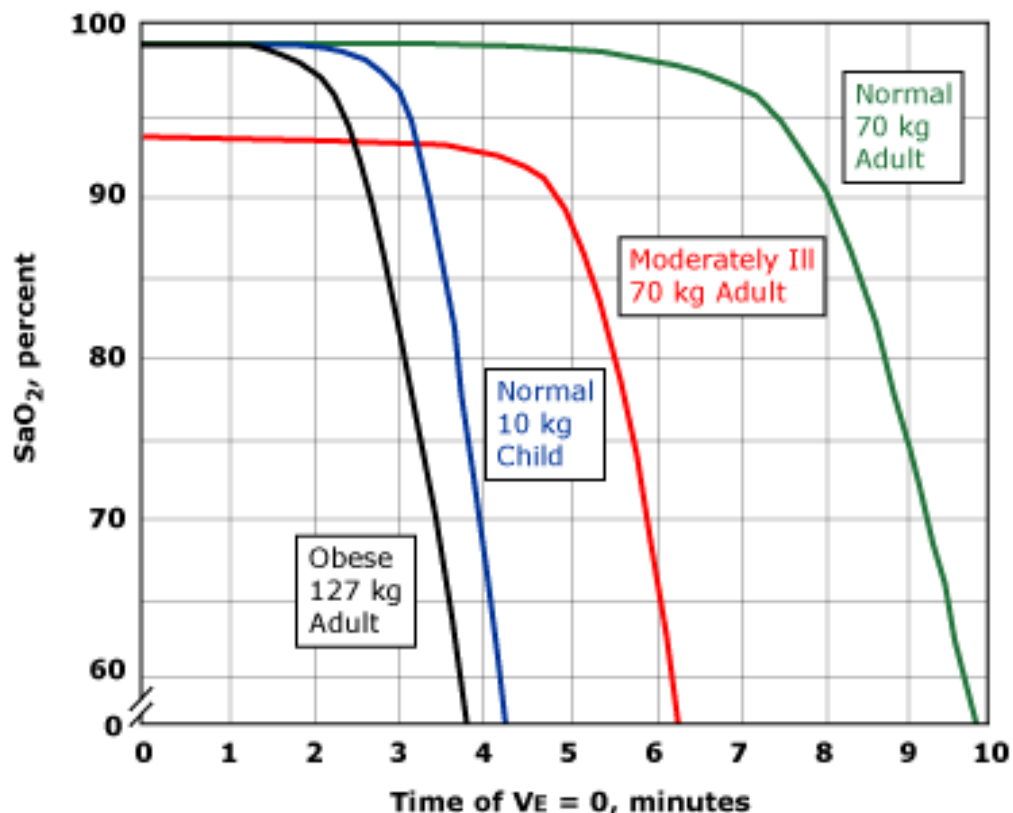
**A:** Assistant; Ambu bag with face mask; Airway devices (ETTs, syringe, stylets, LMA); Airway assessment

**I:** Intravenous access

**D:** Drugs, including induction agent, neuromuscular blocking agent, and desired adjuncts (eg, IV fluids, vasopressor, fentanyl)

# RSI : 2. PREOXYGENATION :

O2 100% 10 L/M, 3 min or Deep breath 8 time/min, Keep SpO2 >90%



- Healthy 70-kg male: 6 to 8 minutes
- Young children (10 kg): <4 minutes
- Adults with chronic illness or obesity: <3 minutes
- Women at near full-term pregnancy: <3 minutes

Mean time to recovery of twitch height  
from 1 mg/kg succinylcholine IV

SaO <sub>2</sub> , percent	10	50	90
Time of VE = 0, minutes	6.8	8.5	10.2

### 3. PRETREATMENT

- Lidocaine 1.5 mg/kg IV :
  - Blunted airway reflex, decrease ICP
- Fentanyl 3  $\mu$ g/kg IV :
  - Blunted sympathetic response (prevent tachycardia) in CAD
- Atropine 0.02 mg/kg IV :
  - Prevent bradycardia

# Rapid sequence intubation induction agents for adults

Drug name	Class	Benefits	Contraindications	Notes	Dose
Etomidate	Imidazole derivative	Excellent sedation with little hypotension	Known to suppress adrenal cortisol production	Use cautiously if patient has sepsis; initial dose of glucocorticoid may be needed	0.3 mg/kg
Ketamine	Phencyclidine derivative, dissociative anesthetic	Stimulates catecholamine release Bronchodilation	Use in patients with elevated ICP or elevated blood pressure is controversial	May be an excellent induction agent for patients with bronchospasm, septic shock, <b>AND</b> hemodynamic compromise	1 to 2 mg/kg
Midazolam	Benzodiazepines	Potent dose-related amnesic properties	Dose-related myocardial depression can result in hypotension	Frequently underdosed	0.2 to 0.3 mg/kg
Propofol	Alkylphenol derivative	Bronchodilation	No absolute contraindications Dose-related hypotension		1.5 to 3 mg/kg
Thiopental sodium	Ultrashort-acting barbiturate	Cerebroprotective and anti-convulsive properties	Potent venodilator and myocardial depressant; can cause hypotension Relatively contraindicated in reactive airway disease due to histamine release Acute intermittent and variegate porphyrias	May not be commercially available. Rarely used.	3 to 5 mg/kg



# RSI : 4. Paralysis with induction

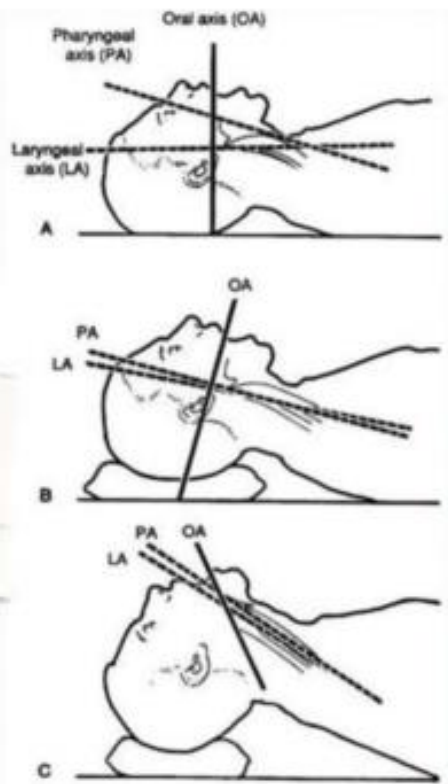
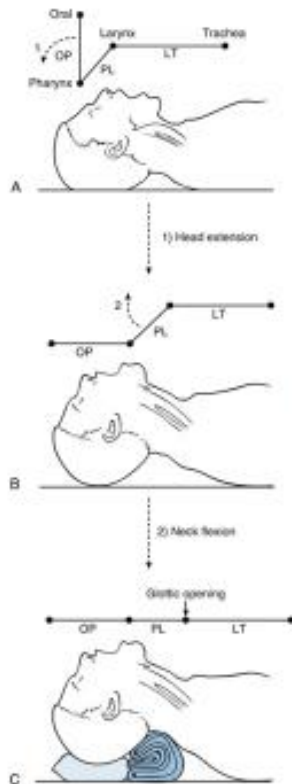
Clinical scenario	Induction agent*	Neuromuscular blocking agent* <sup>¶</sup>	Physiologic optimization (including pre-induction medications) <sup>Δ</sup>
Elevated ICP (head injury, stroke)	Etomidate 0.3 mg/kg IV or ketamine 1 to 2 mg/kg IV (avoid ketamine if signs of cerebral herniation; ketamine preferred in patients with severe hypotension)	rocuronium 1 to 1.2 mg/kg IV	May give fentanyl 3 mcg/kg IV over 30 to 60 seconds, if time permits and patient is not in shock, for conditions exacerbated by rise in ICP (eg, acute brain injury, ischemic stroke, intracranial hemorrhage, meningitis, encephalitis, cerebral edema)
Cardiovascular emergency excluding cardiogenic shock (ACS, aortic dissection)	Etomidate	Succinylcholine or rocuronium	May give fentanyl 3 mcg/kg IV over 30 to 60 seconds, if time permits
Shock	Ketamine or etomidate (reduce dose by half for cardiogenic shock; ketamine preferred by some for septic shock)	Succinylcholine 2 mg/kg IV or rocuronium	<ul style="list-style-type: none"> <li>•Pre-RSI management depends on cause and may include: Hypovolemic shock: Isotonic IVF bolus</li> <li>•Hemorrhagic shock: Blood transfusion</li> <li>•Septic shock: Isotonic IVF bolus; vasopressor (norepinephrine)</li> </ul>
<b>Reactive airway disease</b>			
Stable blood pressure	Ketamine or propofol 1.5 to 2 mg/kg IV	Succinylcholine or rocuronium	Pre-RSI management may include NPPV, heliox, high-flow oxygen (in addition to albuterol and other standard medical therapy)
Hypotensive/unstable	Ketamine or etomidate	Succinylcholine or rocuronium	
Prolonged seizure activity	Propofol or etomidate	Succinylcholine preferred (rocuronium may be used if EEG monitoring immediately available)	
Geriatric patient	Etomidate preferred (reduce dose by half if frail, hypotensive, or significant comorbidity)	Succinylcholine or rocuronium	Physiologic optimization may include isotonic IVF bolus, blood transfusion, and/or vasopressor (norepinephrine) infusion for hypotensive patients or those at risk of hypotension with RSI

# Succinylcholine is contraindicated with:

- Hyperkalemia :
  - Neuromuscular disease with denervation
  - Muscular dystrophy
  - Stroke > 72 hours
  - Significant burn > 72 hours
  - Rhabdomyolysis
  - Hyperkalemia with ECG change
  - Malignant hyperthermia (patient or family history)
- Increase pressure in close space :
  - intracranial, intraocular

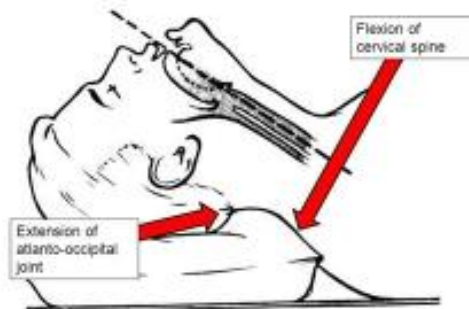
# RSI : 5. POSITIONING

## 1. MANUAL AIRWAY MANEUVERS :PATIENT POSITIONING



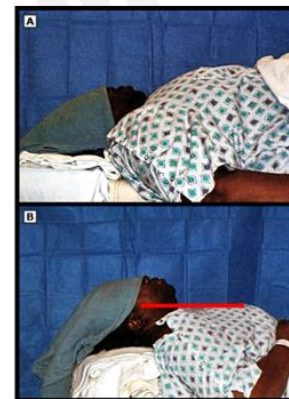
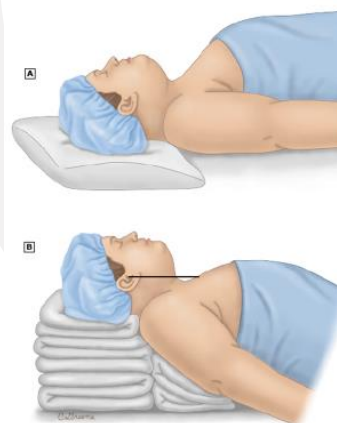
- “sniffing position”
  - A combination of
    - Head extension
    - Neck flexion

Sniffing Position



OA :Oral axis  
PA : Pharyngeal axis  
LA : Laryngeal axis

### RAMP POSITION

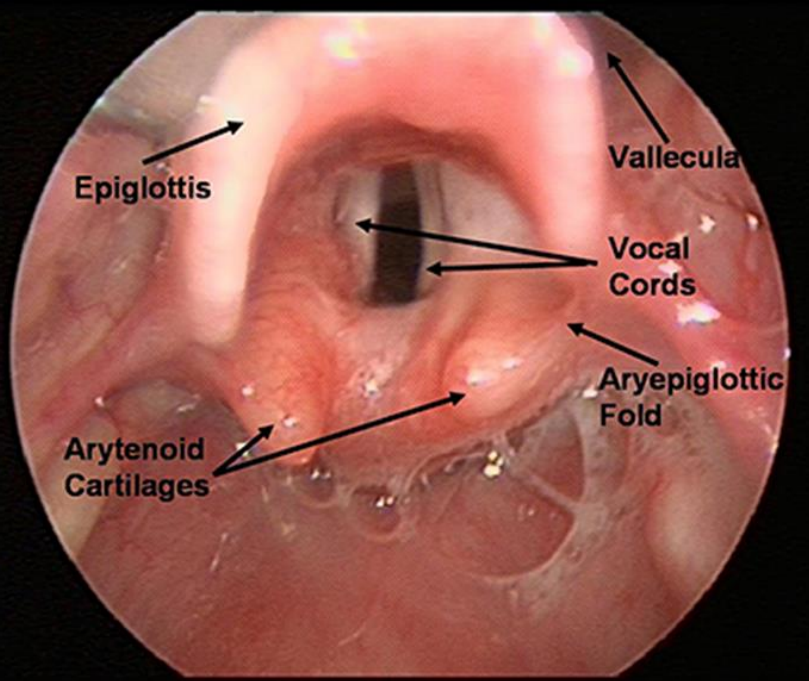
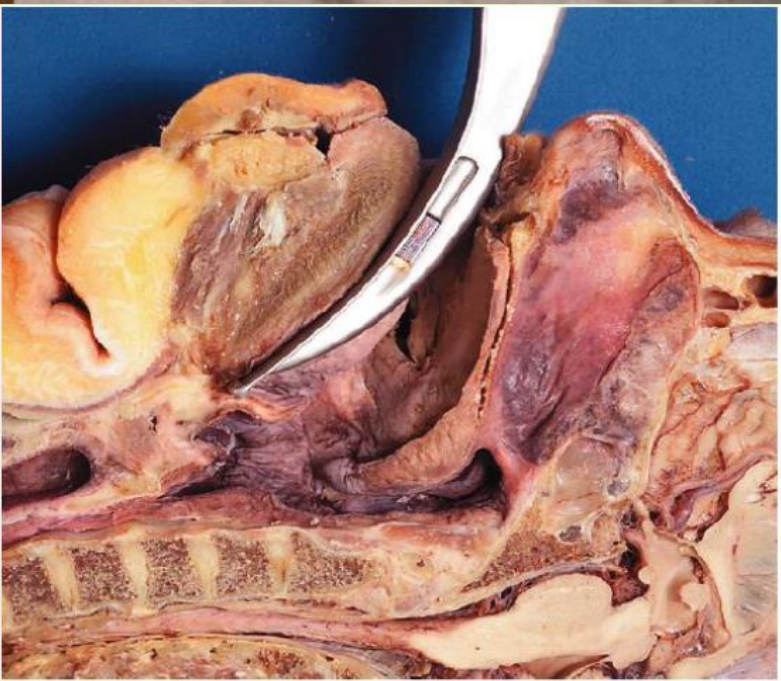
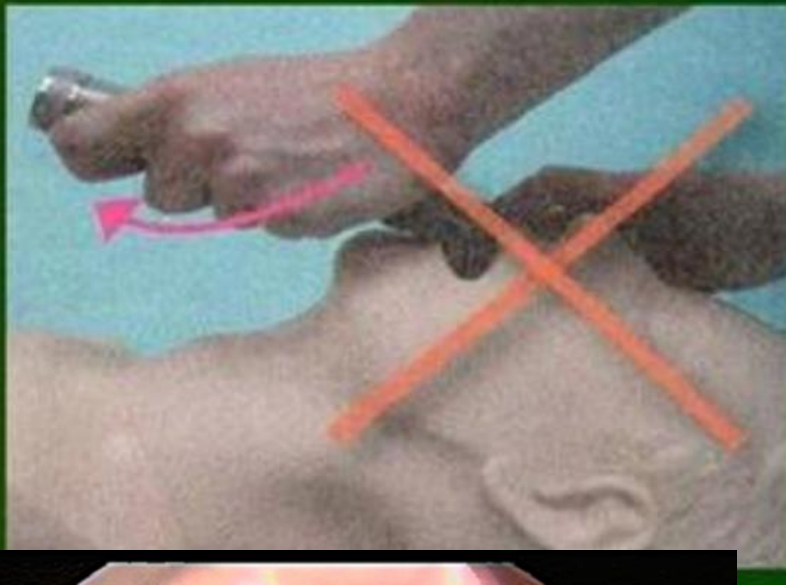
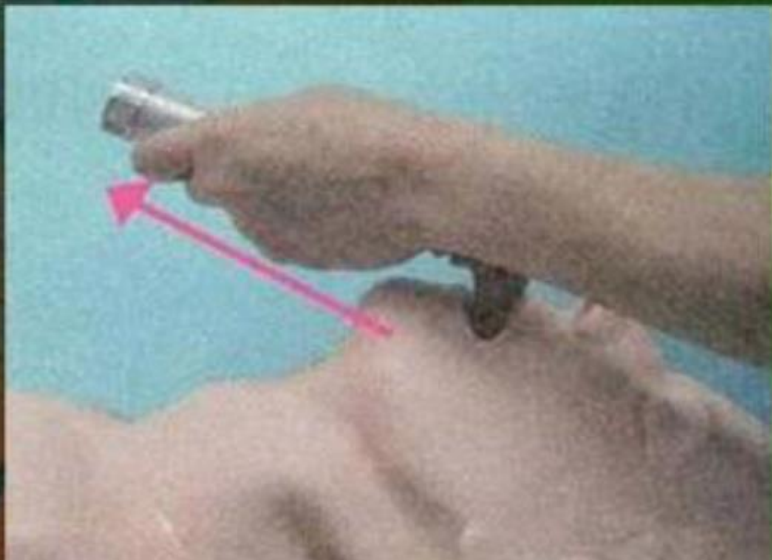


# RSI : 6. PLACEMENT WITH PROOF

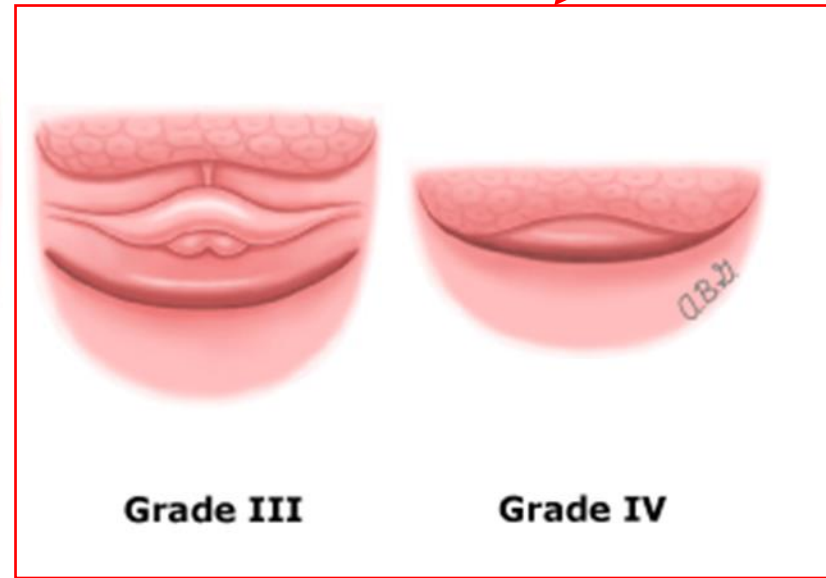
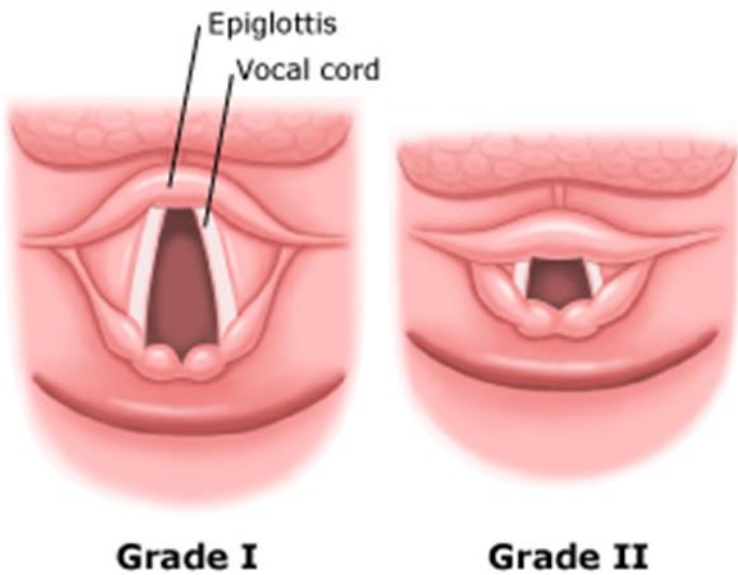
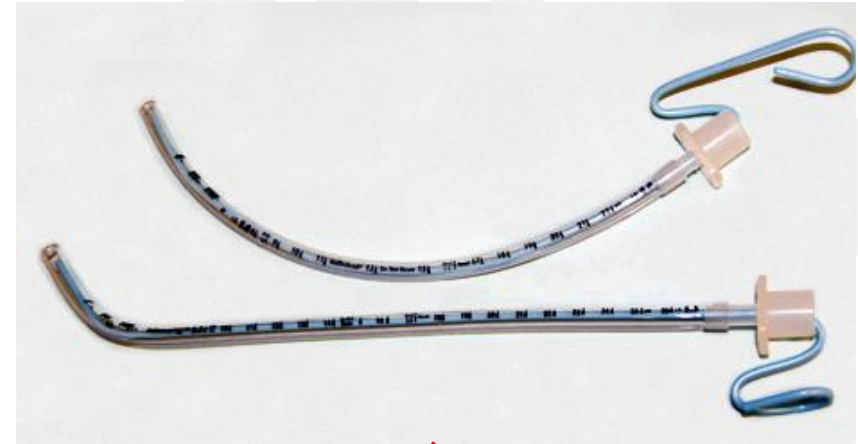
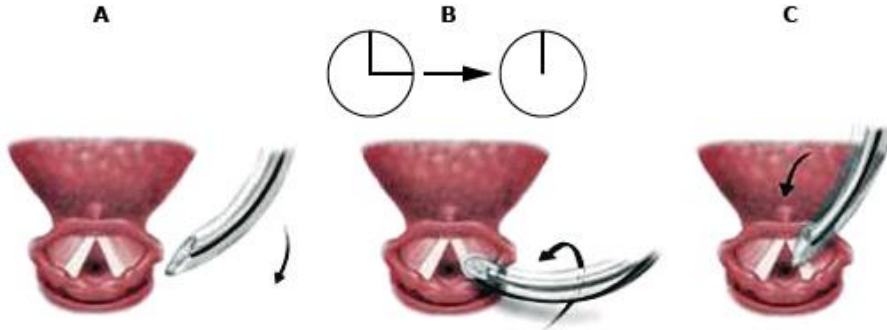




# LIFTING UP A LARYNGOSCOPE:

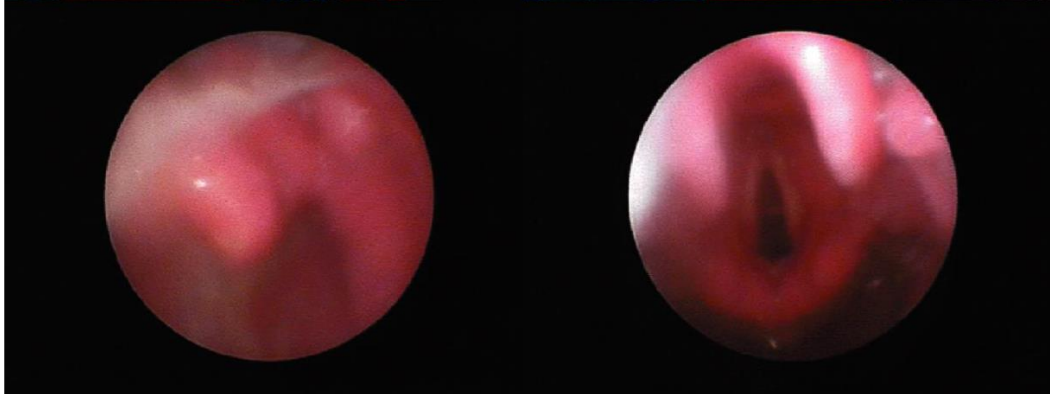


# RSI : 6. PLACEMENT WITH PROOF





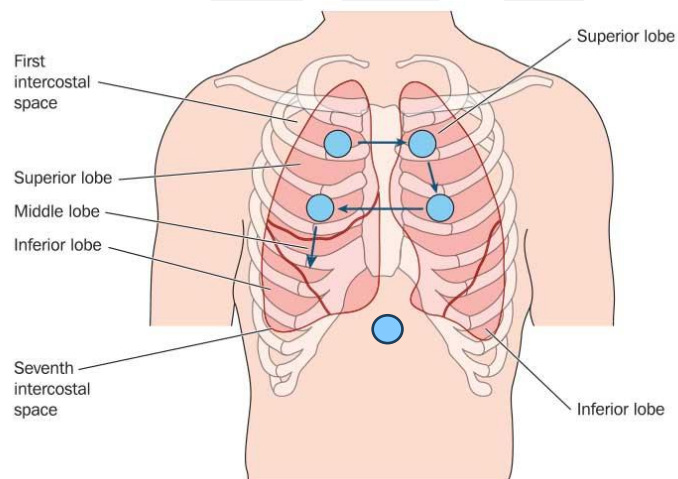
# RSI : 6. PLACEMENT WITH PROOF



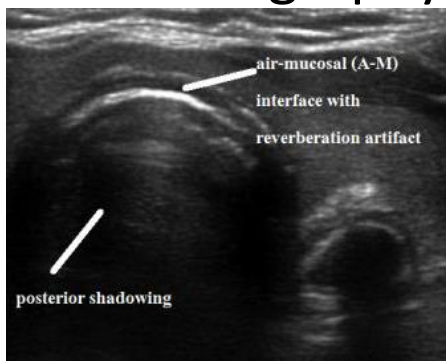
**BURP** Maneuver :  
Backward  
Upward  
Rightward  
Pressure

# RSI : 6. PLACEMENT WITH PROOF

- Clinical assessment to confirm tube placement
- Devices to confirm tube placement



- Exhaled CO<sub>2</sub> Detectors
- Ultrasonography



“double tract sign” : Esophageal intubation

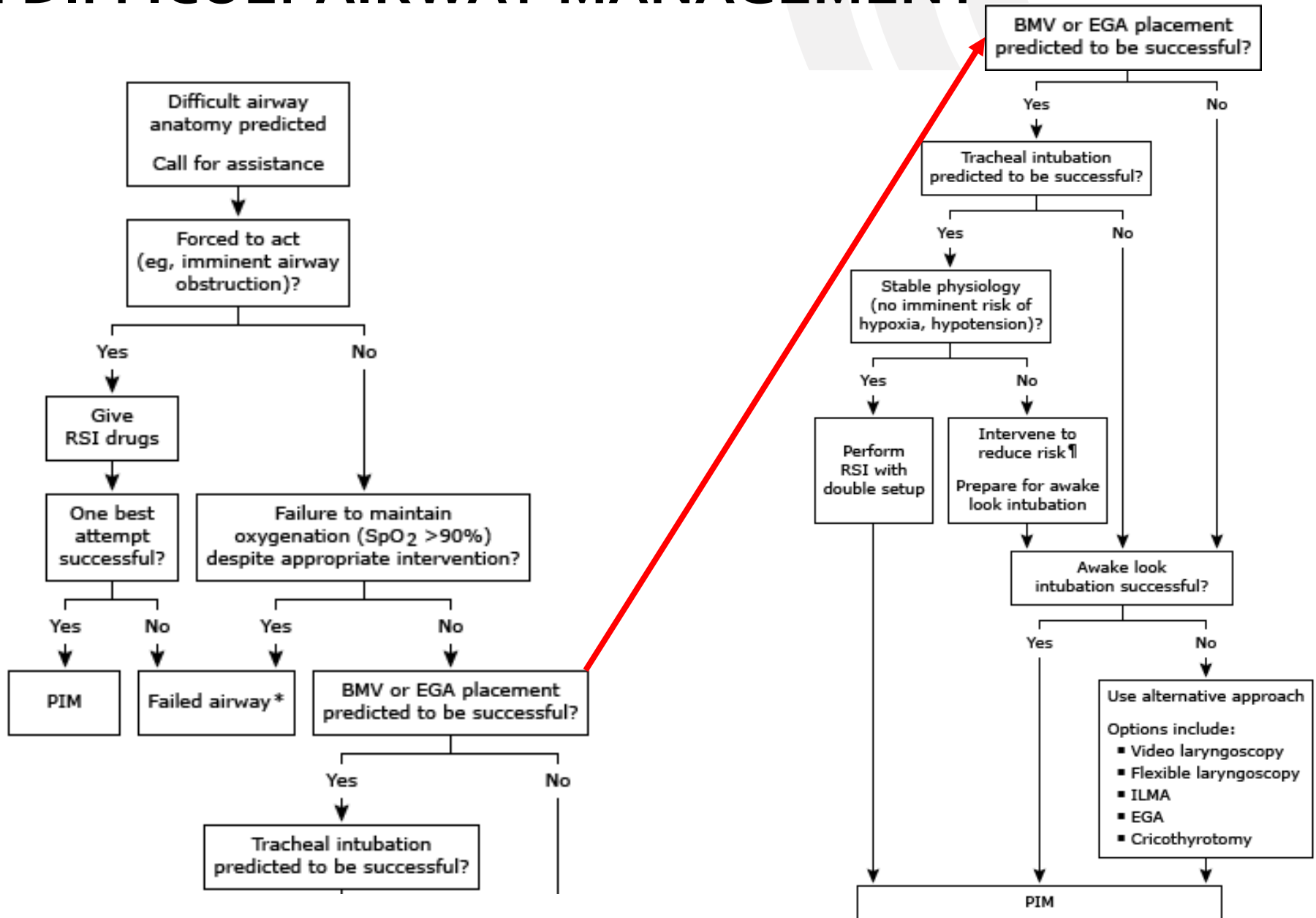


# RSI : 7. POST INTUBATION MANAGEMENT

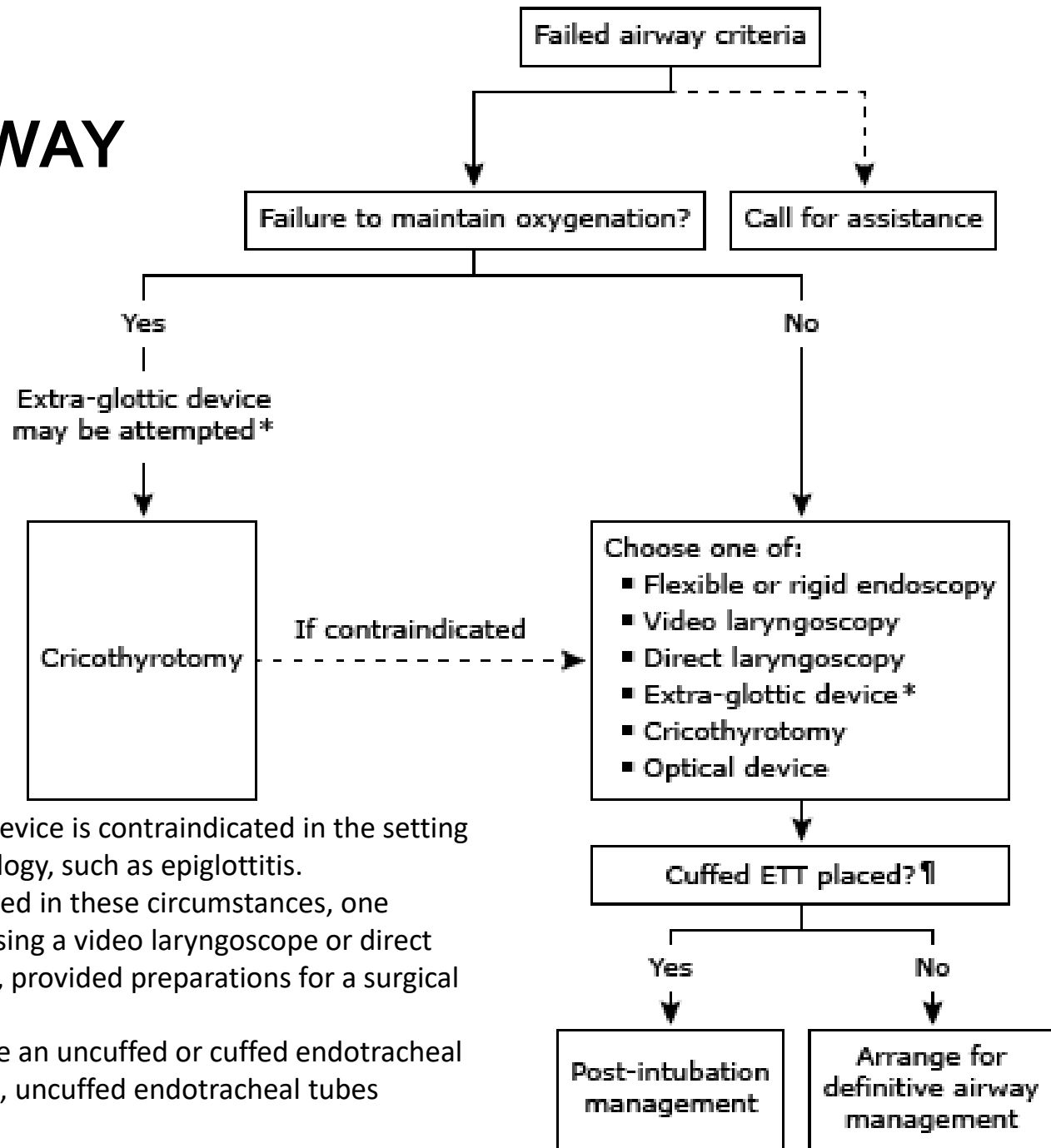
- ต้องทำการผูกยึดท่อเข้ากับผู้ป่วย
- ประเมินตำแหน่งของท่อช่วยหายใจว่าเหมาะสมหรือไม่จาก chest x-ray
  - โดยปลายของท่อช่วยหายใจควรอยู่เหนือ carina 2-3 ซม.
- ต่อกับท่อช่วยหายใจเข้ากับเครื่องช่วยหายใจ ร่วมกับเฝ้าระวังการเกิด barotrauma
- จากนั้นพิจารณาให้ยานอนหลับและยากลายกล้ามเนื้อเพื่อให้ผู้ป่วยหายใจตามเครื่องช่วยหายใจต่อไป

# 7. DIFFICULT AIRWAYS

## : DIFFICULT AIRWAY MANAGEMENT

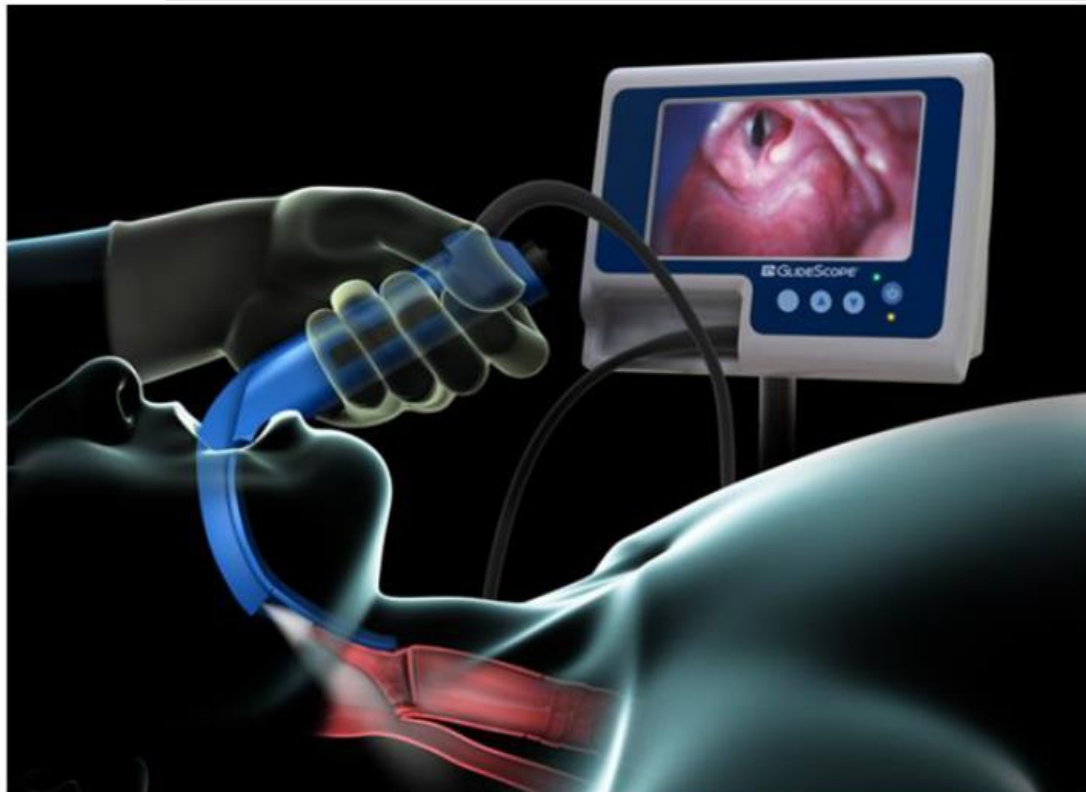
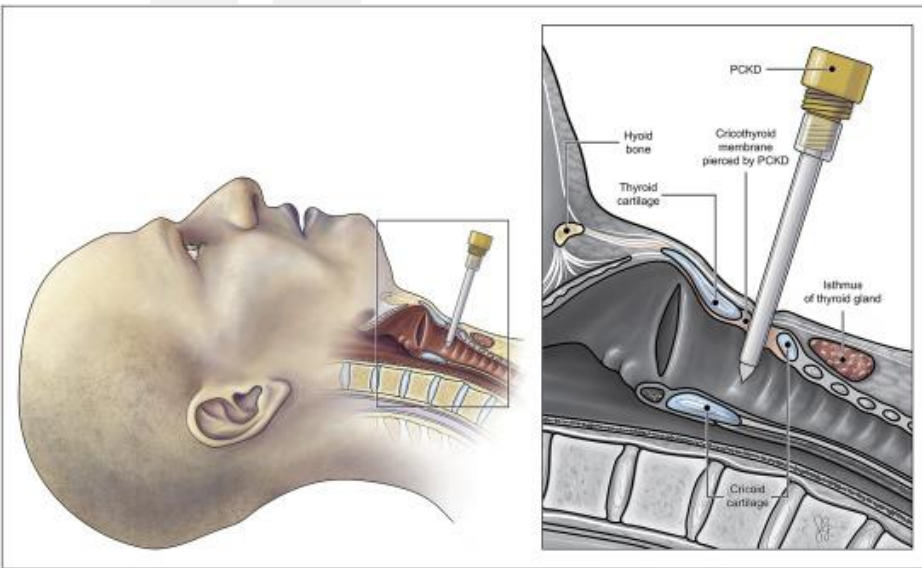


# 8. FAILED AIRWAY



- \* Placement of an extra-glottic device is contraindicated in the setting of severe hypopharyngeal pathology, such as epiglottitis.
- Should a surgical airway be needed in these circumstances, one attempt at tracheal intubation using a video laryngoscope or direct laryngoscopy may be performed, provided preparations for a surgical airway occur simultaneously.
- ¶ In children under 8 years of age an uncuffed or cuffed endotracheal tube may be placed. In neonates, uncuffed endotracheal tubes should be placed.

# 8. FAILED AIRWAY

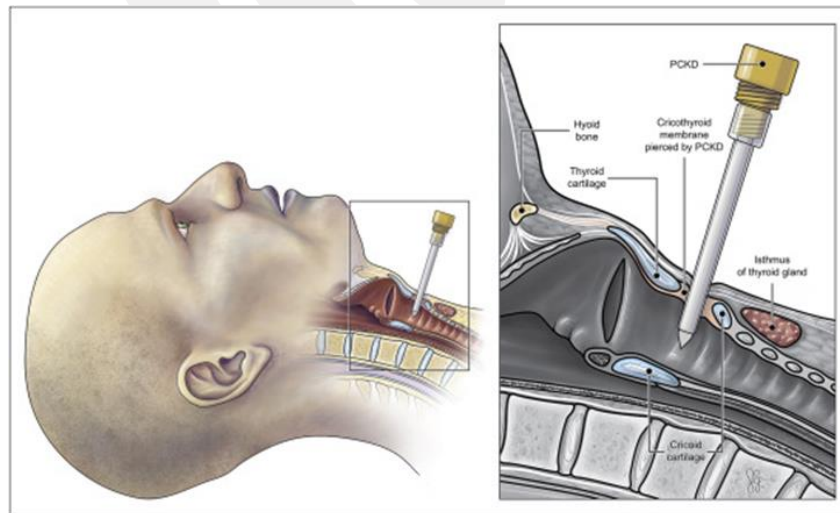




# DIFFICULT CRICOTHYROTOMY

## The SMART mnemonic

- **S**urgery (recent or remote)
- **M**ass (hematoma, abscess, or other mass)
- **A**ccess or **A**natomy (obesity, poor landmarks, or otherwise poor access)
- **R**adiation (or other tissue deformity or scarring)
- **T**umor (including intrinsic airway tumor)



1. endoscopic camera (lens diameter 5.5 mm / 8 mm) (the camera will come up with their own application for mobile connection)

Remark

There are two types of endoscopic camera in the market

- I. Connecting with mobile phone via internet WiFi
- II. Direct connecting with mobile phone (only for android phone)



2. Three pieces of the adhesive tape 1 inch wide and 3 inches long



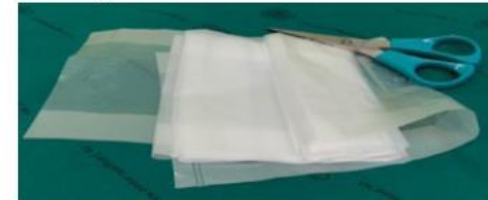
3. One piece of two side adhesive tapes both 1 cm in wide and long



4. Sticker for marking



5. Two plastic bags



6. conventional laryngoscope and Macintosh blade





1. Connect the camera with a mobile phone's application (WiFi/ direct connection)



2. Adjust the brightness to the highest level



3. Check on the mobile phone screen then mark the site with a sticker underneath the camera (the picture should be shown as upside down)





# \*หลักการจัดการทางเดินหายใจ สำหรับ CORONAVIRUS COVID-19

\*\*ผู้ป่วยที่สงสัย หรือวินิจฉัยว่าติดเชื้อ COVID-19



## ก่อนทำหัตถการ

### การป้องกันสำหรับบุคลากร

- ล้างมือให้สะอาด
- สวมอุปกรณ์ป้องกัน PPE\*\*\*
- ลดบุคลากรขณะทำหัตถการ AGPs\*\*\*\*
- ใช้ห้องแยกผู้ป่วยหรือห้องอากาศ AHU (หากมี)

### การเตรียมพร้อม

- เตรียมยาและอุปกรณ์ที่จำเป็น
- ประเมินทางเดินหายใจอย่างละเอียด
- ใช้อุปกรณ์ดูดเสมหะแบบระบบปิด
- กำหนดแผนหรือปฏิบัติล่วงหน้า
- เชื่อมต่อตัวกรองไวรัส/แบคทีเรียเข้ากับวงจร
- ใช้ Video Laryngoscope (ใช้แล้วทิ้งหากมี)

## ขณะทำหัตถการ

### การทำงานของทีมบุคลากร

- ระดมบทบาทหน้าที่ให้ชัดเจน
- พบหน้าเมื่อสารวิปฏิบัติเพื่อลดความผิดพลาด
- ขณะปฏิบัติให้สื่อสารแบบทวนคำสั่ง
- สังเกตพร้อมทีมว่าไม่ก่อให้เกิดการปนเปื้อน

### การทำงานของผู้เชี่ยวชาญ

- ใส่ท่อช่วยหายใจโดยผู้ที่มีประสบการณ์สูงสุด
- กระชกหน้ากากให้แน่นด้วยการจับสองมือ
- รอให้มั่นใจว่ากล้ามเนื้อคลายตัวแล้วไม่ขยับใส่ท่อ
- ใช้ Gas flow ต่ำสุดที่รักษา ระดับออกซิเจนผู้ป่วยได้
- ใส่ท่อหายใจตามขั้นตอน Rapid Sequence Induction
- ช่วยหายใจด้วยแรงดันบวกแรงดันบวกแรงดัน blow cuff แล้วเท่านั้น

## หลังทำหัตถการ

- หลีกเลี่ยงการปลดสายข้อต่อต่างๆ
- หากปลดสายให้ใช้ Standby mode +/- clamp tube
- ถอดPPEตามขั้นตอนปฏิบัติอย่างเคร่งครัด
- ล้างมือให้สะอาด (หลังถอดPPEแต่ละชิ้น)
- สรุปผลการปฏิบัติงาน



\* หลักการนี้จัดทำขึ้นเพื่อเป็นแนวทางปฏิบัติเบื้องต้น ไม่ใช่ข้อบังคับที่ชัดเจน COVID-19 สามารถเปลี่ยนแปลงได้ตลอดเวลา โปรดปฏิบัติตามนโยบายของสถาบัน  
 \*\* การใช้ห้องแยกผู้ป่วยหรือห้องอากาศ AHU (หากมี) เพื่อลดการแพร่กระจายของเชื้อ  
 \*\*\* สวมหน้ากากป้องกันเชื้อ COVID-19 ด้วยความระมัดระวังเป็นพิเศษในกรณีที่มีการสัมผัสโดยตรงกับผู้ป่วย COVID-19  
 \*\*\*\* Aerosol Generating Procedures (AGPs) ระบุการปฏิบัติที่ก่อให้เกิด aerosol ได้แก่ การใส่ท่อช่วยหายใจ, การช่วยหายใจแบบ Non-invasive, การเจาะช่อง, การปฏิบัติหัตถการช่วยชีวิต (CPR), การใส่ท่อช่วยหายใจที่ถอดใส่ได้ทันที, การใส่ท่อช่วยหายใจแบบถอด, การถอดสายและขั้วเชื่อมต่อ

References:  
 1. World Health Organization. Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected Interim guidance, January 2020.  
 2. Center for Disease Control and Prevention. Interim Infection Prevention and Control Recommendations for Patients with Confirmed 2019 Novel Coronavirus (2019-nCoV) or Persons Under Investigation for 2019-nCoV in Healthcare Settings. February 2020.  
 Disclaimer: This infographic is used for informational purposes only, and is not intended to replace institutional policy. Please refer to your own institutional guidelines for appropriate recommendations. © Department of Anaesthesia and Intensive Care, Prince of Wales Hospital, Chinese University of Hong Kong. All rights reserved.  
 Thai translation by: Dr. Chanrit Lawthaveewasat, Anesthesiologist and Deputy Secretary General of The Medical Association of Thailand [MAT] @gaseousChange

Version 1.0 March 2020



# THANK YOU