

A cartoon illustration depicting a medical emergency. In the foreground, a paramedic in a blue uniform is performing CPR on a child lying on a gurney. The paramedic is using a green manual resuscitator (Ambu bag) over the child's face. The child's head is tilted back, and their airway is visible. In the background, a group of people, including a woman with blonde hair and a man with dark hair, are watching the procedure with expressions of concern. A small, stylized figure of a person is also visible. The scene is set outdoors with a simple background.

Always secure the airway...  
especially with aggressive CPR.

# Pediatric airway management

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# Outlines

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- **Pediatric airway**
- **Positioning**
- **Arteficial airway**
  - **Oropharyngeal airway**
  - **Nasopharyngeal airway**
  - **LMA**
- **Intubation**

# PALS

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- PALS ; infants up to 18 years of age
- **Excluding** newborns → Neonatal resuscitation
- Cardiac arrest in infant and children

**not** usually result from a **primary cardiac cause**

it is the end result of **respiratory failure** or shock.

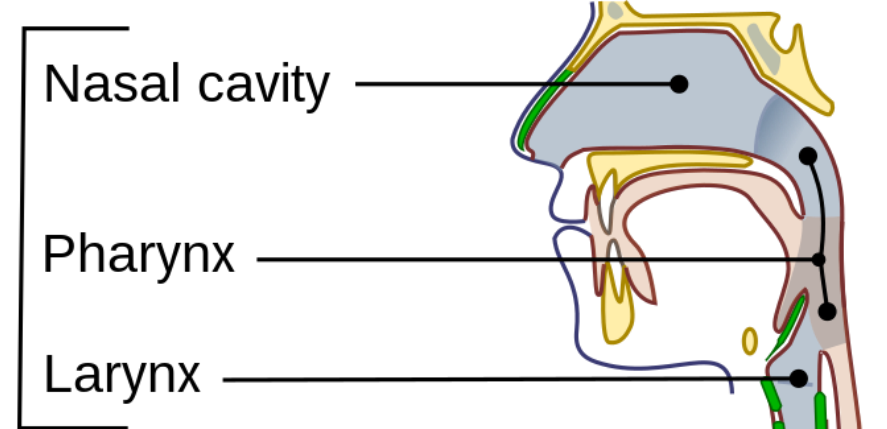
# Term

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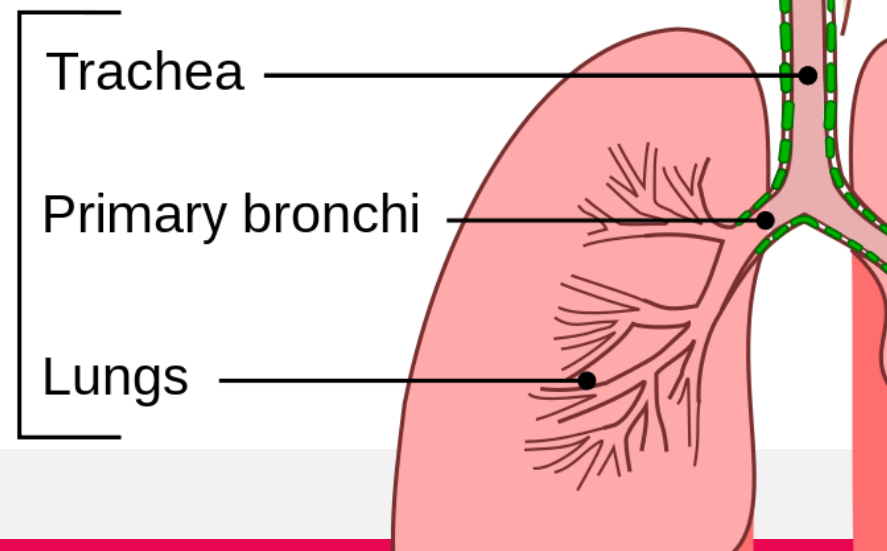
- **Newborn/Neonate** : First 4<sup>th</sup> weeks of a life
- **Infant** : younger than 1 year of age
- **Children** : 1 year of age until puberty
- **Puberty** is
  - Breast development in females
  - Axillary hair in males
- **PALS** : Pediatric Advance Life Support

# Respiratory tract

## Upper respiratory tract

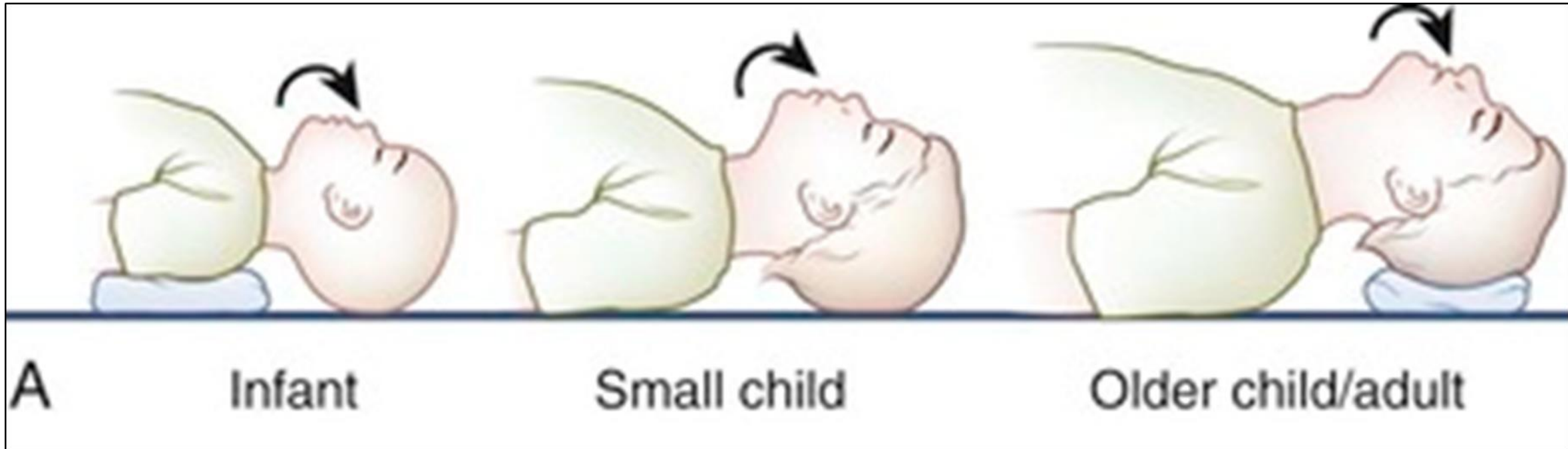


## Lower respiratory tract



# Differences between adult & pediatric airways

- Large occiput



# Narrow nasal cavity

## Differences Between Adult and Pediatric Airways

### Adult

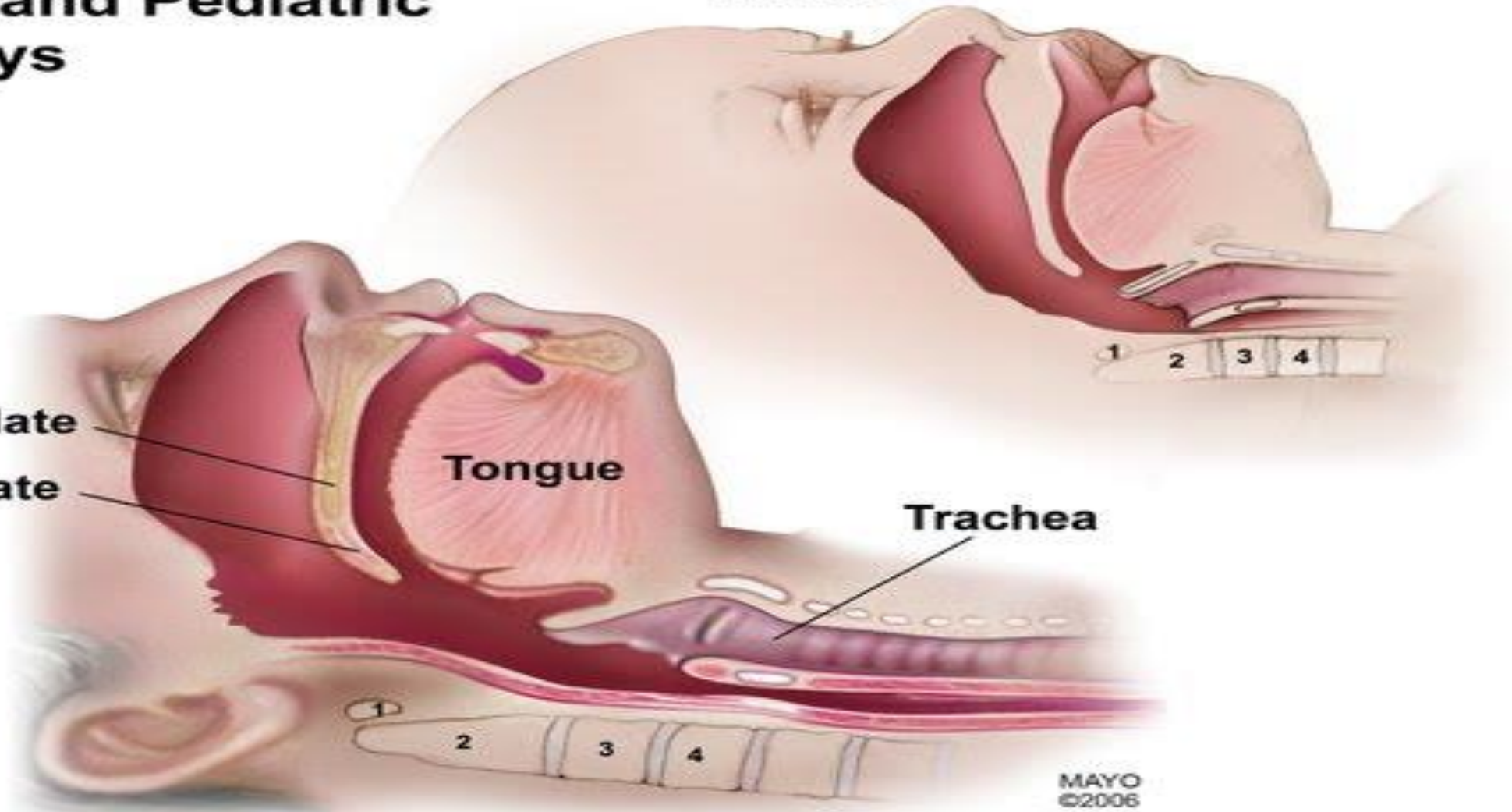
Hard palate

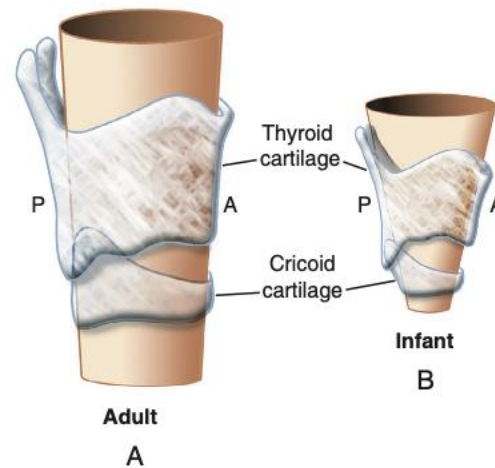
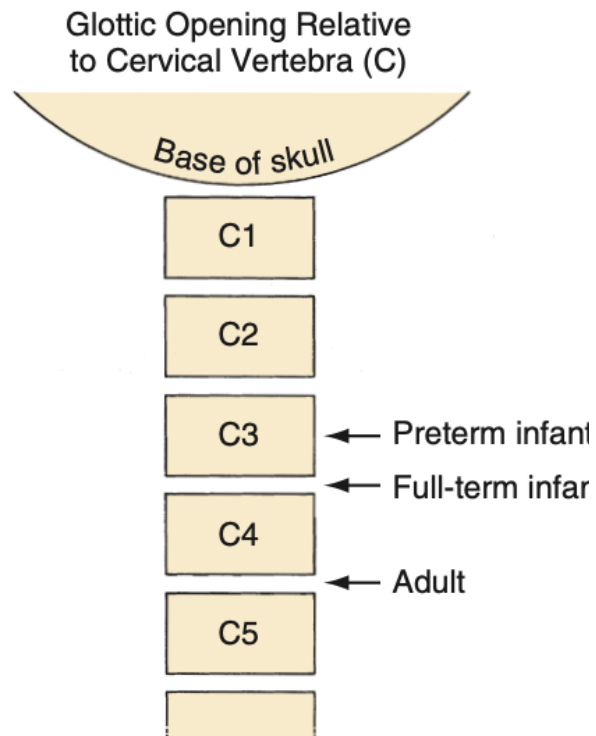
Soft palate

Tongue

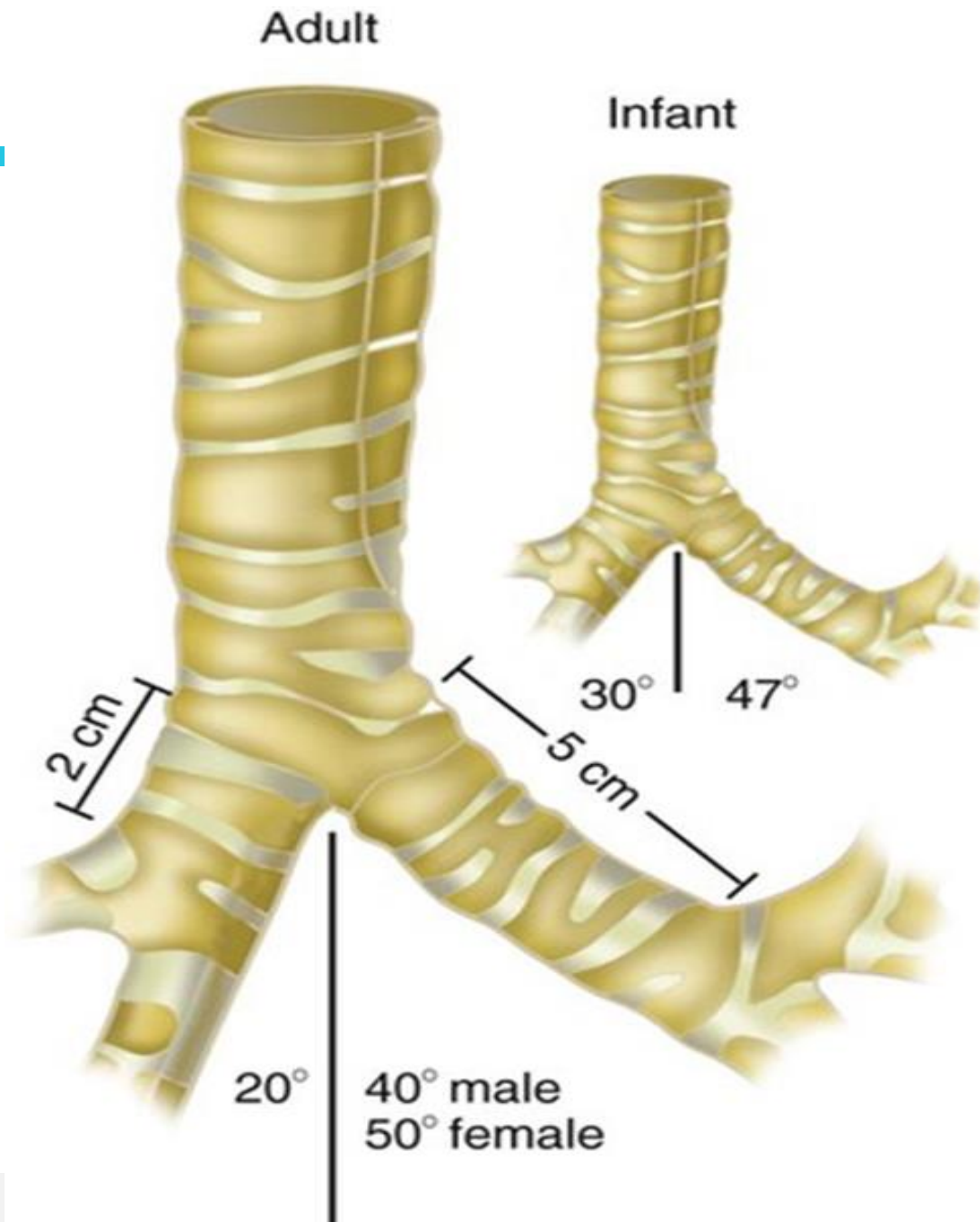
Trachea

### Infant





3. Larynx more cephalad C<sub>3</sub>-4
4. Vocal cords slant caudally
5. Cricoid ring is the narrowest part
6. Short trachea 4-5 cms



**Acute angle of right main bronchus**

# Epiglottitis: Longer, narrower (Omega shape), Floppy

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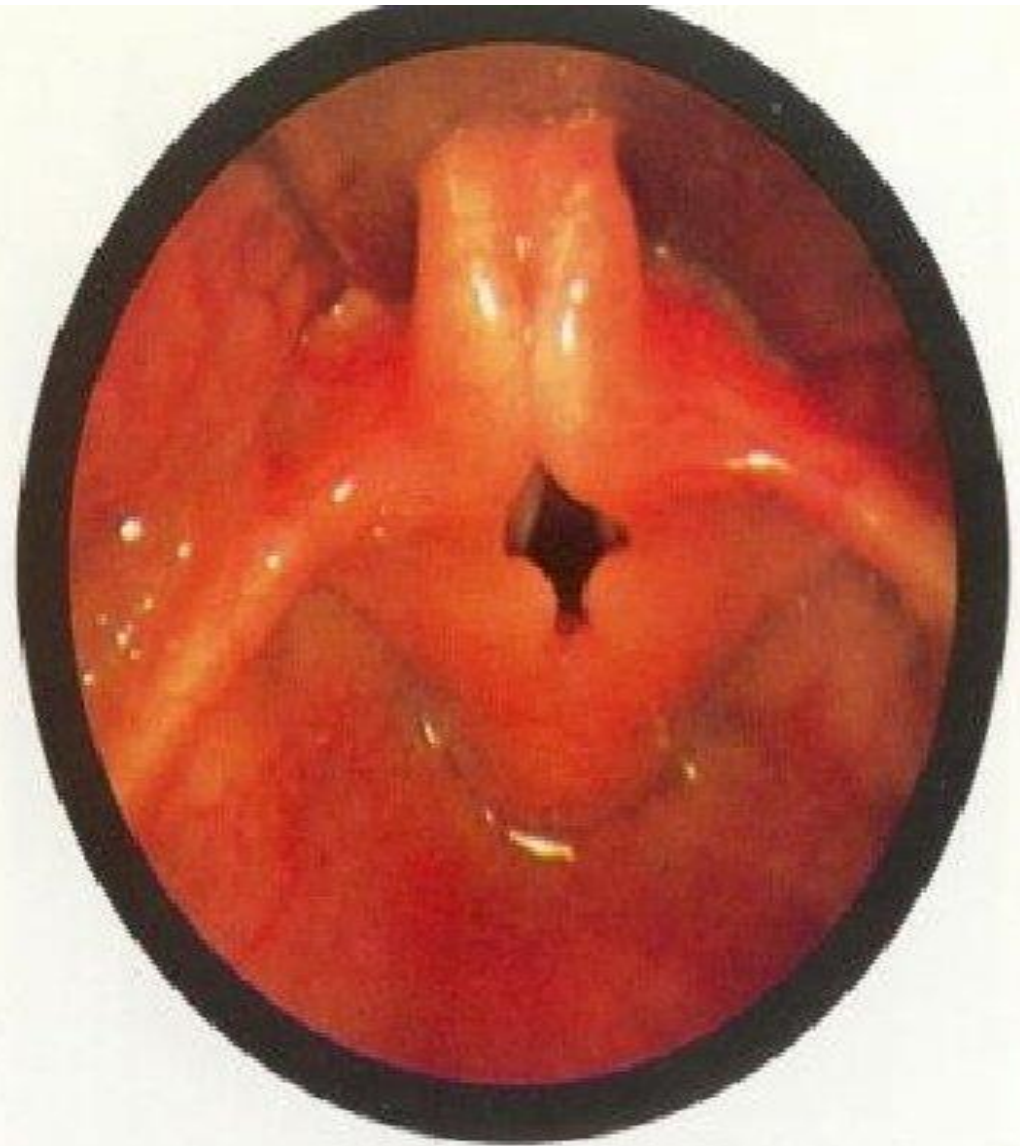
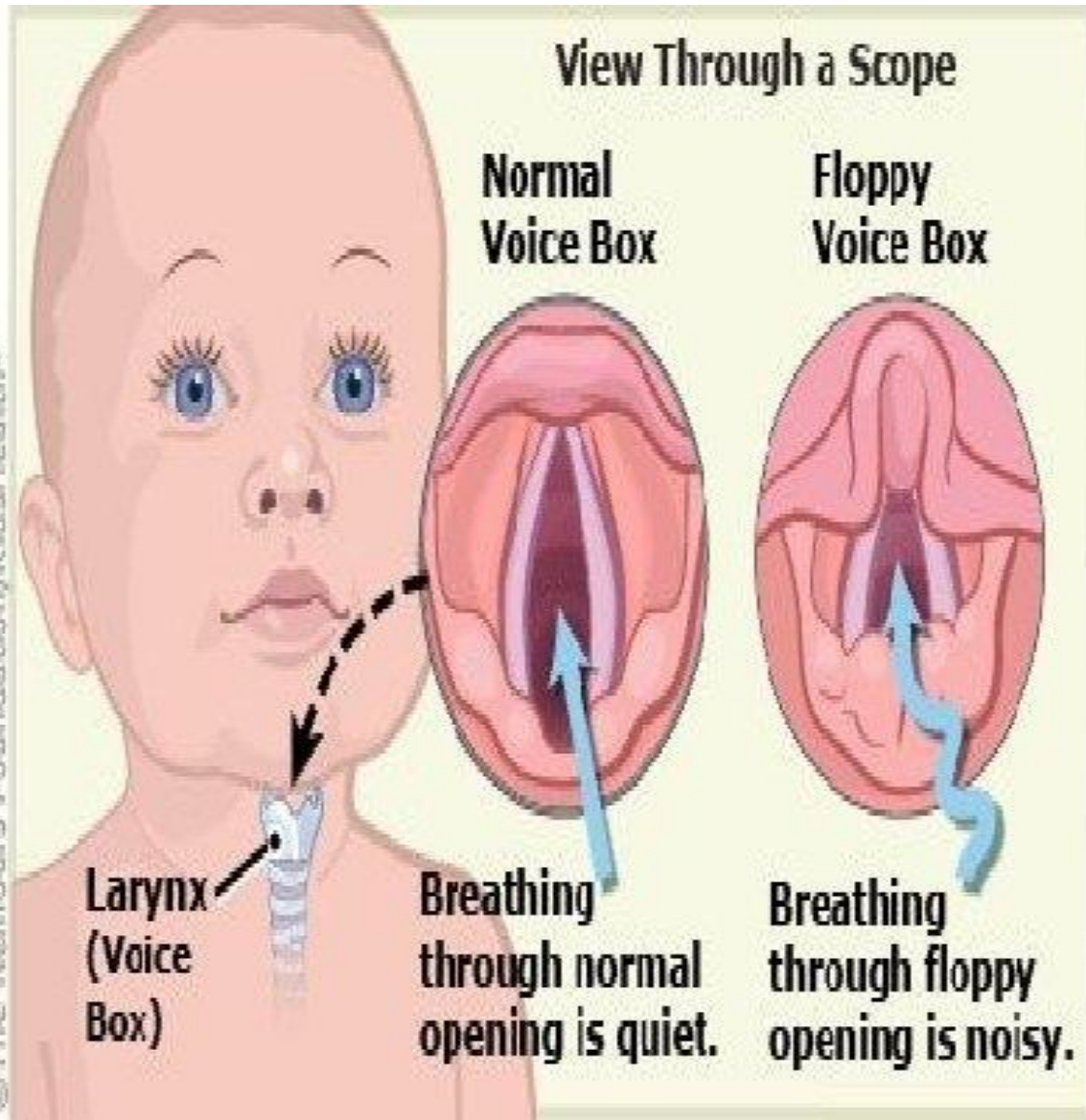
Infant



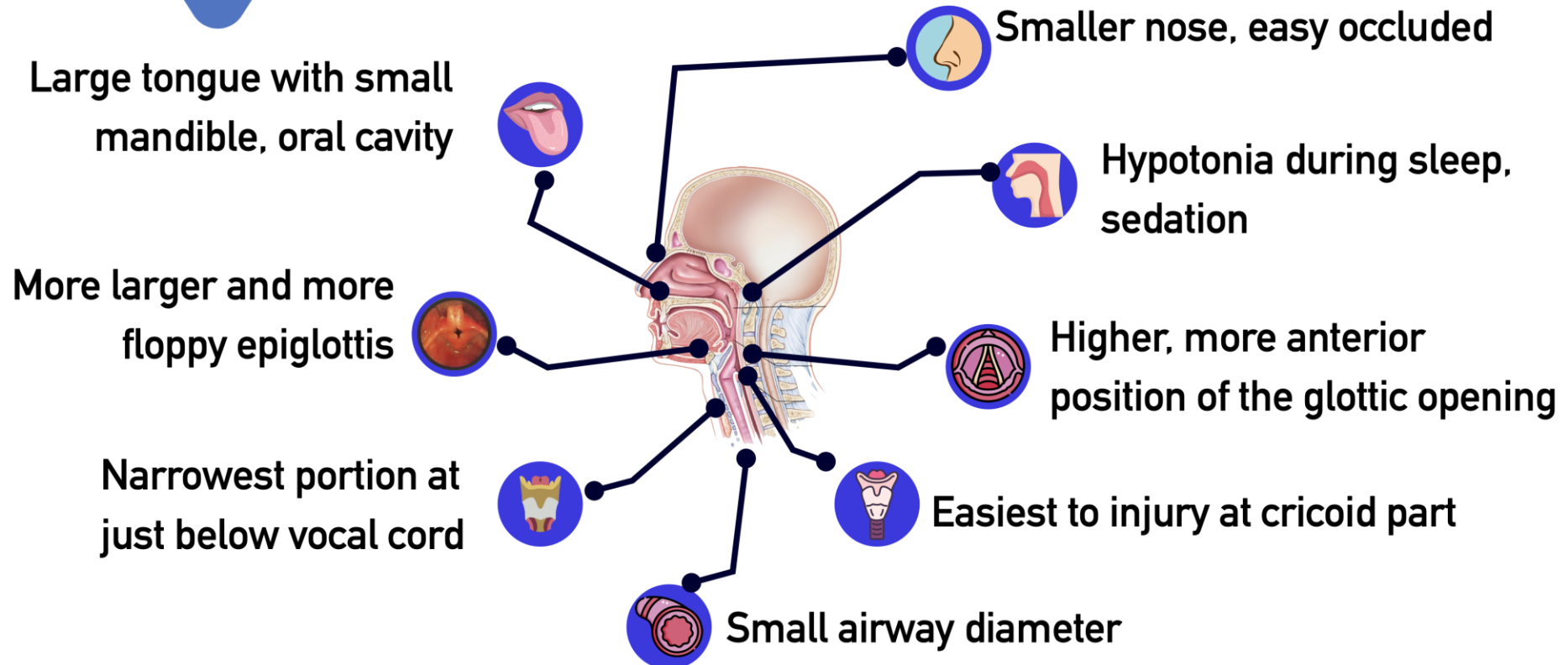
Toddler



Adult



# Pediatric anatomy



| ลักษณะทางเดินหายใจ                                                                        | ความเสี่ยงที่อาจเกิดขึ้น                                                         |
|-------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| 1. คีรีชะโต โดยเฉพาะท้ายทอย                                                               | Airway obstruction ง่ายเมื่ออยู่ในท่าก้ม อาจใส่ ETT ยาก ควรระวังหรือหลัง         |
| 2. ลิ้นค่อนข้างใหญ่ ในขณะที่ช่องปากเล็ก                                                   | Airway obstruction                                                               |
| 3. ผนังภายในจมูกแคบ                                                                       | Airway obstruction ง่าย ถ้าจมูกอุดตัน                                            |
| 4. กล้องเสียงอยู่ค่อนข้างสูง                                                              | ใส่ ETT ยาก, เหมาะกับการใช้ blade ตรงมากกว่าแบบโค้ง                              |
| 5. Epiglottis เป็น omega shape อ่อนต้วง่าย และอยู่ค่อนข้างหนา ทำมุม 45 องศา กับกล้องเสียง | ใส่ ETT ยาก, เหมาะกับการใช้ blade ตรงมากกว่าแบบโค้ง                              |
| 6. สายเสียงทำมุมแคบกับแกนของคอลัม                                                         | ETT อาจไปติดบริเวณ anterior commissure                                           |
| 7. กล้องเสียงรูปกรวย ส่วนแคบสุดอยู่ตำแหน่งต่ำกว่าช่องเปิดของสายเสียง บริเวณกระดูก cricoid | ใส่ ETT ยาก, บริเวณใต้ต่อสายเสียงตีบหรือตันได้                                   |
| 8. คอและคอลัมสั้น                                                                         | Ventilation ยาก และมีโอกาสที่ท่อจะเลื่อนเป็น endobronchial intubation            |
| 9. Adenoid และ tonsils โต                                                                 | Ventilation ยาก                                                                  |
| 10. ทางเดินหายใจแคบ                                                                       | มี airway resistance สูง เมื่อมีการอักเสบหรือบวมทำให้ airway obstruction ได้ง่าย |



# History taking

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- Upper respiratory tract infection
- Noisy breathing, Snoring, stridor
- Underlying respiratory disease
- Congenital airway anomalies, syndrome
- limited jaw or neck movement
- facial trauma
- Previous problem with intubation and anesthesia

# Physical examination

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- General appearance, respiratory distress
- Vital signs include SpO<sub>2</sub>
- Abnormal breath sound: stridor, wheezing
- Dysmorphic or Craniofacial anomalies
- Oropharyngeal Examination



# Airway management

# Methods of Airway Management

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- 1. Airway maneuvers**
- 2. Positioning**
- 3. Positive airway pressure**
- 4. Artificial airways**

# Airway maneuver

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- การเปิดทางเดินหายใจด้วยมือ

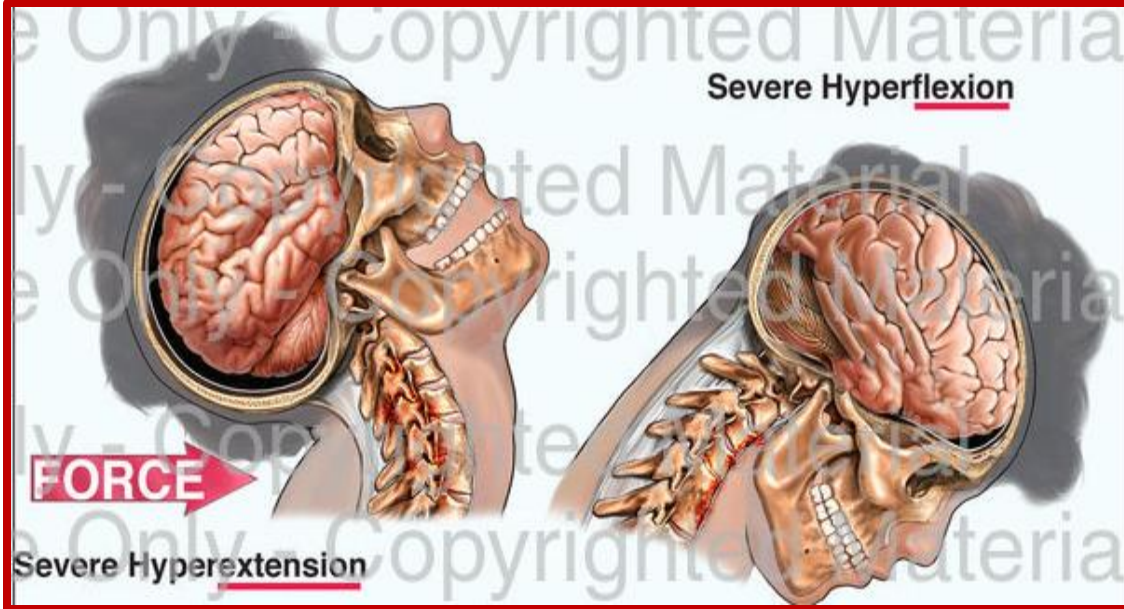
1. Head tilt , Chin lift
2. Jaw thrust

# Head tilt chin lift maneuver



ระวัง !!! นิ้วมือกดเนื้อเยื่ออ่อนใต้คาง

# C-Spine injury



# Pediatric trauma patient

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- C-spine injury ???
- Jaw thrust maneuver
- If cannot maintained airway>> Head tilt chin lift maneuver is recommended

# Jaw thrust maneuver

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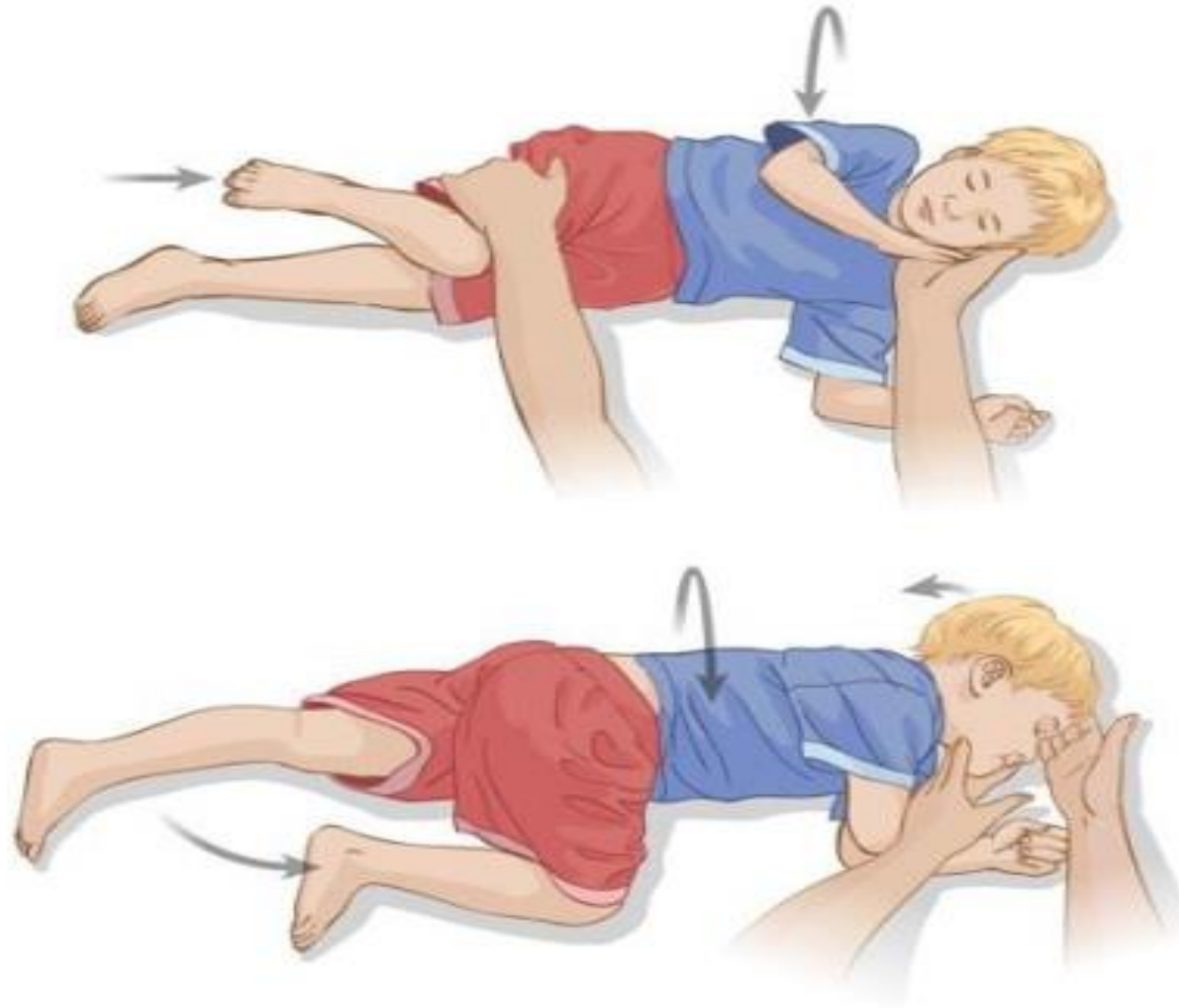


# Jaw thrust maneuver

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# Recovery position



Courtesy of [www.aboutkidshealth.ca](http://www.aboutkidshealth.ca)  
© AboutKidsHealth.ca

**Image 1:** Moving a child into the recovery position

# Artificial airway

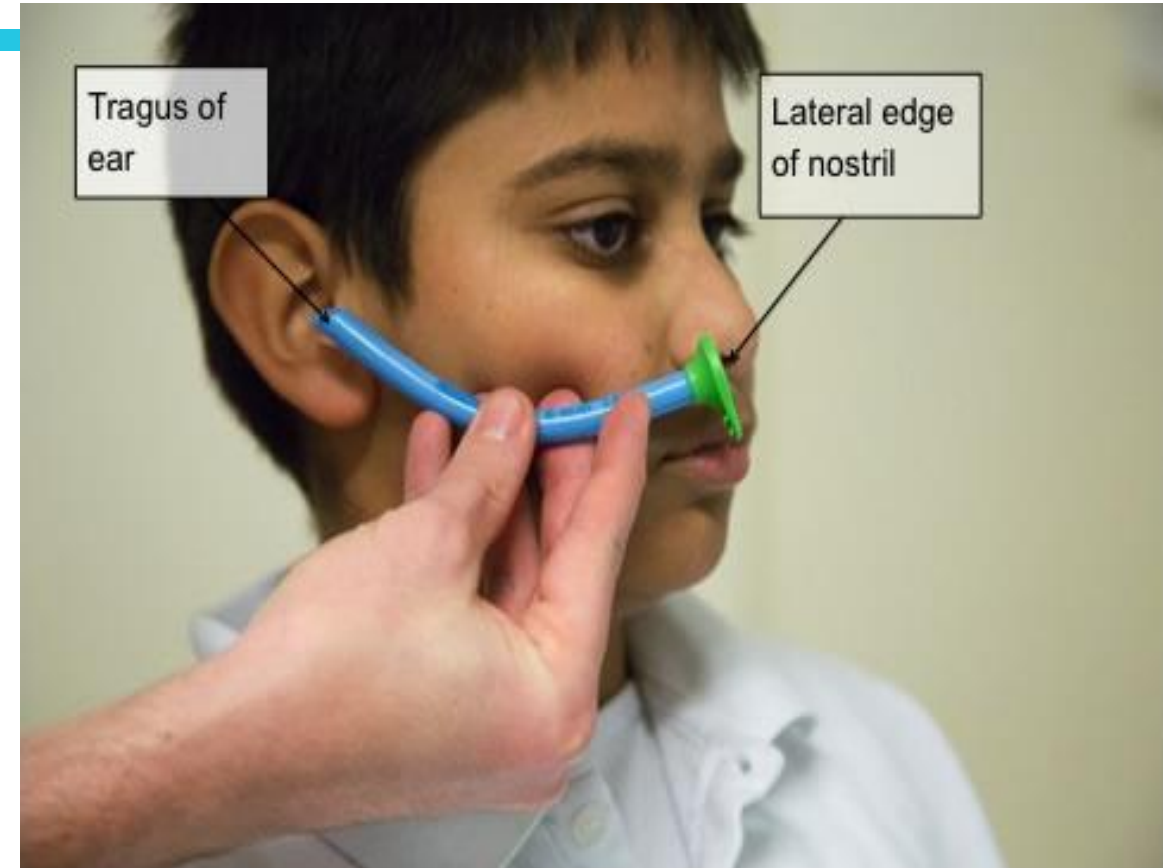
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## ➤ Indication

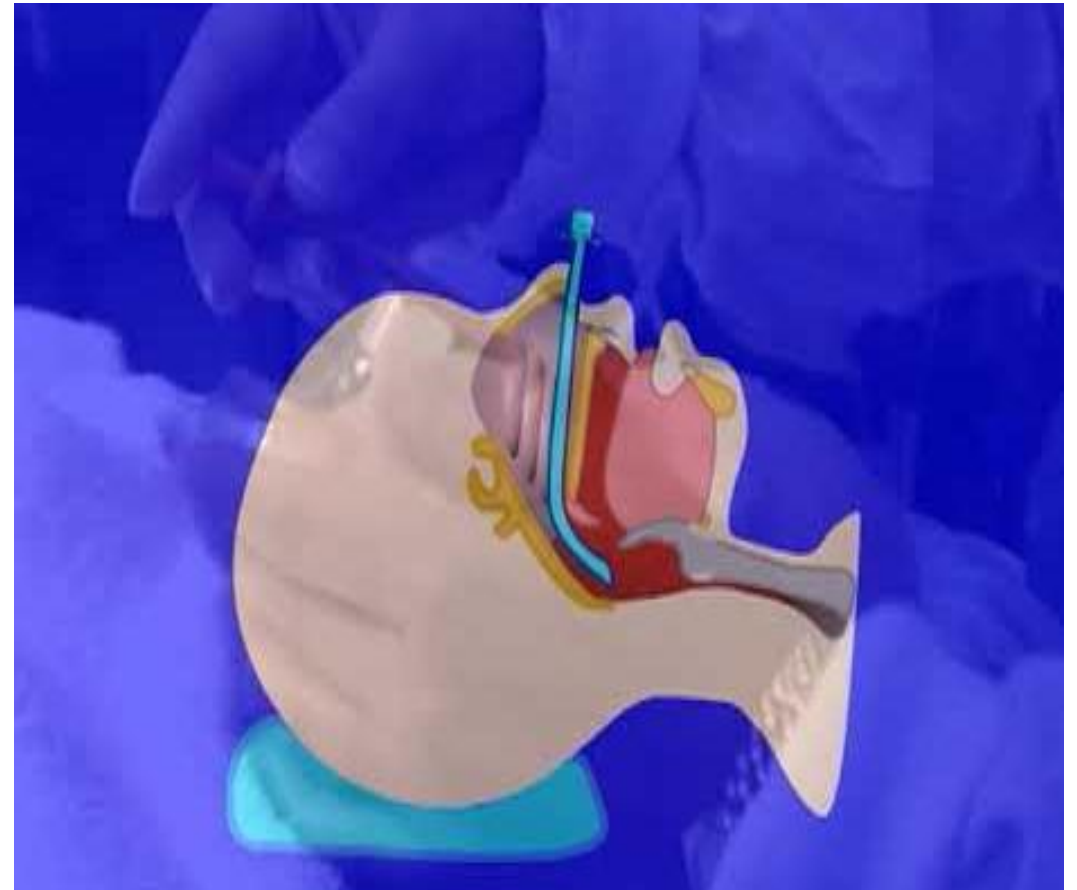
1. Relieve obstruction
2. Prevent aspiration
3. Promote suction
4. Artificial ventilation

# Nasopharyngeal airway

- Semicoma, Sedate
- Size: Tip of nose – Tragus
- วิธีใส่
  - ✓ Lubricate
  - ✓ ทำมูกหมี
  - ✓ ใส่รูจมูกในทิศตั้งฉากกับไบหน้า
- ระวัง!!! neonate < 2-6 month, skull base fracture, bleeding, adenoid hypertrophy



## Supraglottic airways : *Nasopharyngeal airway*



## Oropharyngeal airway

- Unconscious
- Size
  - Corner of mouth to angle of mandible
- วิธีใส่???
- ระวัง!!!
  - intact Gag reflex

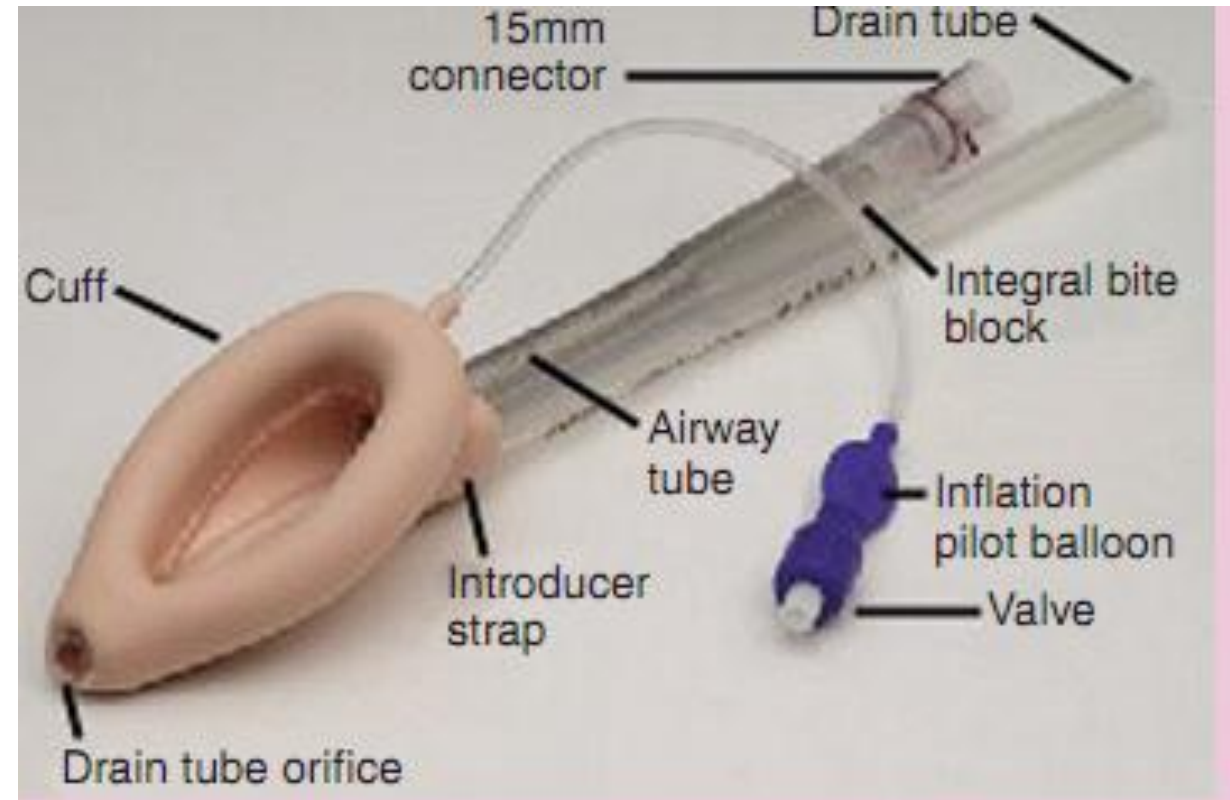
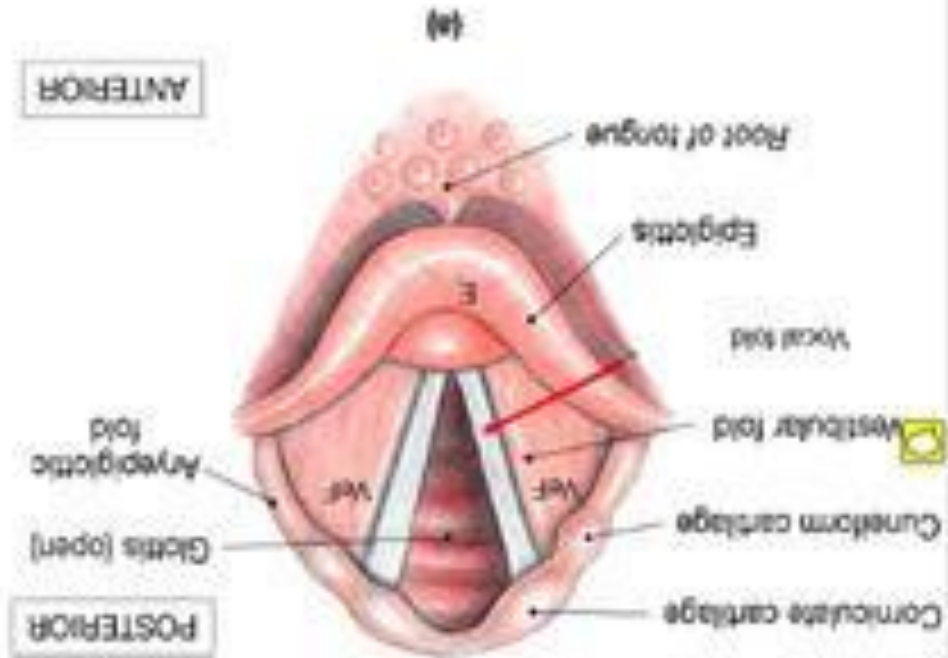


# Oropharyngeal airway

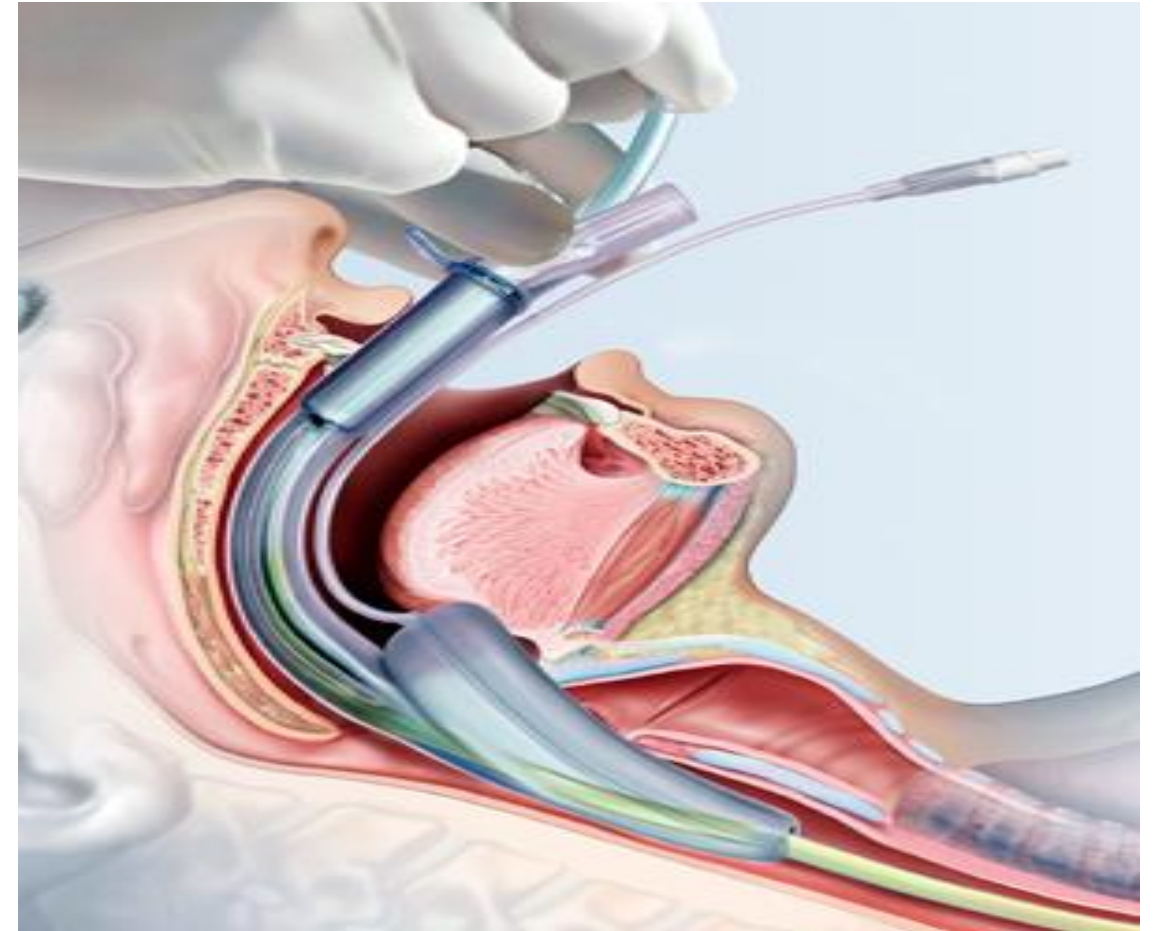
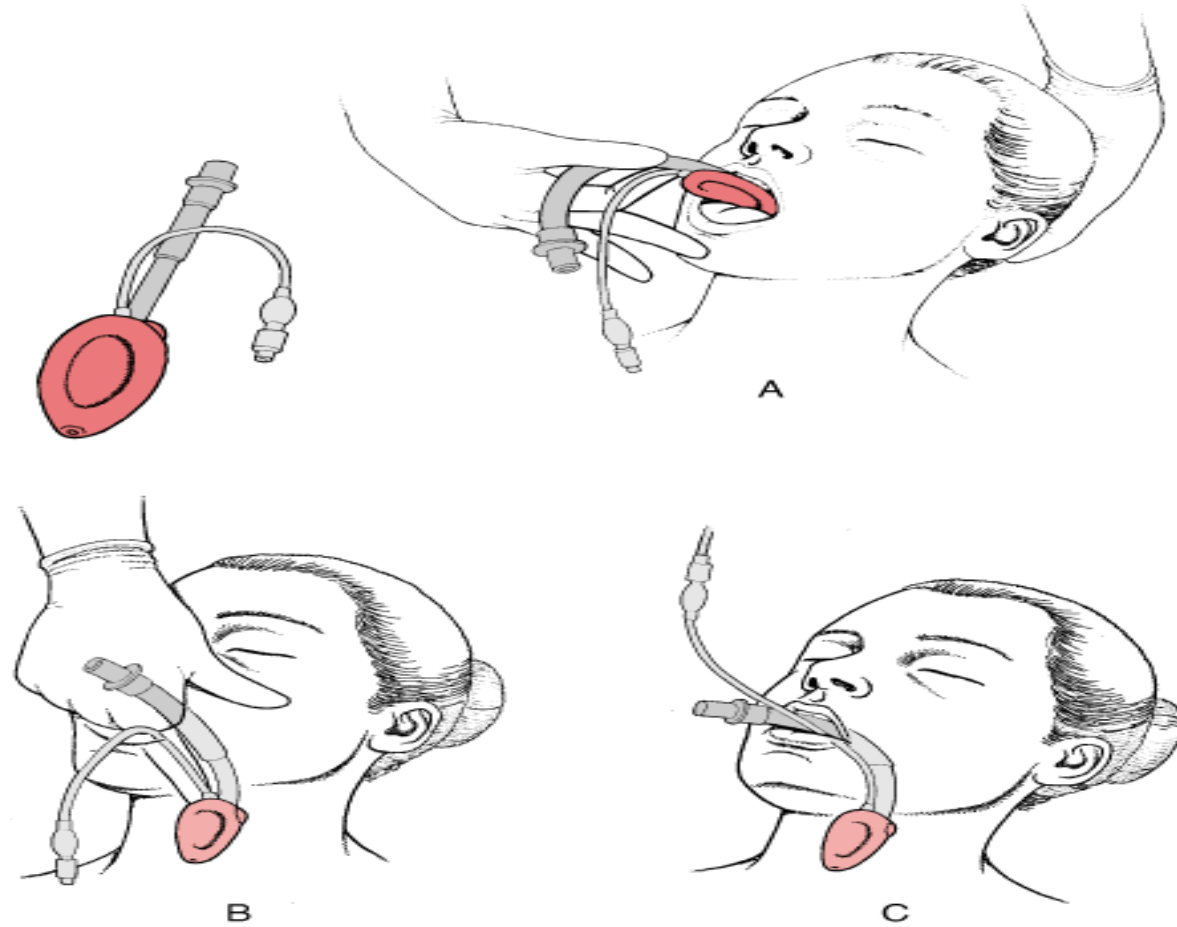
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# Laryngeal Mask airway (LMA)



# Laryngeal mask airway= **LMA**



# Positive airway pressure

- อุปกรณ์

1. Face mask
2. Self inflating  
(resuscitation)bag
3. Reservoir bag
4. Oxygen connector tubing
5. Oxygen



# Face mask



**Correct**  
Covers mouth, nose, and  
chin but not eyes



**Incorrect**  
Too large: covers eyes  
and extends over chin



**Incorrect**  
Too small: does not cover  
nose and mouth well

# Self inflating resuscitation bag : Ambu bag

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- Concept: Acceptable gas exchange **without** gastric inflation

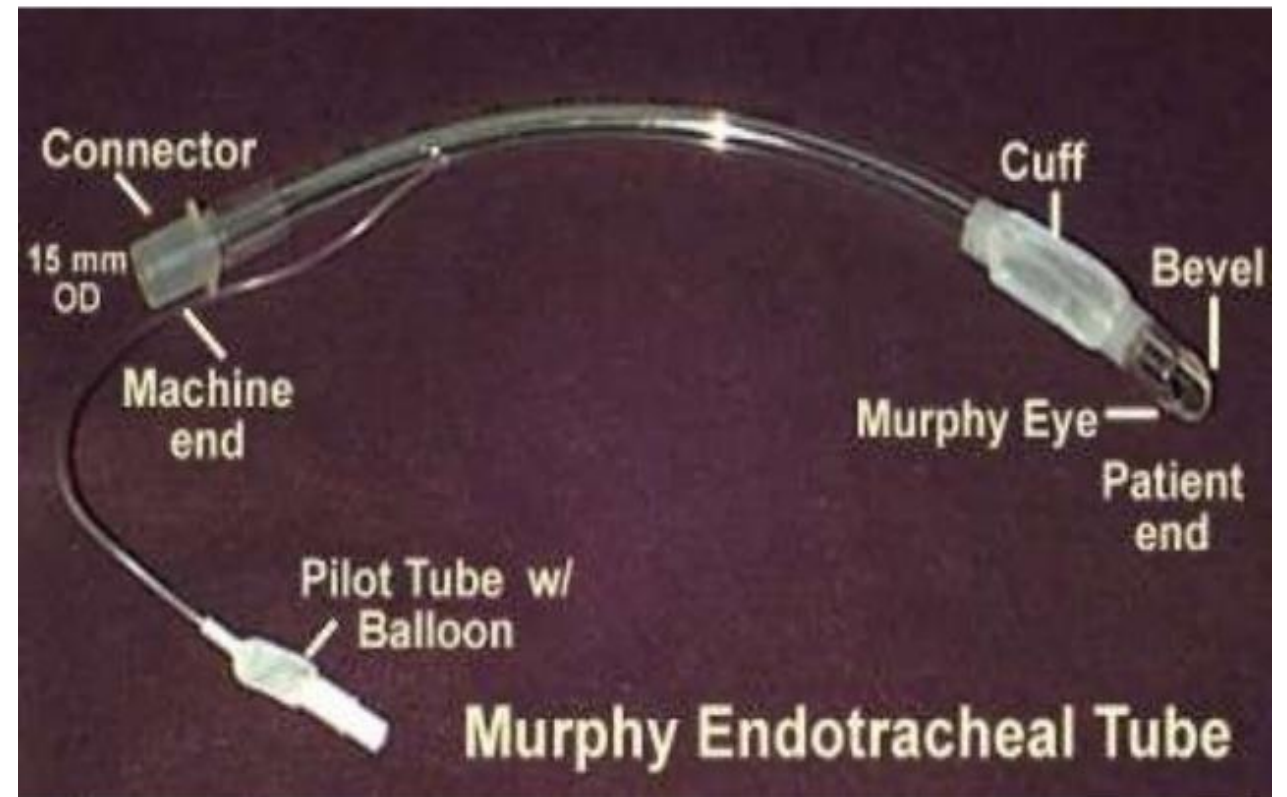
- วิธีการ

1. เดิม 1 breath q 6 second → (2020) 1 breath q 2-3 seconds = 20-30/min
2. บีบซ้ำ over 1 second (Pressure ไม่เกิน 20-25 cm H<sub>2</sub>O)
3. บีบเบา Visible chest rise
4. Avoid PEEP

# Endotracheal tube



## STRUCTURE



# Equipment

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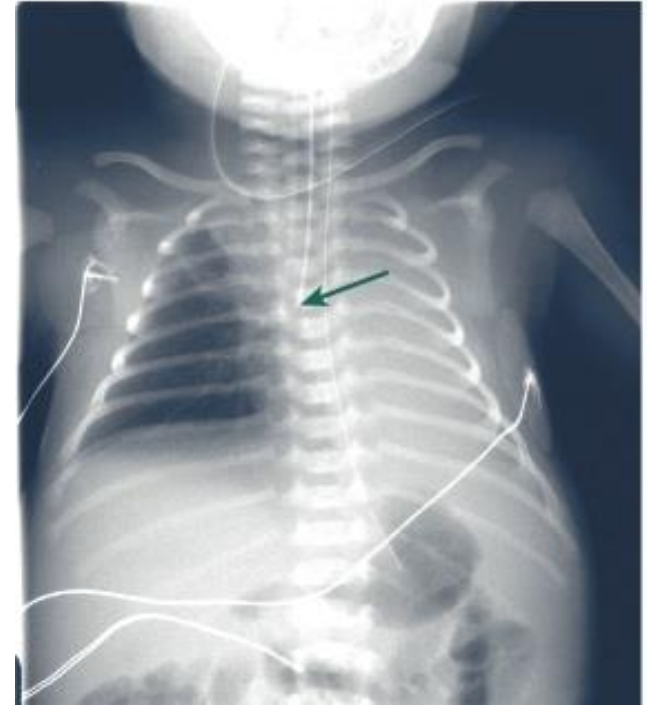
- Suction
- Functional intravenous access
- A 10-mL syringe to inflate the endotracheal tube balloon
- Properly sized endotracheal tube and 1 size smaller and larger than expected a
- Properly sized stylette
- Bag valve mask with oxygen reservoir
- Functioning laryngoscope of proper size

# ETT size and depth

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## ETT size

- ID (mm) = (age [years] / 4) + 4 >> uncuff
- ID (mm) = (age [years] / 4) + 3.5 >> cuff



# Pre oxygenation

- ให้ O<sub>2</sub> 100% แก่ผู้ป่วยโดยใช้ device เดิมที่ผู้ป่วยใช้อยู่เดิม (ปรับเพิ่ม FiO<sub>2</sub> 1.0 )
- กรณีที่ O<sub>2</sub> 100% แล้วยังมีปัญหา desaturation หรือเริ่ม maintain airway ไม่ได้  
ให้ทำ bag mask ventilation

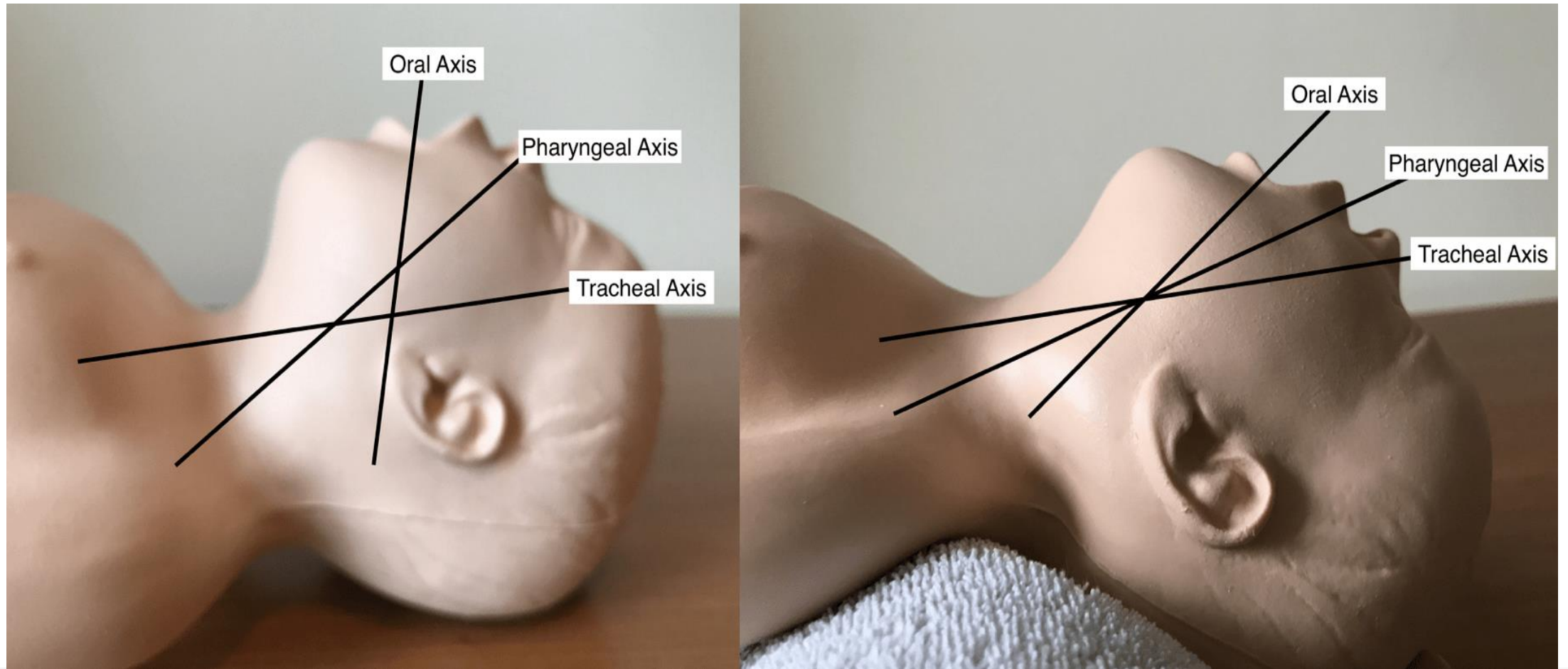


CE technique



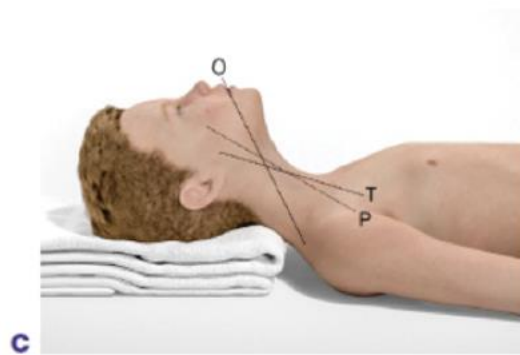
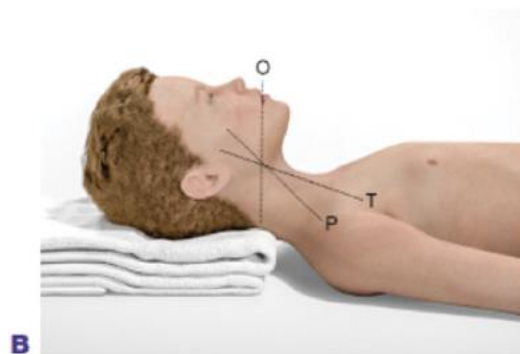
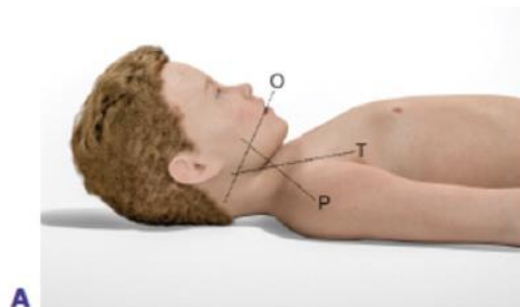
2 person technique

# Why....Sniffing position ?



# Positioning

มากกว่า 2ปี รองศีรษะ



ต่ำกว่า 2ปีหนุนไหล่

# Sedation

| medication | property           | Dose                                                        | Advantage                                                            | Disadvantage       |
|------------|--------------------|-------------------------------------------------------------|----------------------------------------------------------------------|--------------------|
| Fentanyl   | analgesic          | 1 mcg/kg/dose IV                                            | Not effect hemodynamic                                               |                    |
| midazolam  | sedative           | 0.1 mg/kg/dose IV<br>0.2 mg/kg/dose IM<br>0.2 mg/kg/dose IN | Amnesia                                                              | Effect hemodynamic |
| Ketamine   | Sedative+analgesic | 1 mg/kg/dose IV<br>3-5 mg/kg/dose IM                        | Not effect hemodynamic<br>Good for asthma<br>(bronchodilator effect) | Increase secretion |

# Laryngoscope blade

**TABLE 2.** Laryngoscope Blade Size by Age<sup>3</sup>

| Age            | Laryngoscope Blade Size |
|----------------|-------------------------|
| Preterm infant | Miller 0                |
| Term infant    | Miller 0–1              |
| 6 months       | Miller 0–1              |
| 1 year         | Miller 1                |
| 2–10 years     | Miller 2<br>Macintosh 2 |
| Adolescent     | Miller 3<br>Macintosh 3 |



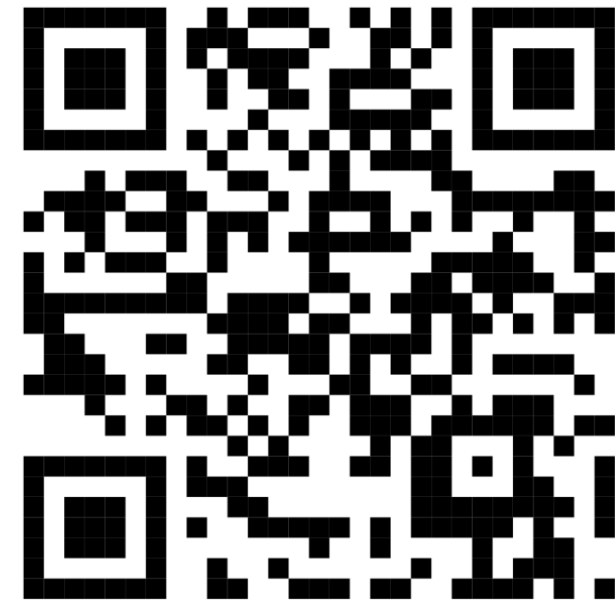
Macintosh



Miller

# Post intubation care

- Confirm ETT placement with end tidal CO<sub>2</sub>
- Confirm tip of ETT (between thoracic inlet and carina/T<sub>4</sub> in chest film)
- Check the cuff pressure
- Secure ETT placement



VDO การ strap ETT



# Take home message

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1. High-quality cardiopulmonary resuscitation (CPR)
  - adequate chest compression rate
  - depth, minimizing interruptions in CPR
  - full chest recoil between compressions
  - **avoiding excessive ventilation**
2. A respiratory rate of **20 to 30 breaths/minute**
3. Using a **cuffed** endotracheal tube
4. For OHCA; **bag-mask ventilation** results in the **same as advanced airway**
5. Resuscitation does not end with ROSC. **Excellent post–cardiac arrest care is critically important**

# Foreign body inhalation

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- Life-threatening
- FB inhalation is frequently unwitnessed with respiratory symptoms
- A history of inhalation or choking must specifically
- Chest x-ray does not exclude an inhaled FB
- Located in the bronchi rather than the larynx or trachea

# Infant & Pediatric with complete UAO

Consciousness

**5 Backblow & 5 chest thrust**

Heimlich maneuver ทำยืน/นั่ง

FB removed

Retained FB

Unconsciousness

Recovery position

Unconsciousness

Jaw tongue lift

Seen FB

Finger sweep

Unseen FB

Apnea

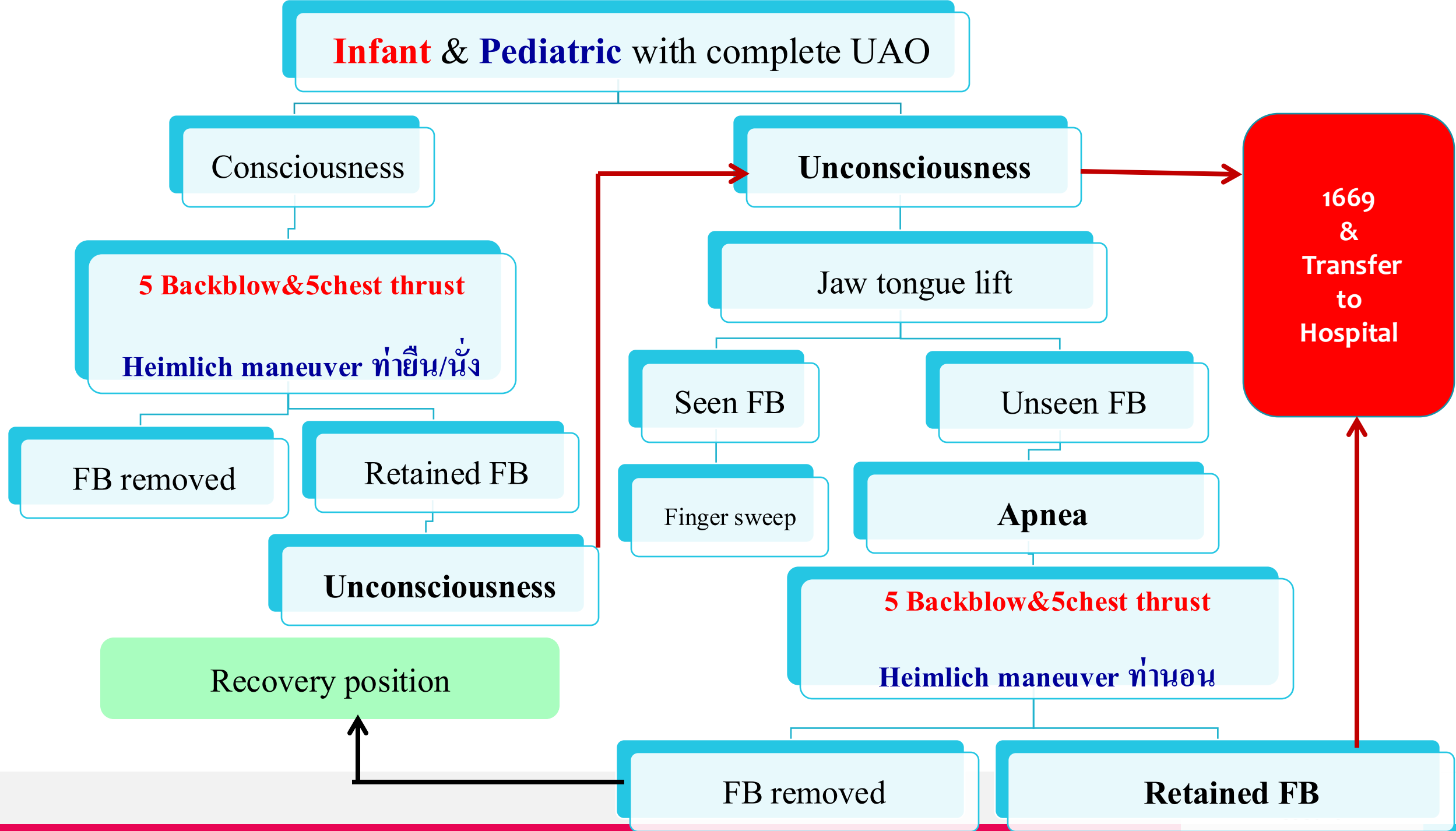
**5 Backblow & 5 chest thrust**

Heimlich maneuver ทำนอน

FB removed

Retained FB

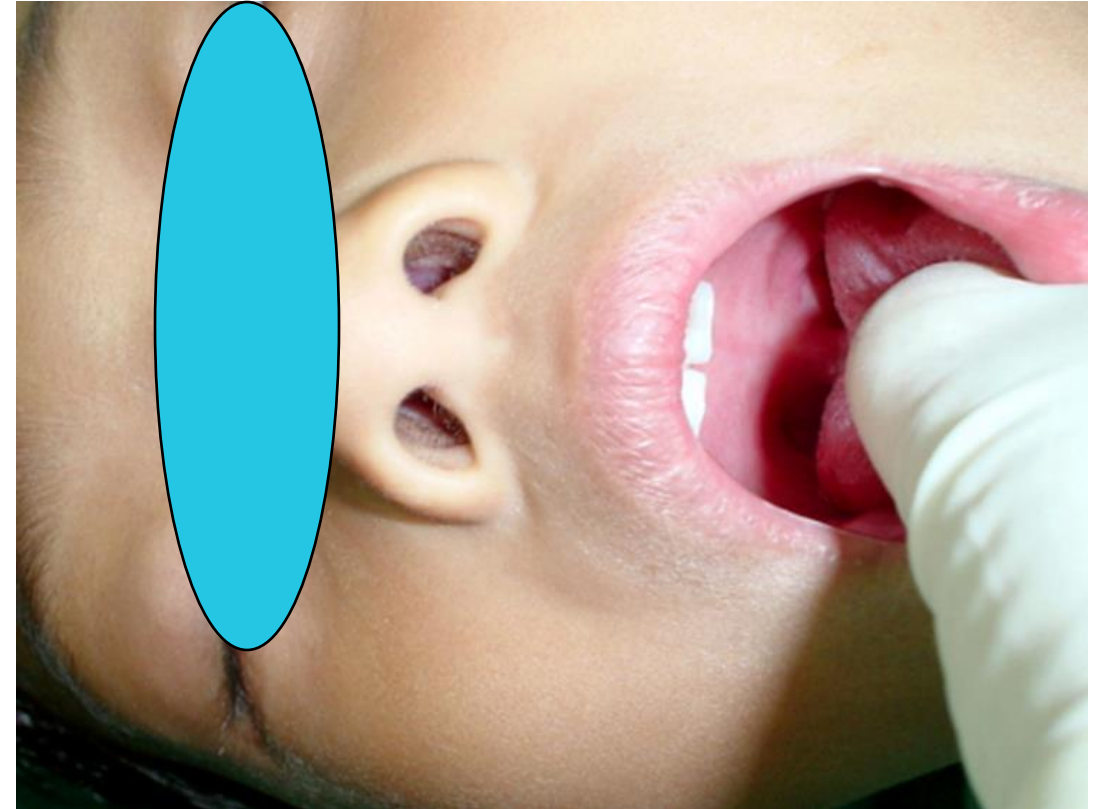
1669  
&  
Transfer  
to  
Hospital



# Back blows & Chest thrust



# Jaw-tongue lift maneuver



# Heimlich maneuver





# Thank You

