Endotracheal tube (ETT)

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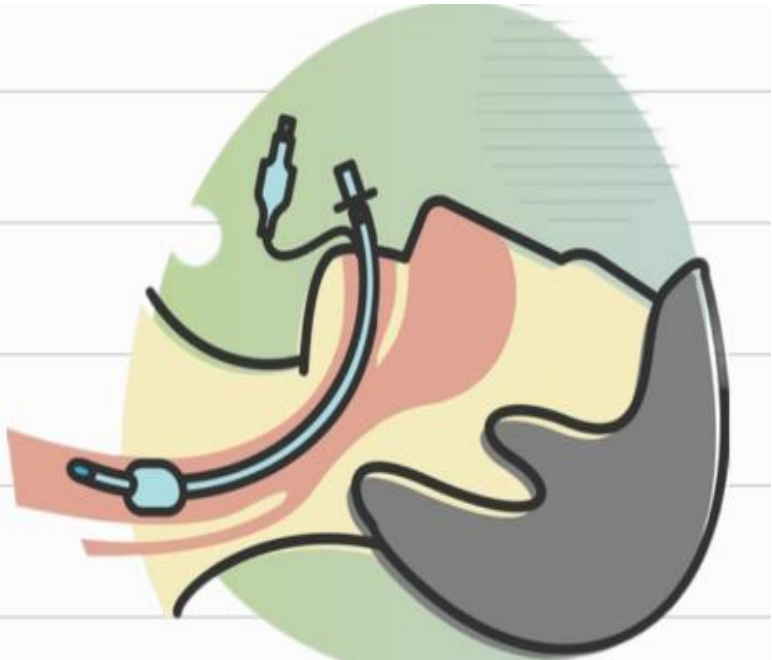
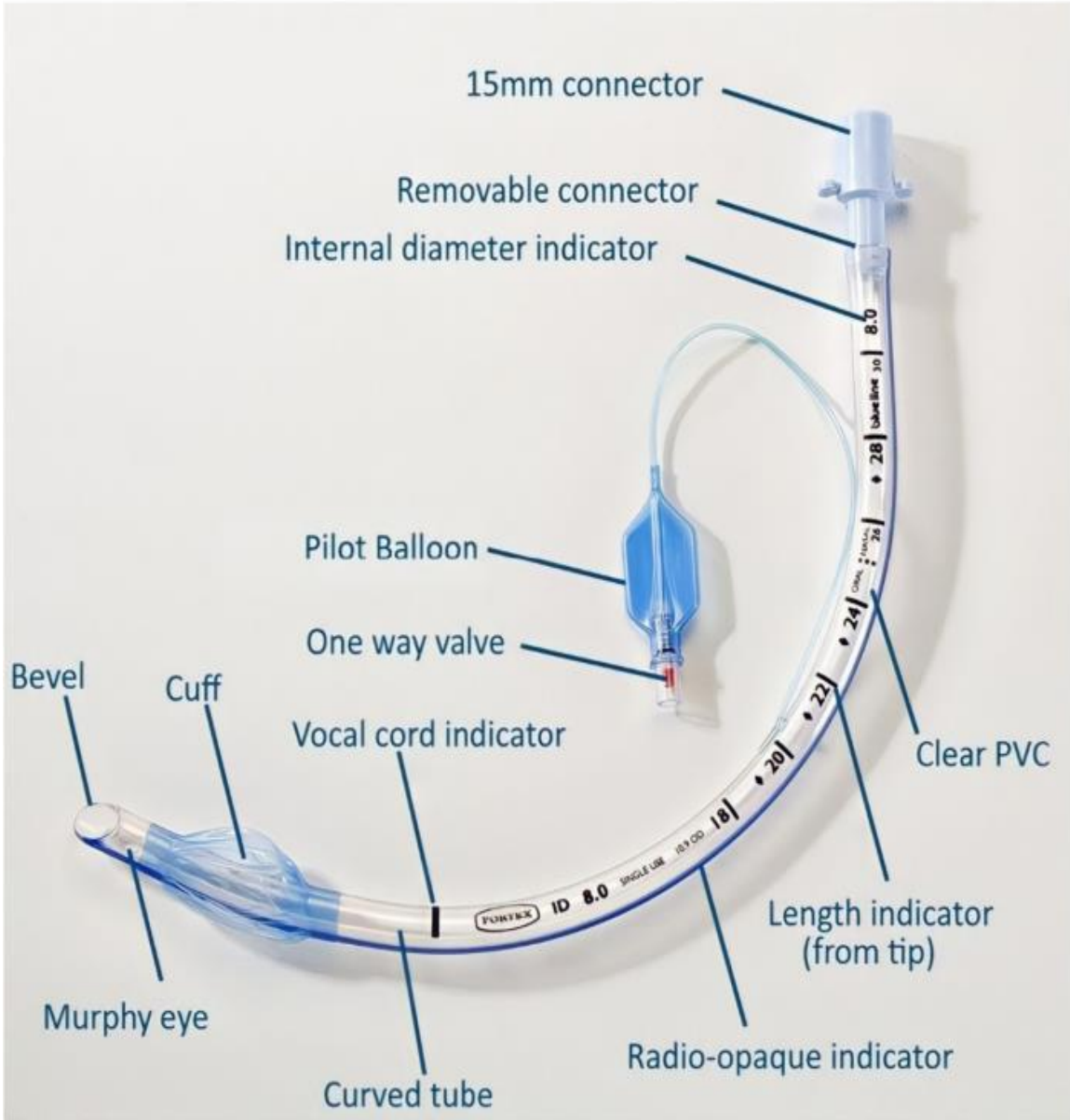
Endotracheal tube (ETT)

Components:

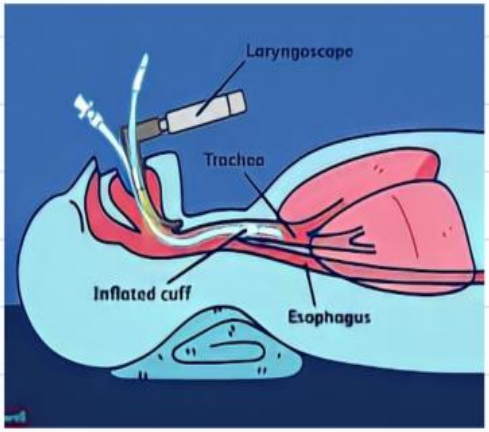
1- bevel
2- Murphy eye
3- Cuff
4- Vocal cord indicator
5- Radio-opaque line
6- Pilot Ballon
7- One way valve
8- inflation line
9- Connector





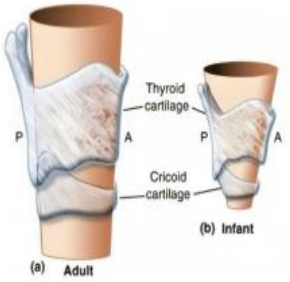
The cuff

1. Tracheal (oral or nasal) tubes can be either cuffed or uncuffed. The cuff, when inflated, provides an air-tight seal between the tube and the tracheal wall. This air-tight seal protects the patient's airway from aspiration and allows efficient ventilation during IPPV.



2. The narrowest point in the adult's airway is the glottis (which is hexagonal). In order to achieve an air-tight seal, cuffed tubes are used in adults.

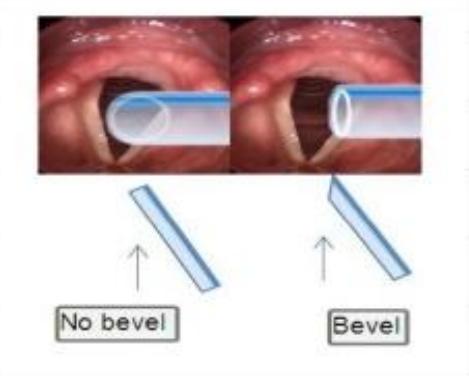
3. The narrowest point in a child's airway is the cricoid cartilage. Since this is essentially circular, a correctly sized uncuffed tube will fit well. Because of the narrow upper airway in children.



Adult trachea(a) vs paediatric trachea(b)

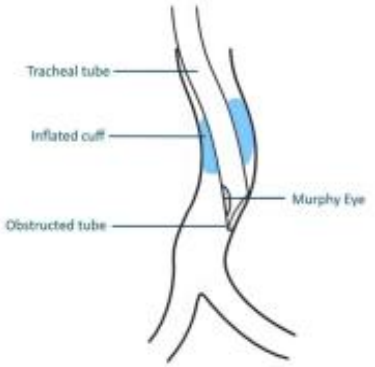
The bevel

The bevel is left-facing and oval in shape in most tube designs. A left-facing bevel improves the view of the vocal cords during intubation.



Murphy eye

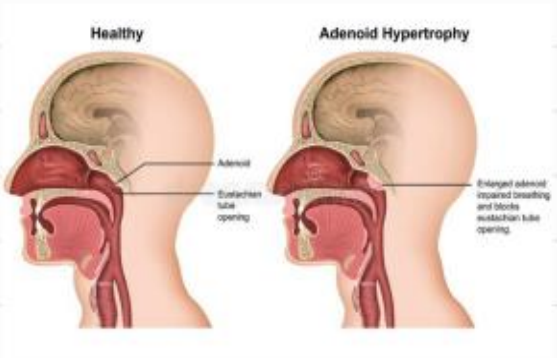
a side hole just above and opposite the bevel, This enables ventilation to occur should the bevel become occluded by wall of the trachea.

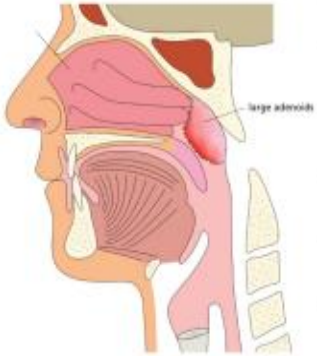


Note :

1- Nasal intubation is usually avoided, if possible, in children up to the age of 8–11 years. Hypertrophy of the adenoids in this age group increases the risk of profuse bleeding if nasal intubation is performed.

2- Ivory PVC nasotracheal tubes cause fewer traumas to the nasal mucosa.

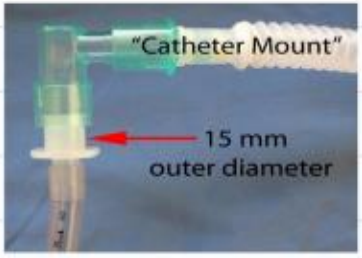




Connectors

These connect the tracheal tubes to the breathing system (or catheter mount).

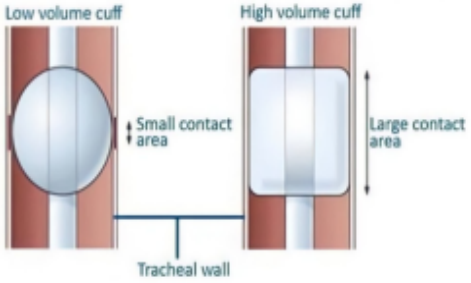
Standard connector has a 15-mm diameter at the proximal end. On the tracheal tube end, the connector has a diameter that depends on the size of the tracheal tube.

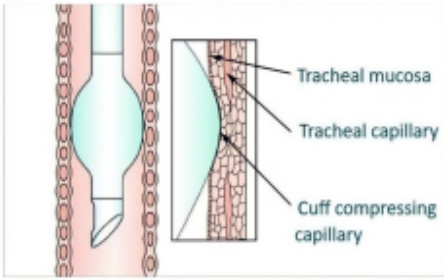


4. Cuffs can either be:

a) High pressure/low volume

b) Low pressure/high volume.





The cuff should be inflated to the lowest pressure at which there is no longer an air leak, this should be below 30cmH2O although the idea range is **15-25cm H2O**. Above 40cm H2O there is an increasing risk of mucosal necrosis. At 80cm H2O mucosal necrosis can occur within 40 minutes.

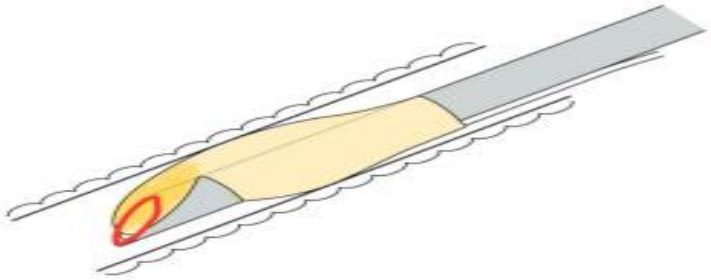
Route of insertion

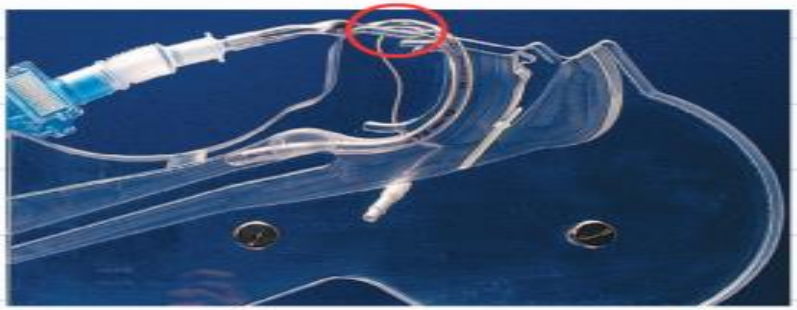
a. Surgery where access via the mouth is necessary, e.g. ENT or dental operations

b. Long-term ventilated patients on intensive care units. Patients tolerate a nasal tube better, and cannot bite on the tube. However, long-term nasal intubation may cause sinus infection.

Problems in practice and safety features

1. Obstruction of the tracheal tube by kinking, herniation of the cuff, occlusion by secretions, foreign body or the bevel lying against the wall of the trachea.





2. Oesophageal or bronchial intubation.
3. Trauma and injury to the various tissues and structures during and after intubation.

Pediatric tube size and length:

- Size of uncuffed ETT : children 1-12 years: Age /4 +4
- Depth of ETT insertion oral: Age/2 +12

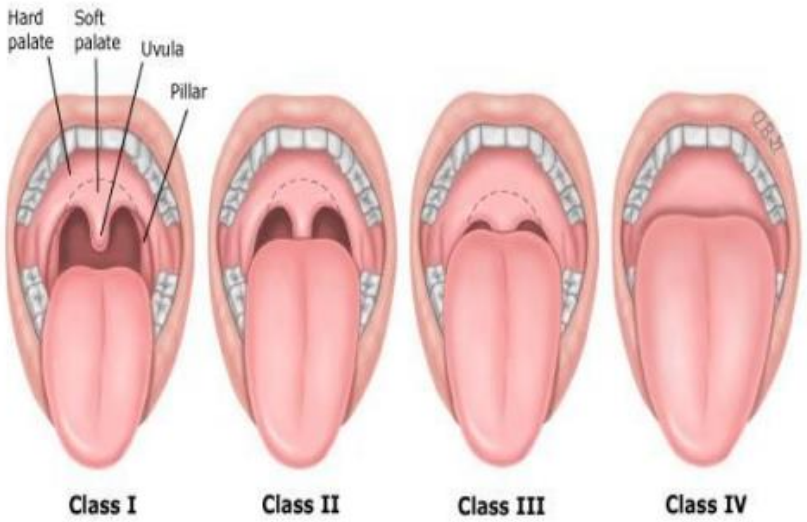
Indications of Endotracheal Intubation

- Endotracheal intubation is indicated in various situations, including:

1. Upper airway obstruction.
2. Respiratory failure.
3. Loss of consciousness.
4. Supporting ventilation during general anesthesia.
5. Patients at risk of pulmonary aspiration.
6. Difficult mask ventilation.
7. Patients at risk of upper airway obstruction (e.g., burns of the upper airways).

Airway Assessment

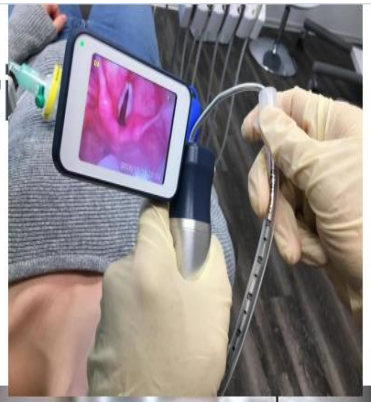
1. Mallampati classification: Used to assess the airway anatomy's visibility during intubation.
    1. Class I: Visualization of the soft palate, uvula, and anterior and posterior pillars.
    2. Class II: Visualization of the soft palate and uvula.
    3. Class III: Visualization of the soft palate and base of the uvula.
    4. Class IV: Only the hard palate is visible, making Classes III and IV difficult to intubate.



Introduction

- History of intubation:
  - Laryngoscopy began in the 1800s with indirect attempts to visualize the glottis.
  - In the 1900s, pioneers like Chevalier Jackson, Miller, and Magill introduced direct laryngoscopy.
  - The flexible fiberoptic bronchoscope became the gold standard in the 1960s for difficult airway management.
  - In the 2000s, video laryngoscopy emerged as a valuable tool for managing difficult intubation.

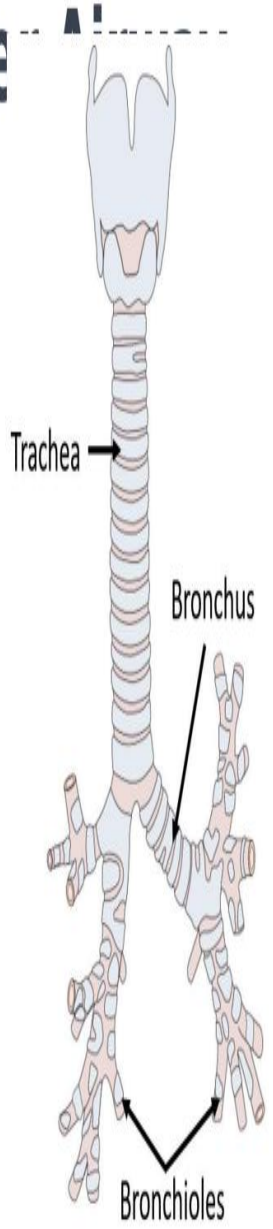
Endotracheal Intubat



- Endotracheal intubation is a critical skill performed by various medical specialists.
- It secures a patient's airway and provides oxygenation and ventilation.
- Two common approaches for endotracheal intubation: direct and indirect laryngoscopy.

Anatomy of the Uppe

- The upper airway includes the oral cavity, pharynx, and larynx.
- These structures humidify and warm the inhaled air.
- The trachea bifurcates into the right and left mainstem bronchi at the fifth thoracic spine.
- The obtuse angle between the trachea and the right mainstem bronchus makes it more susceptible to right mainstem intubation if the endotracheal tube is advanced too distally.



Airway Assessment

1.Interincisal gap.
2.Thyromental distance (normal >4.5 cm).
3.Flexion and extension of the neck.
4.Other factors

Preparing for the Procedure

- Essential items for safe intubation (SALT):
  - Suction for clearing secretions.
  - Airway device to lift the tongue and aid ventilation.
  - Laryngoscope for visualization.
  - Properly sized endotracheal tube (e.g., size 7.0 or 8.0 ID for the average adult).

Instruments Used

- Ambu bag, tube, and oxygen source.
- Plaster or tube holder.
- Introducer (stylets or Magill forceps).
- Laryngoscope.
- Suction apparatus.
- Syringe (10-mL) for cuff inflation.
- Gloves.
- Pulse oximeter.
- Stethoscope

Verifying Tube Placement

- To ensure correct tube placement, consider the following:

1.Visualize the tube passing through the vocal cords.
2.Look for misting of the tube with respirations (not always reliable).
3.Observe chest movement with respirations.
4.Auscultate breath sounds on both sides of the chest.
5.Ensure no gurgling sounds in the stomach during bagging.
6.Use waveform EtCO2 with a numeric reading (preferred method).
7.Employ an esophageal detector device.
8.Monitor rising or stable O2 saturation.

Difficult Intubation

- The American Society of Anesthesiologists defines a difficult airway as a clinical situation in which anticipated or unanticipated difficulty or failure is experienced by a trained physician in anesthesia care.
- Difficulties may arise during facemask ventilation, laryngoscopy, ventilation using a supraglottic airway (like an LMA), or tracheal intubation.