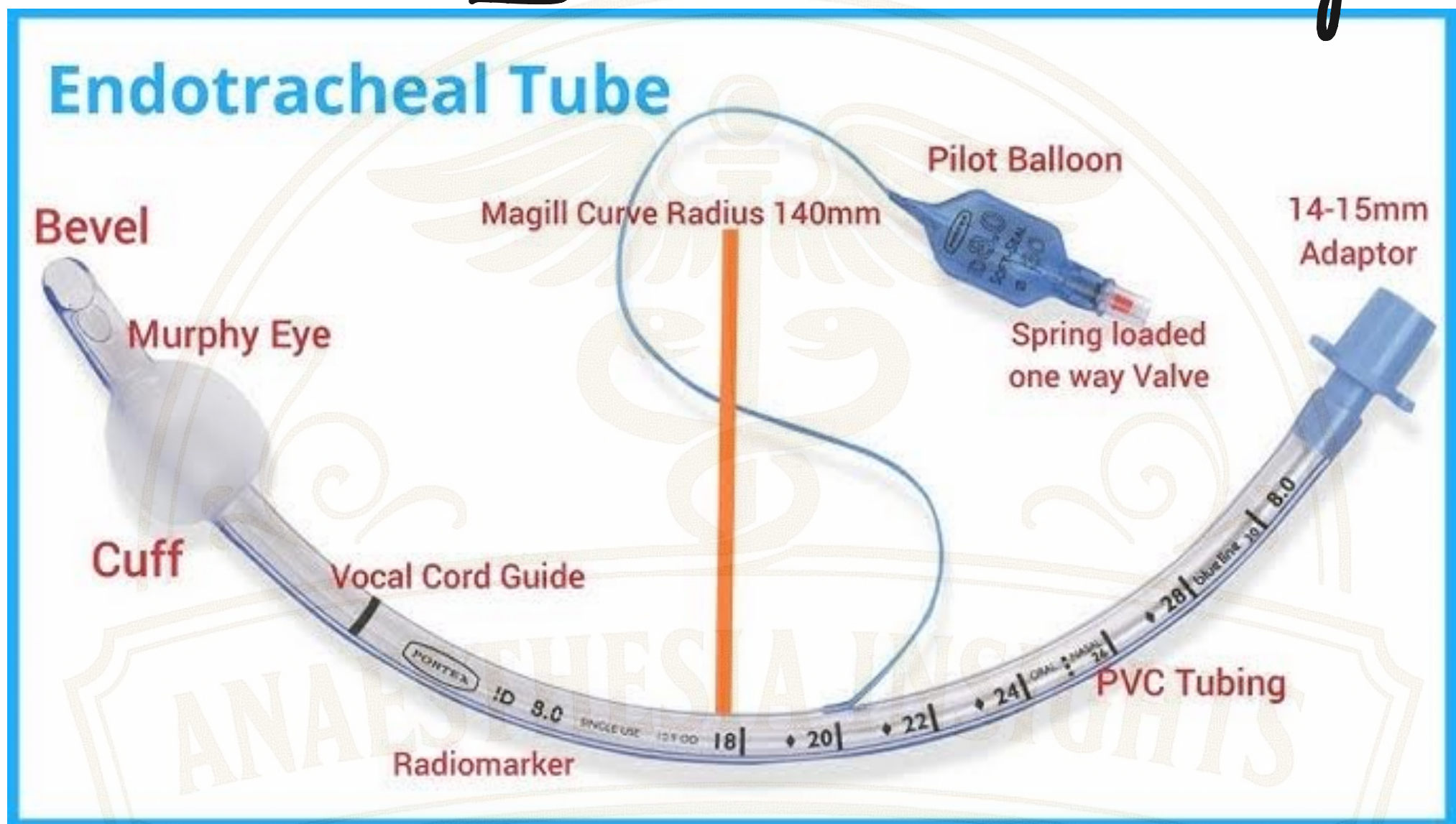


ENDOTRACHEAL TUBE (ETT)

(Conventional)

A device inserted through the larynx into the trachea to convey gas & vapours between breathing system & the lungs.



GENERAL PRINCIPLES:

① Resistance & work of breathing:

Factors that determine the resistance to gas flow

- Internal Diameter
- Tube length
- Sharp curves & kinking.

② Dead Space:

⇒ Tracheal tube & connector constitute mechanical dead space.

⇒ In pediatric pts, long tubes & connectors
↑ dead space

MATERIALS:

- 1) **RED RUBBER:** [HIGH PRESSURE; LOW VOLUME CUFF]
- ⇒ cleaned, sterilized, reused.
 - ⇒ not transparent
 - ⇒ Bubbles hardened & sticky w age.
 - ⇒ Poor resistance to kinking
 - ⇒ can become clogged by dried secretions
 - ⇒ Usually have high pressure cuff
 - ⇒ Latex allergy: a possible problem.

2) POLYVINYL CHLORIDE (PVC)

- ⇒ Inexpensive
- ⇒ Compatible with tissues
- ⇒ less likely to kink
- ⇒ Transparent - permits observation of moisture & other materials in lumen
- ⇒ low pressure cuffs.

3) SILICON:

- ⇒ More expensive
- ⇒ Can be sterilized & reused.

4) POLYURETHANE: More effective in preventing early post-op pneumonia

PARTS:

1) BEVEL: (Angle of Bevel: $30 \pm 10^\circ$)
acute

⇒ Usually faces to (L) on viewing tube from its concave aspect

This is because tube is introduced from the (R) & it's easier to visualise larynx with bevel facing to (L)

⇒ Hemispherical bevel ↓ nasal morbidity during nasotracheal intubation

⇒ During nasal intubation, turning tracheal tube so that bevel faces up may avoid impinging the tip beside the (R) VC or on epiglottis.

2) MURPHY EYE:

- ⇒ alternate pathway for gas flow if lumen becomes occluded.
- ⇒ also helps to ↓ Nasal trauma.
- ⇒ Disadv: Secretions may accumulate on it.
- ⇒ Tracheal tubes lacking Murphy eye is k/a Magill's Tube.
- ⇒ If Murphy eye is absent; cuff is closer to the tip to ↓ risk of inadvertent bronchial intubation.
- ⇒ For Nasotracheal intubation, Magill type causes less trauma.

TRACHEAL TUBE MARKINGS:

To aid proper placement with respect to vocal cord.

CUFF SYSTEM: Inflation tube, pilot balloon } Inflation value.

Purpose: To provide a seal between the tube & tracheal wall to prevent pharyngeal contents from passing into the trachea & ensures no gas leaks past the cuff during positive pressure ventilation.

- The cuff also serves to centre the tube in the trachea.

⇒ Low volume ; High pressure cuff:

- Red rubber tubes
- Reusable Silicon tube

⇒ As the cuff is inflated, inflating pressure
↑ because compliance of cuff wall is low.

⇒ Better protection against aspiration

⇒ Better visibility during intubation

⇒ Lower incidence of sore throat.

⇒ High volume ; low pressure cuff:

⇒ High residual volume ; high compliance

⇒ ADV: cuff wall is not stretched,
intra cuff pressure closely approximates
the pressure on the tracheal wall.

∴ It is possible to measure & regulate
the pressure exerted on tracheal mucosa.

⇒ DISADV:

• Difficult to insert because cuff may
obscure the view of tip of larynx.

- The cuff may be torn during intubation if forceps are used.
- High chance of dislodging.

⇒ Greater incidence of sore throat

⇒ May not prevent fluid from leaking into lower airway even @ high cuff pressure

PREFORMED CURVE: K/a Magill's curve
 Radius of curvature: $140 \pm 20 \text{ mm}$.

Markings on the Tube:

- Oral / Nasal.
- Tube size : mm (ID) or French (3 times external diameter in mm)
- Name of manufacturer
- longitudinal radio-opaque.

- A transverse black line (should be visible just above larynx)
- Distance from tip of level marked in centimeters
- "Single use only" on disposable tubes
- Markings describing implant testing & CE (compliance with the essential requirements of the medical devices Directive)

TUBE SIZE:

Avg adult ♀ : 7 - 7.5mm
 ♂ : 8 - 8.5mm

For children (uncuffed tubes) : < 6 yrs: $\left(\frac{\text{age in yrs}}{3}\right) + 3.5$
 > 6 yrs: $\left(\frac{\text{age in yrs}}{4}\right) + 4.5$

For > 2 yrs : MODIFIED COLE'S formula
$$\left(\frac{\text{age in yrs}}{4} \right) + 4$$

RHINE formula
$$\left(\frac{\text{age in yrs}}{4} \right) + 3$$

TUBE CUFF : Types:

- High volume ; low pressure (mlc)
- Low volume ; high pressure
- Foam cuff (polyurethane foam cuff)
- Lenz cuff (latex pilot balloon inside a plastic sheath $\rightarrow$ pressure value)

Cuff Pressure : Between 18 mm Hg to 25 mm Hg

Machine End : Has a 15 mm male fitting connector.

CONFIRMATION OF CORRECT PLACEMENT OF ETT

- ① Direct visualization of tube passing through VC
- ② Moisture formation in the tube lumen (exhaled air)
- ③ Palpation of tube over trachea.
- ④ B/L chest movement
- ⑤ B/L air entry on auscultation.
- ⑥ Feel of reservoir bag with patient's spontaneous efforts
- ⑦ Pulse oximeter.
- ⑧ * Capnometry (Most reliable method)
- ⑨ Esophageal detector device
- ⑩ Calorimetric ETCO₂
- ⑪ Chest X-Ray
- ⑫ SCOTT: Somatic confirmation of tracheal intubation

