Dr. mokhalad mohamed

M.B.Ch.B & C.A.B.A

Alaa Hussein Al-Gubouri

Msc.anasthesia &I.C.

Endotracheal tube

أسس التخدير العملي

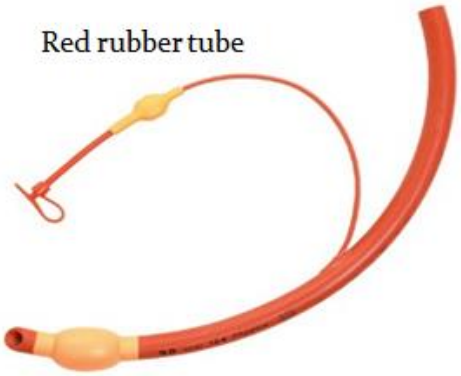
المرحلة الثانية

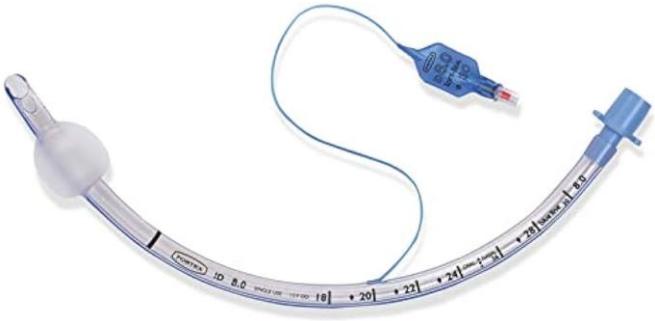
محاضرة ٣

*Tracheal tubes provide a means of securing the patient's airway, allowing spontaneous and controlled ventilation. These disposable plastic tubes are made of polyvinyl chloride (PVC).

*As plastic is not radio-opaque, tracheal tubes have a radio-opaque line running along their length, which enables their position to be determined on chest X-rays.

*In the past, tracheal tubes used to be made of rubber allowing them to be reused after cleaning and autoclaving.



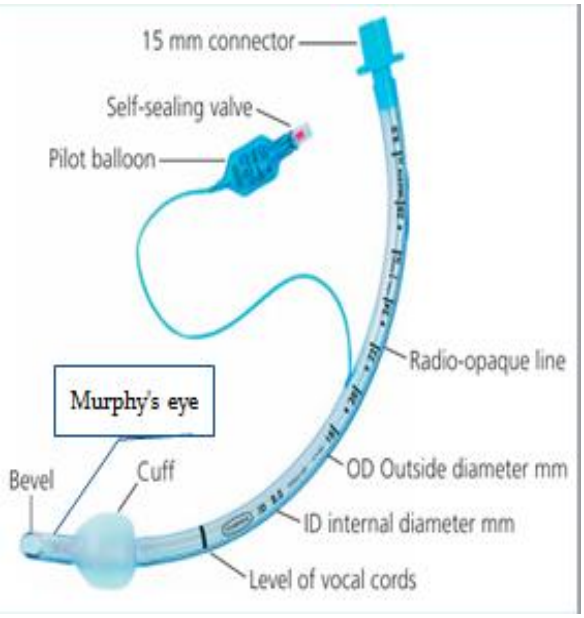


Features of endotracheal tube

1.'size' of a tracheal tube refers to its internal diameter (ID) which is marked on the outside of the tube in millimetres.

Narrower tubes increase the resistance to gas flow, therefore the largest possible ID should be used. This is especially important

during spontaneous ventilation where the patient's own respiratory effort must overcome the tube's resistance.



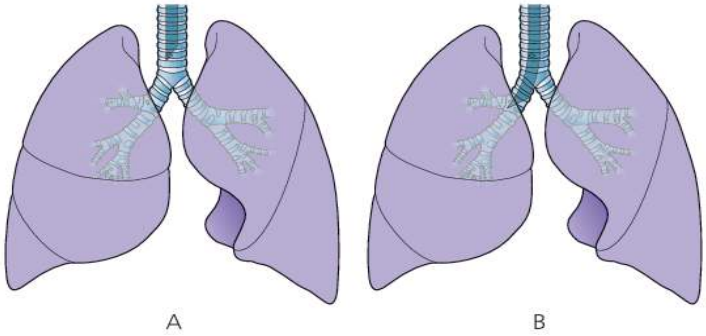
Tube size in pediatric

❖ to determine the size of pediatric tracheal tubes. A commonly used formula is:

Internal diameter in mm = age in year/4 + 4 up to 10 years

❖ Tube length in cm = age/2 +12 (or ID x 3 for an oral ETT and add 2cm for a nasal tube).

2. The length (taken from the tip of the tube) is marked in centimeters on the outside of the tube. If the tube is advance too long, there is a significant risk to be located in one of the main bronchi tracheal tube position depth should always be confirmed by auscultation.



(A) Correctly positioned tracheal tube. (B) The tracheal tube has been advanced too far, into the right main bronchus.

3. The bevel

A. The bevel is left-facing and this is improves to view the vocal cords during laryngoscopy and intubation.

B. Murphy eye is a side hole just above and opposite the bevel and it is enables ventilation when bevel become occluded.

4.The cuff

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 intermittent positive pressure ventilation (IPPV).

❖ The cuff is connected to its pilot balloon which has a self-sealing valve for injecting air. The pilot balloon also indicates whether the cuff is inflated or not. After intubation, the cuff is inflated until no gas leak can be heard during IPPV.

❖ The narrowest point in the adult's airway is the glottis(which is hexagonal) while The narrowest point in a child's airway is the cricoid cartilage which is circular, a correctly sized uncuffed tube will fit well. Because of the narrow upper airway in children, post-extubation subglottic oedema is more common and can be a problem. In order to minimize the risk, the presence of a small leak around the tube at an airway pressure of 15 cm H2O is desirable.

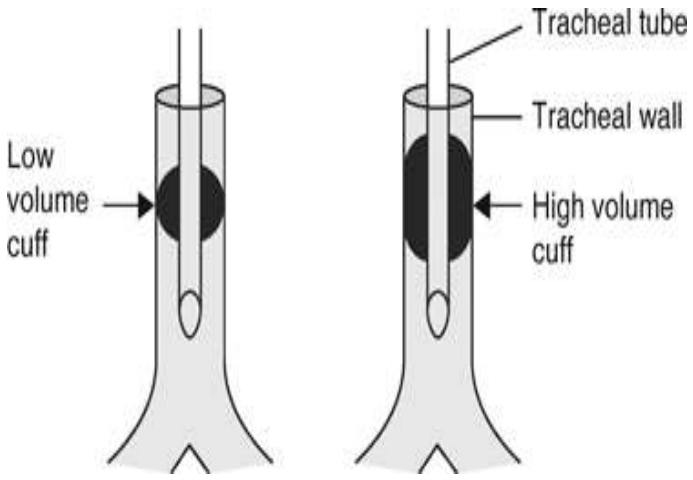
Cuffs can either be

A. high pressure/low volume : These can prevent the passing of vomitus, secretions or blood into the lungs. At the same time, they exert a high pressure on the tracheal wall. If left in position for long periods, they may cause necrosis of the tracheal mucosa.

B. low pressure/high volume : These exert minimal pressure on the tracheal wall as the pressure equilibrates over a wider area .This allows the cuff to remain inflated for longer periods.

They are less capable of preventing the aspiration of vomitus or secretions.

The pressure in the cuff should be checked at frequent and regular intervals maintaining a pressure of 15–20 mmHg (20–30 cm H2O).



5.Route of insertion

*Tubes can be inserted orally or nasally.

*The indications for nasal intubation include:

1.surgery where access via the mouth is necessary, e.g. ear, nose and throat (ENT) or dental operations

2. long-term ventilated patients on intensive care units. Patients tolerate a nasal tube better, and cannot bite on the tube.

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

6.Connectors

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

a 15-mm diameter at the proximal end

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 aginst the wall of the trachea

2. Oesophageal or bronchial intubation.

3. Trauma and injury to the various tissues and structures during and after intubation.

Specially designed tracheal tubes

1.ARMOURED/REINFORCED TRACHEAL TUBE

Armoured tracheal tubes are made of plastic or silicone rubber. The walls of the armoured tube are thicker than ordinary tracheal tubes because they contain an embedded spiral of metal wire or tough nylon. The spiral helps to prevent the kinking and occlusion of the tracheal tube .They are used in anesthesia for head and neck surgery.

It’s flexible so An introducer stylet is used to aid intubation.



2.Double lumen endobronchial tubes

During thoracic surgery, one lung needs to be deflated. This offers the surgeon easier and better access within the designated hemithorax. In order to achieve this, double lumen tubes are used which allow the anaesthetist to selectively deflate one lung while maintaining standard ventilation to the other.

DLT has two separate colour-coded lumens One lumen ends in the trachea and the other lumen ends in either the left or right main bronchus. Each lumen has its own cuff (tracheal and bronchial cuffs) and colour-coded pilot balloons.



3.RAE (Ring, Adair and Elwyn) tube

The RAE tube has a preformed shape to fit the mouth or nose without kinking. It has a bend located just as the tube emerges, so the connections to the breathing system are at the level of the chin or forehead and not interfering with the surgical access. RAE tubes can be either north- or south-facing, cuffed or uncuffed.

Its mainly use in Head and neck surgery, ophthalmic surgery, Maxillofacial or dental surgery.



