Department of Anesthesia Techniques

Title of the lecture: - special types of tube

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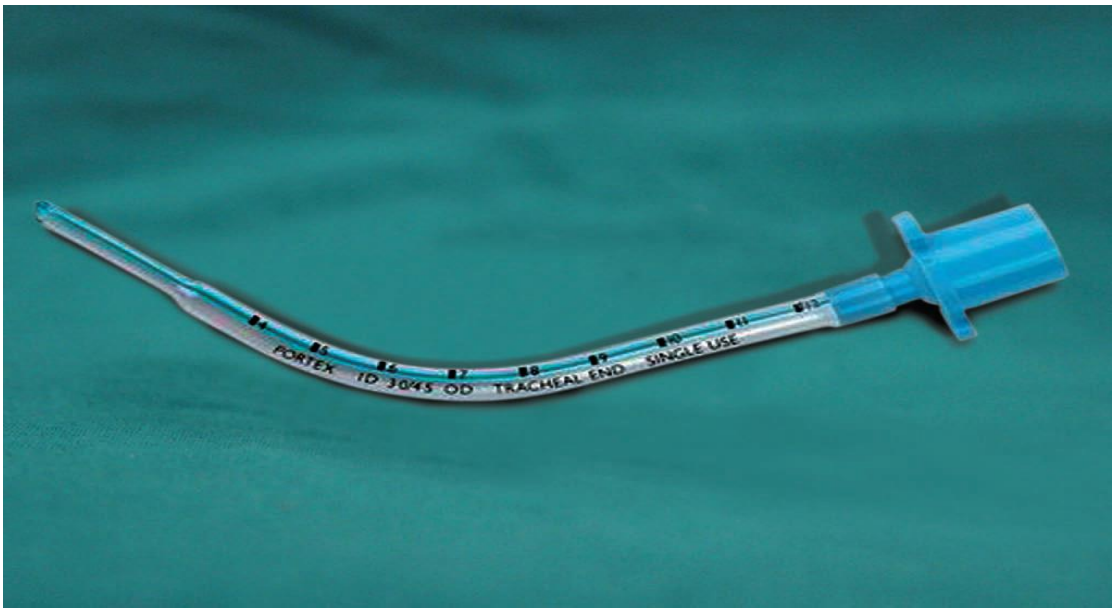
Special endotracheal tubes

Cole Tube:



Cole tube is used in emergency neonatal resuscitation. It is an uncuffed oral tube with a patient end with smaller diameter than the rest of the shaft. It has a shoulder at the junction of narrow patient end and broad proximal end.

**There are chances of blockage of tube with secretions due to narrow patient end.

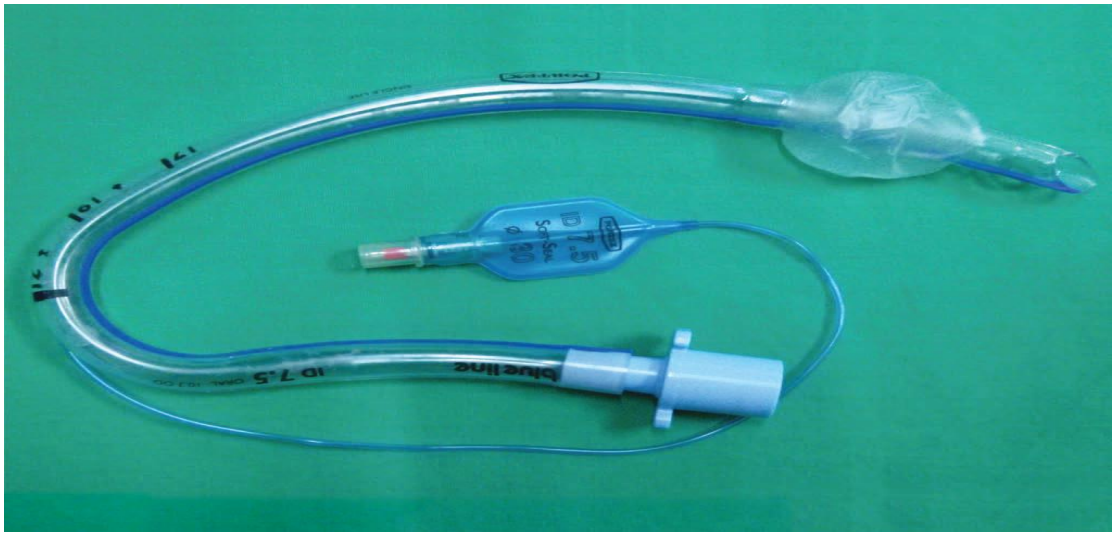
Microcuff Endotracheal Tubes:

It is a cuffed tube specially designed for children. It consists of a short, ultra-thin polyurethane cuff located away from the subglottic area.

The cuff effectively seals the tracheal wall at pressures as low as 10 cm of H2O and fills the gap between the tube and the tracheal wall without folds.

Shortened cuffs and the elimination of a Murphy eye allow a more distal position of the upper cuff border, thereby reducing the risk of pressure being applied to the cricoid ring and adjacent mucosa.

3. **Ring-Adair-Elwin (RAE) Tube**:



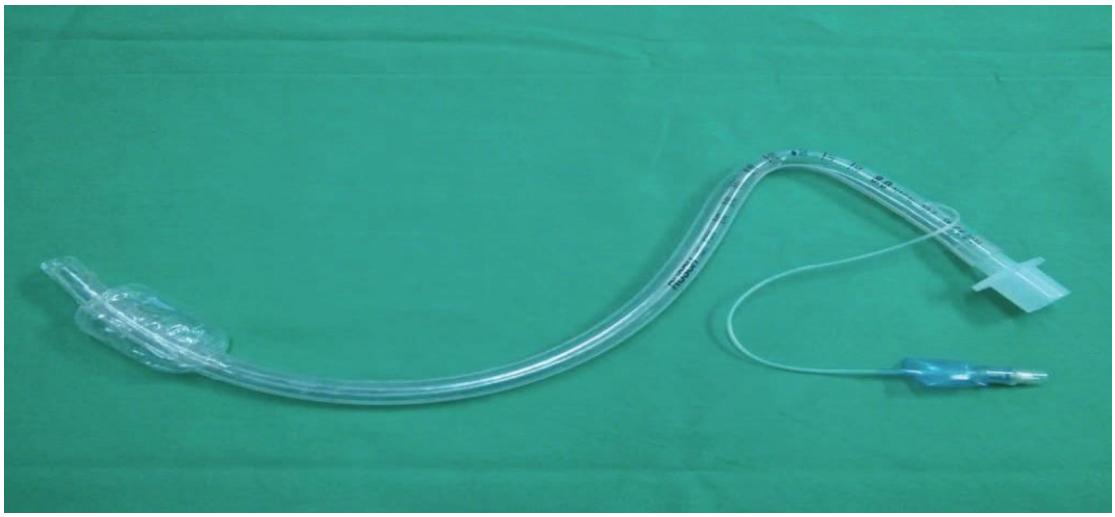
RAE tube has a preformed bend with a marking at the bend so as to facilitate surgery on head and face.

Oral or South Polar Ring-Adair-Elwin Tube

The external portion of the oral version is bent at an acute angle so that when in place, it rests on the patient's chin with the connector on chest and the proximal tube passes down the chin away from the face, thus improving surgical access in cleft lip, palate and nasal surgeries.

Nasal or North Polar Tube:

The nasal version has a cephalic curve so that when in place the outer portion of the tube is directed over the patient's forehead. This helps to reduce pressure on the nares. The nasal version is bent where it exits the nose so that the part with connector passes upwards to the forehead. It is used for surgeries on the lower face, mandible and floor of mouth.



The nasal and oral versions are available in various sizes and in cuffed and uncuffed versions. Uncuffed RAE tubes are shorter than cuffed RAE tubes and oral tubes are shorter than nasal tubes. As the diameter increases, the length and distance from the distal tip to the curve also increases.

Advantages:

• These tubes are easy to secure and reduce the risk of accidental extubation

• The curve of tube helps to place the circuit away from the surgical field

• The long length may make them useful for insertion through a supraglottic airway device

• The nasal tube may be useful for oral intubation of patients who are to be in the prone position.

Disadvantages:

• There is a difficulty in passing a suction catheter through them

• These tubes offer more resistance than comparably sized conventional tubes

• Since they are designed to fit the average patient, a tube may be either too long or too short for a given patient.

Flexometallic Tubes:

The flexometallic (spiral embedded, armored, reinforced, wire reinforced) tube is made up of rubber, PVC, or silicone and has a metal or nylon spiral wound reinforcing wire within the wall of the tube which makes it flexible and nonkinking.

Advantages:

• The primary advantage of these tubes is resistance to kinking and compression, hence useful in head and neck surgery, where head and neck is rotated or flexed

• The portion of the tube outside the patient can be angled away from the surgical field without kinking, making it useful for surgery in patient with tracheostomy, for submental intubation, and retromolar positioning

• It may pass more easily over a fiberscope than a conventional tube.

Disadvantages:

• A forceps and/or a stylet will often be needed for intubation and it may rotate on the stylet during insertion

• It is difficult to pass the tube through the nose

• Reinforced tubes have a thicker wall and therefore we get a smaller ID for a given outer diameter (OD)

• Because of the spiral, these tubes cannot be shortened.

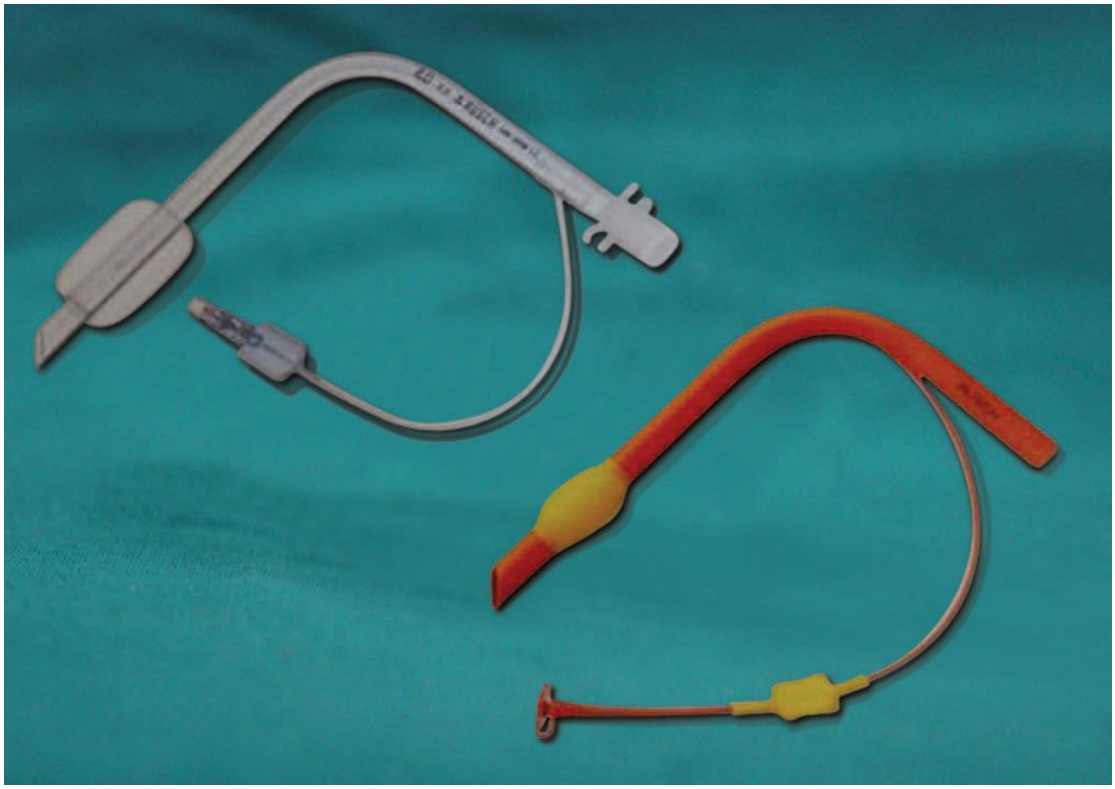
• Repeated sterilization makes the tubes sticky and soft mainly at the junction of the start of the spiral and the connector and can cause kinking at this junction

• The elastic recoil force may increase the incidence of accidental extubation hence throat pack and proper fixation of tube is must

• The tube does not have Murphy eye, hence may result in obstruction if the bevel abuts the wall of the trachea

• The metal wire spiral may obscure radiological imaging in some cervical spine surgery.

Oxford Tube:



It is an L-shaped tube made up of red rubber. It may be cuffed or uncuffed. The ID is uniform throughout the tube but the thickness of the tube wall varies. A portex tube may be better than red rubber tube in terms of kinking and resistance.

Advantages

• As the proximal portion of tube is thicker than the tracheal part, a bigger tube can be passed through the trachea

• The thicker wall at the lips prevents compression by the mouth gag in cleft lip or palate surgery

• It also can be used in prone position surgeries like posterior fossa surgery and cervical spine surgery, etc.

Disadvantages:

• All sizes are not available

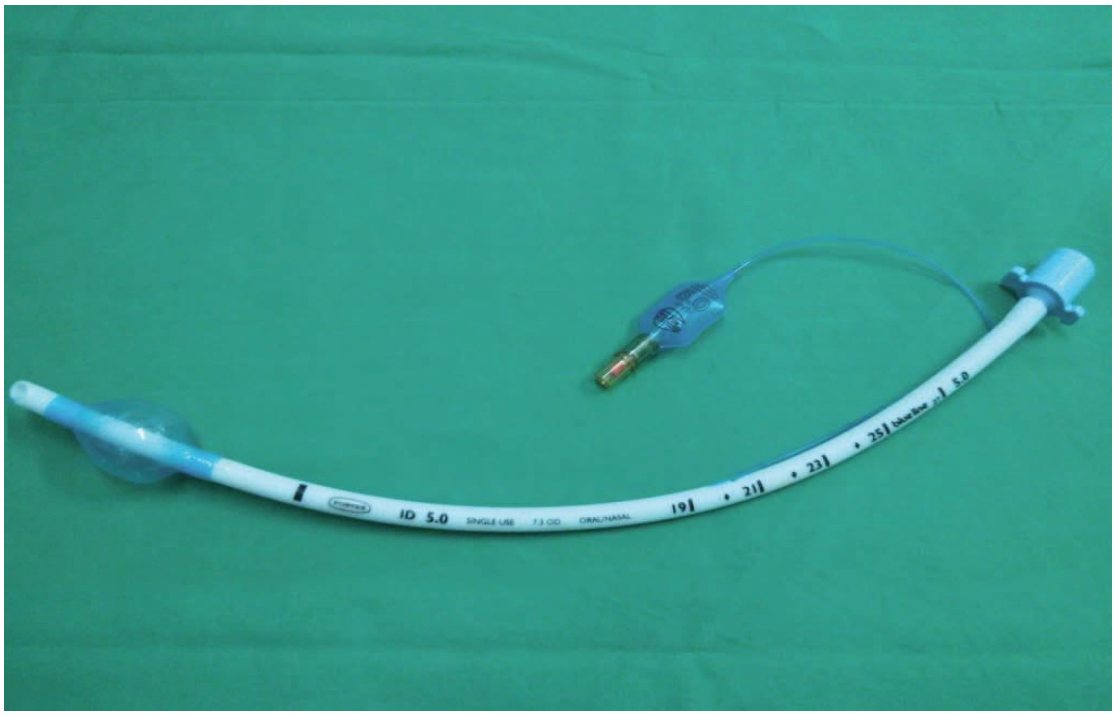
• The bevel situated posteriorly may abut against tracheal wall during flexion of head

• The tube, because of its acute curve offers greater resistance and difficult to suction

• The distance from the bevel to curve is fixed; hence to avoid endobronchial intubation a proper size tube must be used.

Microlaryngeal Tracheal Surgery Tube:

The microlaryngeal tracheal surgery tube (MLT or LTS) is available with an ID of 4, 5, or 6 mm, but an adult sized length and high volume low pressure cuff (same as on a standard 8 mm ID tube). This helps to keep the tube centered in the trachea. Sometimes it may have a yellow-colored cuff.



Advantages:

• For microlaryngeal surgery and for patients with narrow airway where a normal sized tracheal tube cannot be inserted

• The small tube diameter provides better visibility and access to the surgical field

• Its length allows it to be used for nasal intubation and intubation via a laryngeal mask airway (LMA) or other supraglottic airway device.

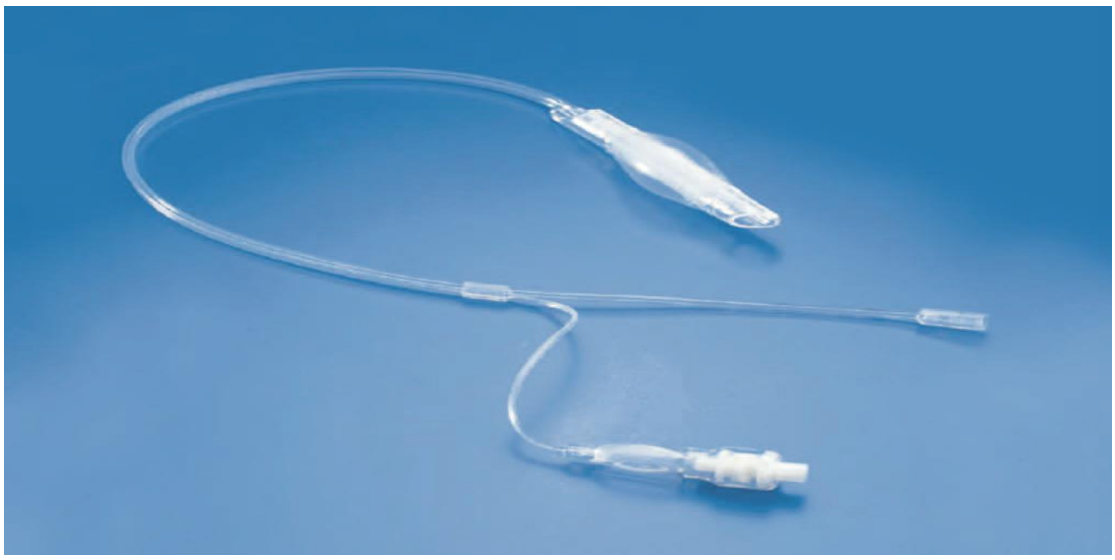
Disadvantages:

• Narrow diameter may lead to resistance to exhalation hence obligates controlled ventilation and a long expiratory phase should be used to allow complete expiration

• This type of tube is not safe for use with lasers

• Due to their flexibility they can be difficult to insert unless Magill's forceps is used.

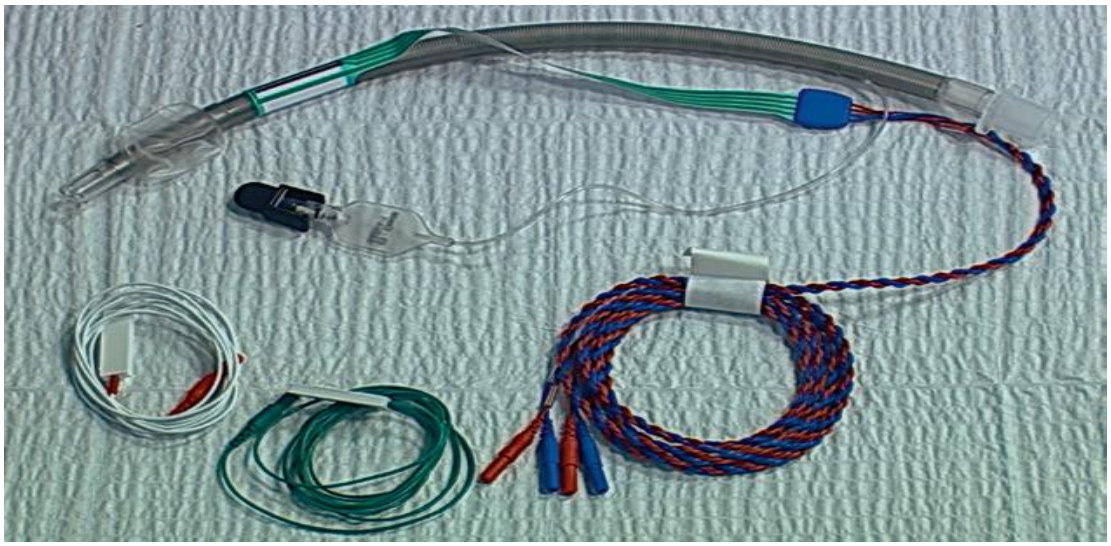
Carden tube:



This tube was developed to facilitate microsurgery of the larynx. It is rarely used now. It comprises a shortened cuffed tracheal tube that sits wholly below the glottis attached to a long catheter for insufflation of gas and a long pilot tube for the cuff.

Electromyogram Reinforced Tracheal Tube:

This tube is designed to monitor recurrent laryngeal nerve electromyogram (EMG) activity during surgery. The tube is wire reinforced and has four stainless steel electrodes above the cuff. The electrodes are connected to a monitor.



LASER-RESISTANT TRACHEAL TUBES:

These tubes are used in anaesthesia for laser surgery on the larynx or trachea. They are designed to withstand the effect of carbon dioxide and potassium titanyl- phosphate (KTP) laser beams, avoiding the risk of fire or damage to the tracheal tube.

One design hasa flexible stainless steel body. Reflected beams from the tube are defocused to reduce the accidental laser strikes to healthy tissues

Other designs have a laser-resistant metal foil wrapped around the tube for protection.

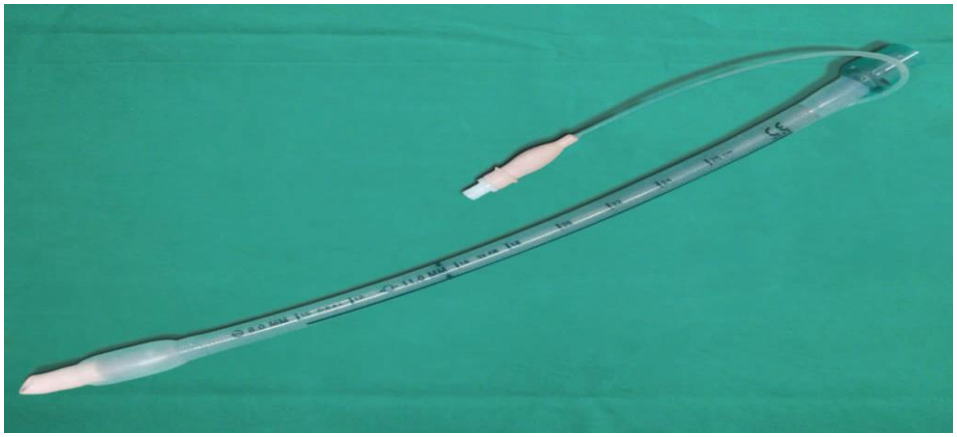
The cuff is filled with methylene blue coloured saline. If the laser manages to damage the cuff, the colouring will help identify rupture and the saline will help prevent an airway fire.

Some designs have two cuffs. This ensures a tracheal seal should the upper cuff be damaged by laser. An airfilled cuff, hit by the laser beam, may ignite and so it is recommended that the cuffs are filled with saline instead of air.

Intubating Laryngeal Mask Tracheal Tube:

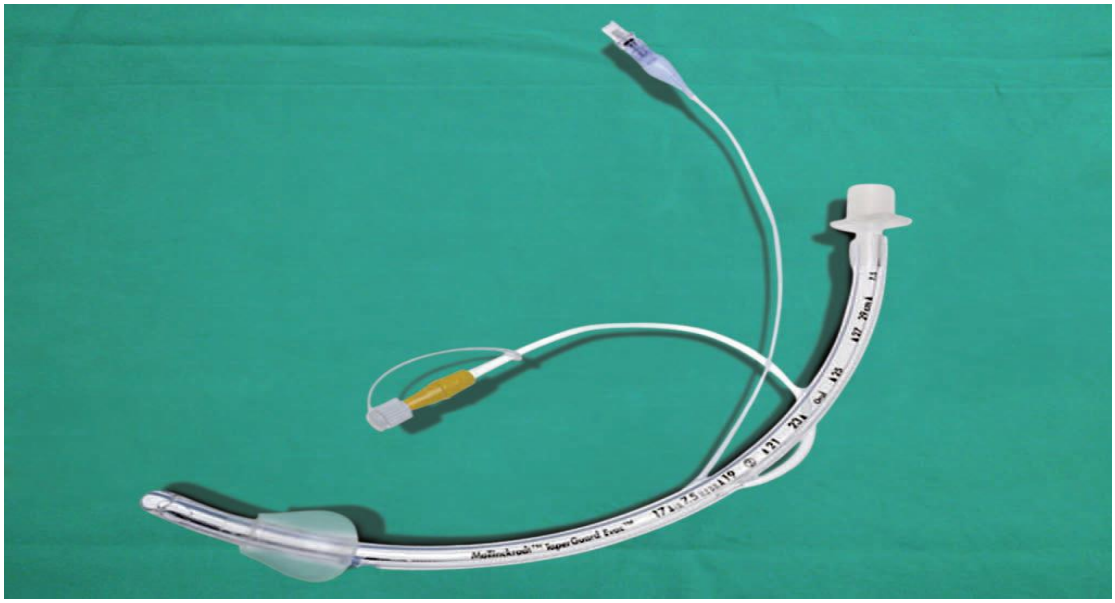
The intubating laryngeal mask (ILMA) tracheal tube is designed to be inserted through the intubating laryngeal mask but can be used separately. It is a straight, wire reinforced silicone tube with a blunt tip, short bevel, and Murphy eye. It has a high pressure, low volume cuff.

It is reusable and can be autoclaved. It is available in sizes 6, 6.5, 7, 7.5, and 8.



Hi-Lo Evac® Tube

The Hi-Lo Evac® tube incorporates a dedicated channel that can be used to clear secretions below the vocal cords but above the cuff. Results were mixed when using this tube to prevent or delay pneumonia. The lumen may become blocked by secretions.



Thanks