Practice anaesthesia equipements

Airways

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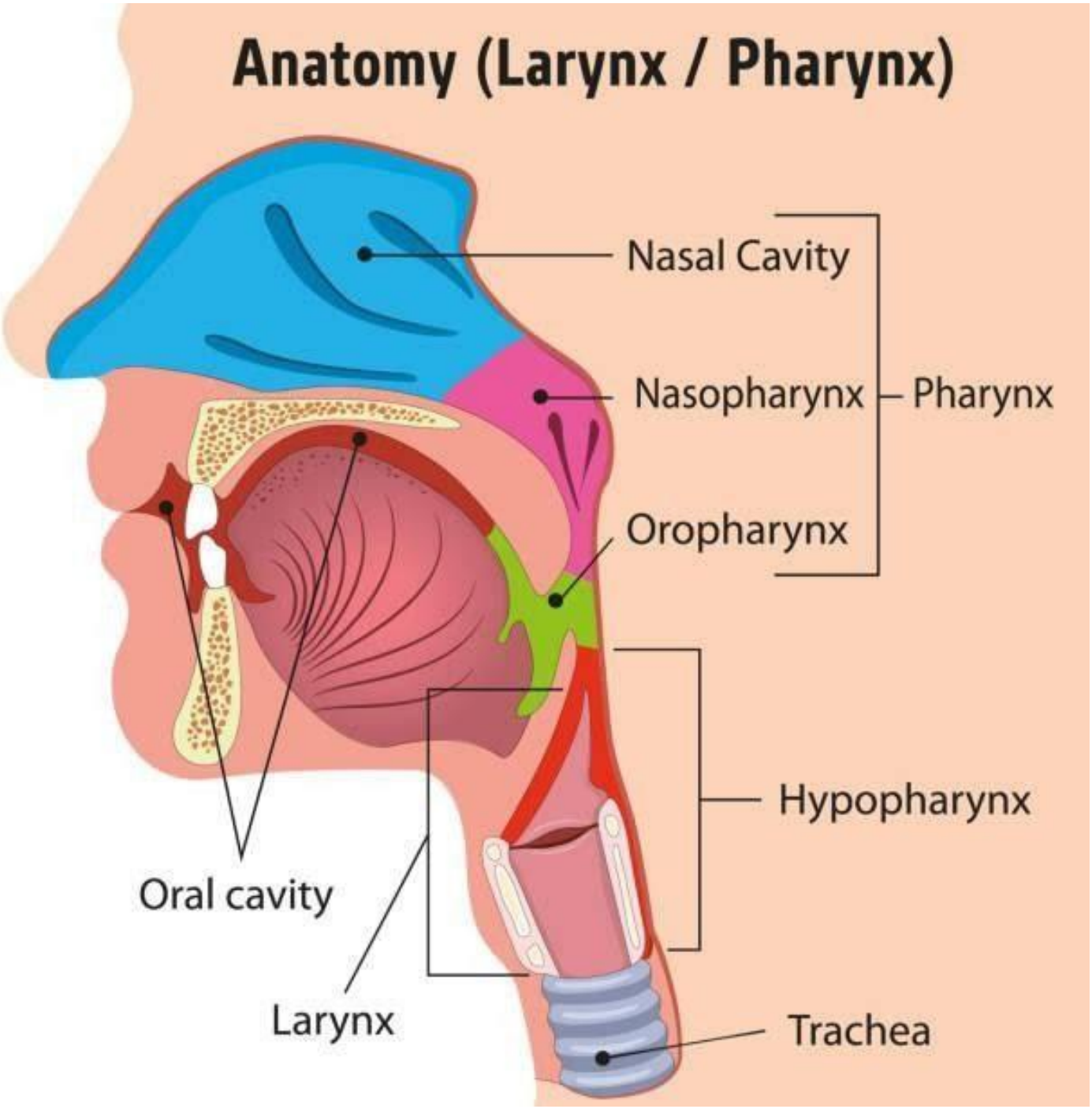
Anatomy


Anatomy (Larynx / Pharynx)
Nasal Cavity
Nasopharynx
Pharynx
Oropharynx
Hypopharynx
Oral cavity
Larynx
Trachea

Oropharyngeal airway

This anatomically shaped airway is inserted through the mouth into the oropharynx above the tongue to maintain the patency of the upper airway. in cases of upper airway obstruction caused by a decreased level of consciousness in a patient. Decreased consciousness can lead to loss of pharyngeal tone that can result in airway obstruction by the tongue, epiglottis, soft palate or pharyngeal tissues. There are various regularly used types of oropharyngeal airway. The most common type is the Guedel airway, named after its developer Arthur Guedel, an American anesthetist who served in France during the First World War. It is available in up to nine sizes, which have a standardized number coding (the smallest '000' to the largest '6').

Components:-

1. The curved body of the oropharyngeal airway contains the air channel. It is flattened anteroposteriorly and curved laterally.

2. There is a flange at the oral end to prevent the oropharyngeal airway from falling back into the mouth so avoiding further posterior displacement into the pharynx.

3. The bite portion is straight and fits between the teeth. It is made of hard plastic to prevent occlusion of the air channel should the patient bite the oropharyngeal airway.

Mechanism of action

1. The patient's airway is kept patent by preventing the tongue and epiglottis from falling backwards.

2. Oropharyngeal airways are designed in different sizes to fit the majority of patients from neonates to adults.

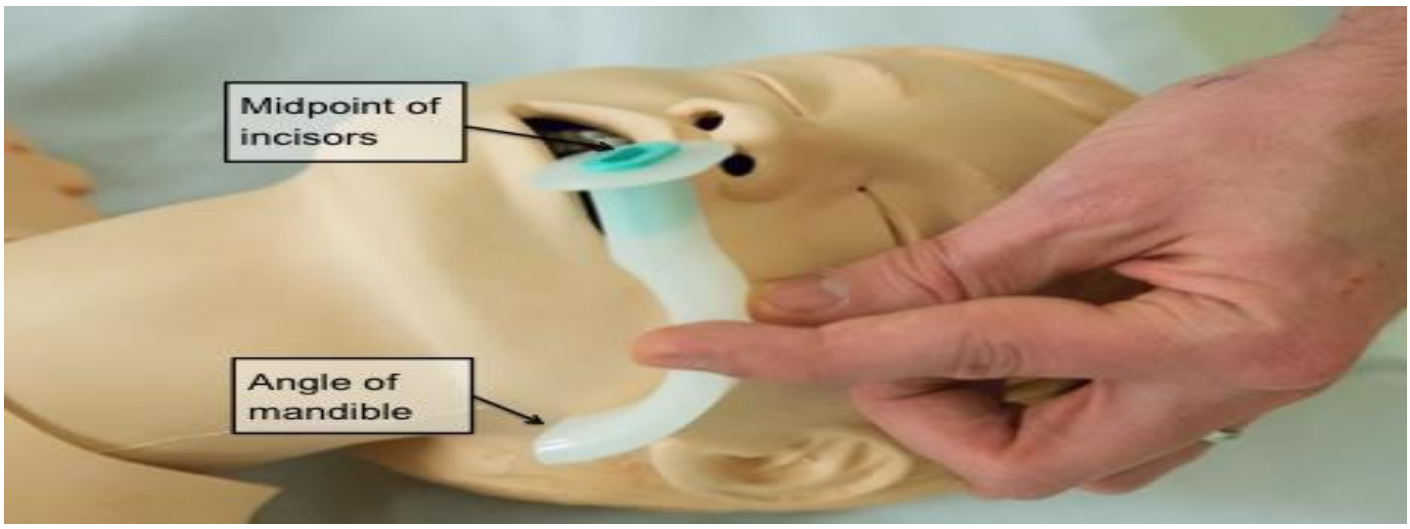
3. The air channel should be as large as possible in order to pass suction catheters.

4. As a good indication, a suitable Guedel airway size can be equivalent to either distance from the patient's incisors to the angle of the mandible, or corner of the patient's mouth to the tragus.

5. In adults, the Guedel airway is initially inserted upside down, with the curvature facing caudad. Once partially inserted, it is then rotated through 180° and advanced until the bite block rests between the incisors. This method prevents the tongue being pushed back into the pharynx, causing further obstruction.

6. In children, it is often recommended that the Guedel airway is inserted the right way round, using a tongue depressor or laryngoscope to depress the tongue.

7. Bermann airway is another type of oropharyngeal airway, designed to assist with oral fiberoptic intubation. It acts to guide the fiberscope around the back of the tongue to the larynx, with the purpose of both maintaining the patient's airway and acting as a bite block, thus preventing damage to the fiberscope.



Problems in practice and safety features

1. Trauma to the different tissues during insertion. Trauma to the teeth, crowns/ caps if the patient bites on it.

2. If inserted in a patient whose pharyngeal reflexes are not depressed enough, the gag reflex can be induced that might lead to vomiting and laryngospasm.

3. They confer no protection against aspiration.

Nasopharyngeal airway

This airway is inserted through the nose into the nasopharynx, bypassing the mouth and the oropharynx. The distal end is just above the epiglottis and below the base of the tongue.

Mechanism of action

1. It is an alternative to the oropharyngeal airway when the mouth cannot be opened or an oral airway does not relieve the obstruction.

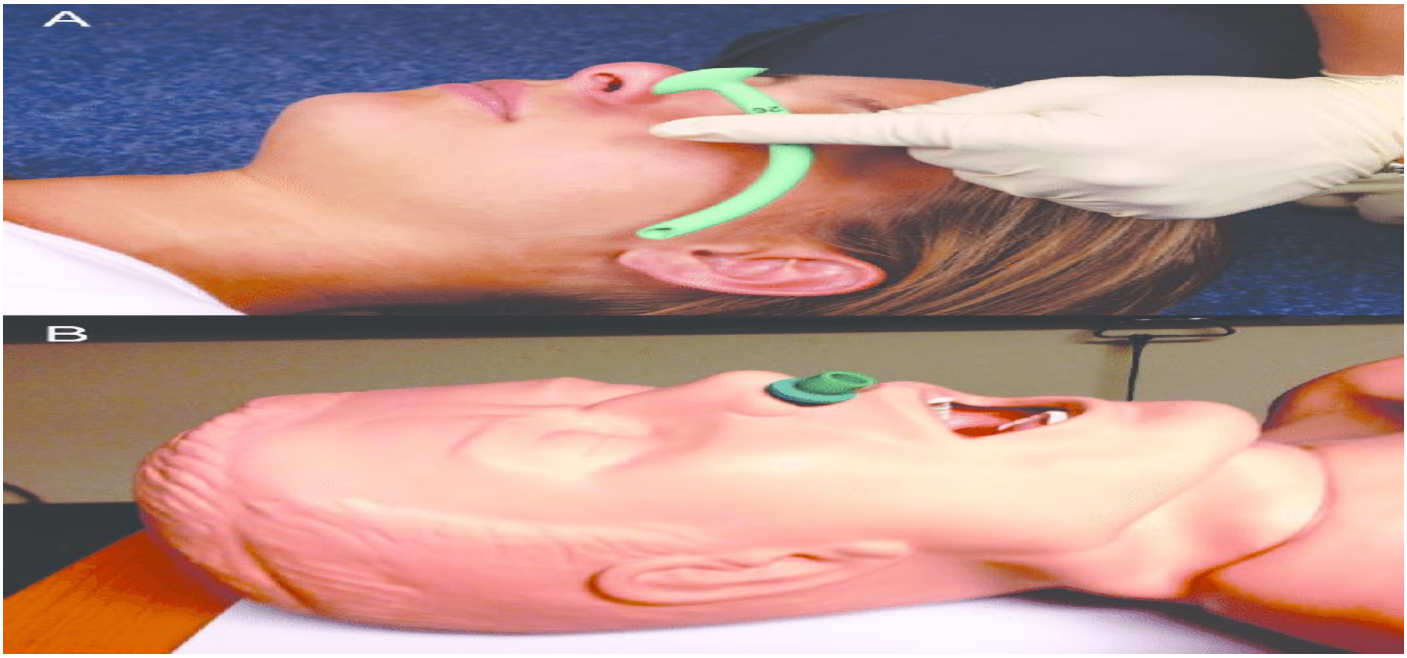
2. Nasotracheal suction can be performed using a catheter passed through the nasal airway.

3. It is better tolerated by semi awake patients than the oral airway.

4. A lubricant is used to help in its insertion.

5. The size inserted can be estimated as size 6 for an average height female and size 7 for an average height male.

6. Once lubricated, it can be inserted through either nares, although the left-facing bevel is designed to ease insertion into the right nostril.



Problems in practice and safety features

1. Its use is not recommended when the patient has a bleeding disorder, is on anticoagulants, has nasal deformities or sepsis.

2. Excess force should not be used during insertion as a false passage may be created.

3. An airway that is too large can result in pressure necrosis of the nasal mucosa, while an airway that is too small may be ineffective at relieving airway obstruction.

Supraglottic (or extra glottic) airway devices

Benefit:-

1. The ability to be placed without direct visualization of the larynx.

2. Increased speed and ease of placement when compared with tracheal intubation.

3. Increased cardiovascular stability on insertion and emergence.

4. During emergence, improved oxygen saturation and lower frequency of coughing.

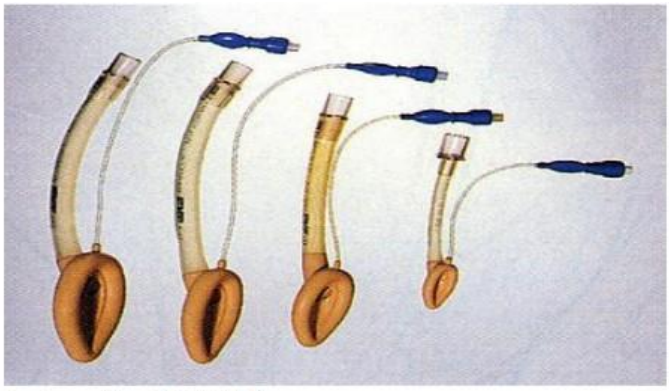
5. Minimal rise in intraocular pressure on insertion.

6. When the device is properly placed, it can act as a conduit for oral tracheal intubation.

7. In the 'can't intubate, can't ventilate' scenario, the decision to use such devices should be made early to gain time while attempts are made to secure a definite airway.

➢Laryngeal mask (classical LMA)

This very useful device is frequently used as an alternative to either the face mask or tracheal tube during anaesthesia.



(classical LMA)

(LMA-Supreme™. Note the drainage lumen.

Reinforced laryngeal mask, single use (left) and reusable (right).

Components:-

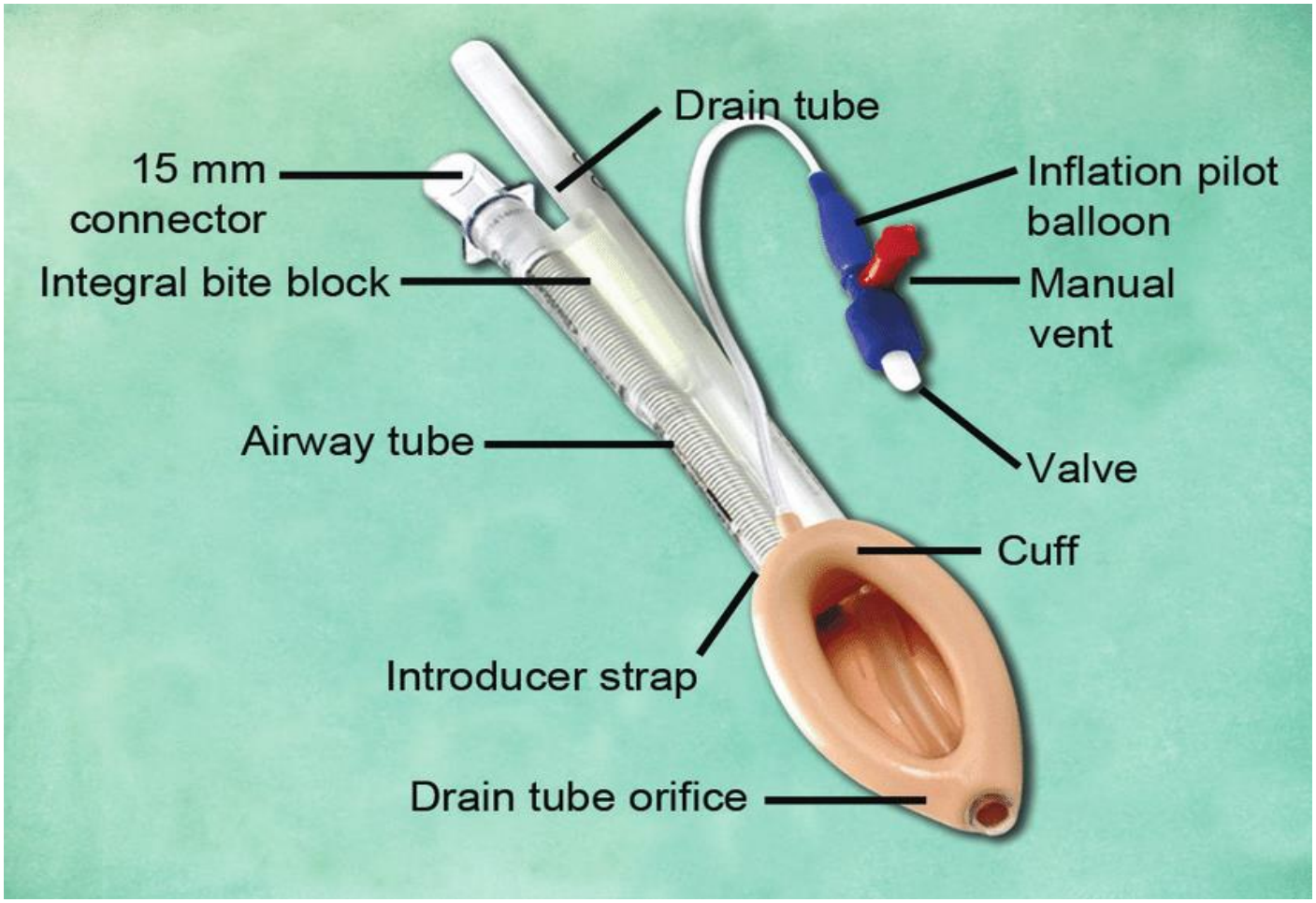
1. A transparent tube of wide internal diameter. The proximal end is a standard 15-mm connection.

2. An elliptical cuff at the distal end. The cuff resembles a small face mask to form an air-tight seal around the posterior perimeter of the larynx and is inflated via a pilot balloon with a self-sealing valve.

3. The original design (Classic LMA™) had two slits or bars at the junction between the tube and the cuff to prevent the epiglottis from obstructing the lumen of the laryngeal mask.

4. A modified design (LMA ProSeal ™) has an additional lumen (drain tube) lateral to the airway tube, allowing blind passage of an orogastric tube and helps in the drainage of gastric air or secretions.

5. A single-use version, (LMA Supreme™), is available which combines the best features of previous LMA versions, and contains an elliptical and anatomically shaped curve, which facilitates insertion success and provides a double seal. A first seal is important for adequacy of gas exchange, better known as the oropharyngeal seal. It also incorporates a second seal, designed to reduce the risk of stomach insufflation during ventilation, to provide a passive conduit for (unexpected) regurgitation or active suctioning of gastric content and enhances the effectiveness of the first seal.



The recommended sizes and cuff inflation volumes

	Size of patient	***Cuff inflation volume***
Size 1	Neonates, infants up to 5 kg	Up to 4 mL
Size 1.5	Infants 5–10 kg	Up to 7 mL
Size 2	Infants/children 10–20 kg	Up to 10 mL
Size 2.5	Children 20–30 kg	Up to 14 mL
Size 3	Paediatric 30–50 kg	Up to 20 mL
Size 4	Adult 50–70 kg	Up to 30 mL
Size 5	Adult 70–100 kg	Up to 40 mL
Size 6	Large adult over 100 kg	Up to 60 mL

Mechanism of action

1. A variety of techniques have been described for the insertion of the laryngeal mask. It should provide an adequate seal for spontaneous and mechanical ventilation with a minimal leak, at a pressure of 20–25-cm H2O. A seal pressure of up to 35 cm H2O can be achieved with the LMA-Proseal™.

2. The cuff is deflated and lubricated before use. It is inserted through the mouth. The cuff lies over the larynx.

3. Once the cuff is in position, it is inflated.

The recommended safety checks before the use of laryngeal masks:

- Inflate the cuff and look for signs of herniation.
- Check that the lumen of the tube is patent.
- The tube can be bent to 180° without kinking or occlusion.
- Inspect the device for signs of dehiscence of the tube or mask aperture bars.
- The device should also be inspected after removal from the patient for signs of bleeding.

➢I-gel airway

The i-gel airway is a single-use extra glottic airway that uses an anatomically designed mask to fit the peri laryngeal and hypopharyngeal structures without the use of an inflatable cuff. It also incorporates a second drain tube. Two separate ventilation and gastric channels or lumens. The gastric channel allows direct suctioning or passage of a gastric tube. It is intended for use with fasted patients, with both spontaneous and controlled ventilation, and can be used as a conduit for tracheal intubation.