

Artificial Airways & Insertion Techniques

Nasopharyngeal airway

- Flexible rubber tube which goes through the nose ends at base of tongue (an *adjunct* to help keep airway open)
- An oxygen mask or bag mask ventilation can be applied over the top if needed
- **Use:** prevents tongue covering epiglottis in patients with reduced GCS. It is tolerated better than oropharyngeal airways in more alert patients.
- **Size:** should be similar to distance between nostril and tragus; 6-7mm diameter for most adults
- **Insertion technique:**
 - Lubricate the nasopharyngeal airway with water-soluble jelly
 - Insert into the nostril (preferably right) vertically along the floor of the nose with a slight twisting action (aim towards the back of the opposite eyeball)
 - Confirm airway patency



Oropharyngeal airway (e.g. Guedel)

- Rigid plastic tube which sits along top of mouth and ends at base of tongue (an *adjunct* to help keep airway open)
- An oxygen mask or bag mask ventilation can be applied over the top if needed
- **Use:** prevents tongue covering epiglottis in patients with reduced GCS
- **Size:** should be similar to distance between corner of mouth and angle of jaw
- **Insertion technique:**
 - Ensure no foreign bodies in the mouth
 - Lubricate the oropharyngeal airway
 - Insert into the mouth upside down (reduces risk of pushing tongue back) – do not continue if patient gags
 - Once tip is around hard-soft palate junction, rotate 180° and advance the rest of the way
 - Confirm airway patency



Supraglottic airway (e.g. laryngeal mask airway, LMA; i-Gel)

- Flexible plastic tube with inflatable circular opening on end which sits over top of larynx (some aspiration protection but doesn't fully secure airway and can only withstand a small amount of positive pressure ventilation)
- Attached to ventilation machine which allows spontaneous ventilation ± low-level positive pressure ventilation supplementation during surgery, or attached to ventilation bag in respiratory arrest
- **Use:** *airway protection* during anaesthetic for surgery (if no risk of aspiration and a muscle relaxant is not required); cardiac arrest; if there is an indication for endotracheal intubation but the provider is not trained or attempts failed
- **Size:** usually size 5 for men, size 4 for women
- **Gather equipment**
 - Supraglottic airway
 - Syringe for cuff inflation
 - Water-soluble lubricating jelly
 - Monitoring: end-tidal CO₂ monitor, pulse oximeter, cardiac monitor, blood pressure
 - Tape
 - Suction
 - Ventilation bag
 - Face mask
 - Oxygen supply
 - Medications in awake patient – hypnotic, analgesia
- **Insertion technique:**
 - Give medications if required
 - Deflate cuff using 20ml syringe (LMA)
 - Lubricate outer cuff
 - Position patient – neck flexed to 15°, head extended on neck (i.e. chin anteriorly), no lateral deviation
 - From behind the patient, hold the tube like a pen and insert into the mouth, sliding the outer cuff along the palate
 - Push back over tongue until it reaches the posterior pharynx wall
 - Apply pressure to force it backwards and downwards until it reaches the back of the hypopharynx
 - Inflate the cuff (LMA; 40ml for size 5, 30ml for size 4)
 - If required, attach ventilation bag/machine and ventilate (~10 breaths/min) with high concentration oxygen and observe chest expansion and auscultate to confirm correct positioning
 - Consider applying CO₂ detector or end-tidal CO₂ monitor to confirm placement
 - Secure with bandage or tape



Endotracheal tube

- Flexible plastic tube with cuff on end which sits inside the trachea (fully secures airway – gold standard)
- Attached to ventilation bag/machine
- **Use:** *ventilation* during anaesthetic for surgery (if muscle relaxant is required, long case, abdominal surgery, or head positioning may be required); patient can't protect their airway (GCS <8, aspiration risk, muscle relaxation); potential airway obstruction (airway burns, epiglottitis, neck haematoma); inadequate ventilation/oxygenation (e.g. COPD, head injury, ARDS)
- **Rapid sequence induction (RSI) intubation** = procedural variation using rapid anaesthetisation with cricoid pressure to prevent aspiration while airway is quickly secured – used for patients at risk of aspiration e.g. non-fasted patients
- **Size:** 8mm diameter for men, 7mm diameter for women
- **Gather equipment**
 - Laryngoscope (check size – the blade should reach between the lips and larynx – size 3 for most patients), turn on light
 - Cuffed endotracheal tube
 - Syringe for cuff inflation
 - Monitoring: end-tidal CO₂ monitor, pulse oximeter, cardiac monitor, blood pressure
 - Tape
 - Suction
 - Ventilation bag
 - Face mask
 - Oxygen supply
 - Medications in awake patient – hypnotic, analgesia, short-acting muscle relaxant (to aid intubation)
- **Laryngoscope technique:**
 - Give medications if required
 - Pre-oxygenate patient with high concentration oxygen for 3-5mins
 - Position patient – neck flexed to 15°, head extended on neck (i.e. chin anteriorly), no lateral deviation
 - Stand behind the head of the patient
 - Open mouth and inspect: remove any dentures/debris, suction any secretions
 - Holding laryngoscope in left hand, insert it looking down its length
 - Passing the tongue
 - Slide down right side of mouth until the tonsils are seen
 - Now move it to the left to push the tongue centrally until the uvula is seen
 - Advance over the base of the tongue until the epiglottis is seen
- **Insertion technique:**
 - Apply traction to the long axis of the laryngoscope handle (this lifts the epiglottis so that the V-shaped glottis can be seen)
 - Insert the tube in the groove of the laryngoscope so that the cuff passes the vocal cords
 - Remove laryngoscope and inflate the cuff of the tube with ~ 15ml air from a 20ml syringe
 - Attach ventilation bag/machine and ventilate (~10 breaths/min) with high concentration oxygen and observe chest expansion and auscultate to confirm correct positioning
 - Consider applying CO₂ detector or end-tidal CO₂ monitor to confirm placement
 - Secure the endotracheal tube with tape

NB. if it takes more than 30 seconds, remove all equipment and ventilate patient with a bag and mask until ready to retry intubation



Tracheostomy

- Surgical hole made in trachea, through which a tracheostomy tube is passed
- Attached to ventilation bag/machine
- **Use:** a *tracheostomy* is performed for long-term ventilation in intensive care
- **Note:** a *needle or surgical cricothyroidotomy* is different and is used in the emergency setting when an acute upper airway obstruction is preventing endotracheal intubation



Sedation, paralysis, ventilation

- If a patient has had a muscle relaxant they need to be ventilated
- Otherwise the need for ventilation/supplementation of breathing depends on the *degree* of sedation (a low amount of sedation can allow spontaneous ventilation)
- Patients need to be sedated to a certain degree to be intubated and a short-acting muscle relaxant helps endotracheal intubation