**Context**

Pulmonary gas exchange is essential to survival; a short interruption of four to five minutes will invariably result in irreversible brain damage. It is no wonder that opening the airway (A) is the first priority in the Basic Life Support protocol for both respiratory and cardiac arrests. Obstructions to the airway must be relieved at once for any attempts at resuscitation to be successful.

**Anatomy**

The airway is a continuum from the mouth/ nose to the lower tracts in the lungs. The narrowest point in the adult is at the cords.

![Upper airway anatomy](image)

Figure 1: Upper airway anatomy
Causes of airway obstruction

An obstruction may occur at any level from the nostrils and mouth to the bronchi, with the most common site being at the level of the laryngopharynx. There are two main mechanisms of airway obstruction:

- a depressed level of consciousness (the commonest cause)
- a physical obstruction

It is often a combination of both factors.

In unconscious states the neuronal control of the muscles of the mouth and throat are lost. The muscles relax and fail to maintain the airway patency. The tongue (with the surrounding soft tissues) prolapses backwards to occlude the pharynx.

A physical obstruction may be due to:

- a foreign matter in the airway, for example:
  - the presence of vomitus or blood in the pharynx
  - foreign bodies ingested/ inhaled
- or, it could result from a swelling or narrowing in the wall of the airway, for example:
  - laryngeal spasm
  - laryngeal oedema from burns, anaphylaxis or inflammation

Recognising an obstruction

The airway is best assessed by the Look, Listen and Feel approach. Stand at the head of the bed and look caudally for chest and abdominal movements with your ear close to the patient’s nostrils and mouth. Listen for airflow (which when obstructed is usually noisy due to turbulence) and feel the exhaled air against the side of your face. The palm of the hand may also be placed close to the nares to feel exhaled air. This should not be for more than ten seconds.

Look

You may observe:

- a normal respiratory pattern
- no respiration at all
- asymmetrical breathing

Observing the chest and abdomen may also reveal a “see-saw” breathing pattern whereby the chest is drawn in whilst the abdomen expands. This a paradoxical movement in contrast to the synchronicity
seen with normal respiration and it occurs with near-complete or complete obstruction in a patient who is making efforts to breath. Be careful to note any usage of the accessory muscles of respiration.

**Listen**

The following sounds may be noted:

- **stridor** - caused by obstruction at the laryngeal level. It is a high-pitched sound usually heard on inspiration but may also be heard in the expiratory phase
- **expiratory wheeze** - suggests obstruction of the lower airway and commonly heard in asthma
- **gurgling** - suggests the presence of liquid or semisolid in the main airways
- **snoring** - occurs when the pharynx is partially occluded by the tongue or palate
- **crowing** - the sound of laryngeal spasm and is similar to stridor

**Simple manoeuvres to optimise the airway**

As soon as a degree of obstruction is recognised, measures should be taken to optimise the airway. Open the mouth and check for the presence of foreign bodies. They should be carefully removed with McGills forceps under direct illumination.

There are three manoeuvres that have been shown to improve an inadequate airway (Safar et al., 1959):

- **head tilt**
- **chin lift**
- **jaw thrust**

**Head tilt**

The head tilt is performed by tilting the head backwards in the absence of a suspected cervical spine injury. The tilt stretches the anterior neck structures thereby lifting the tongue away from the posterior pharyngeal wall. This manoeuvre alone may not open the airway sufficiently and additional measures may be needed.

**Chin lift**

The chin lift is performed by placing the index and middle fingers under the rim of the mandible and lifting the chin vertically upwards until the teeth are brought almost together but without closing the mouth. This tightens the anterior neck soft tissues.
Jaw thrust

The mandibular jaw thrust is added if the above measures are not adequate. It pushes the hyoid bone and the attached soft tissues forward. It is done by placing the fingers behind the identified angle of the mandible and applying steady upward pressure to lift the mandible. The thumbs are used to slightly open the mouth by downward displacement of the chin. This produces additional forward displacement of the tongue and neck structures. The use of this manoeuvre with the head tilt and chin lift is referred to as the triple airway manoeuvre.

When there is suspicion of a cervical spine injury the jaw thrust is used alone.
These basic manoeuvres are able to open the airway but can be very tiring to maintain so it useful to consider the use of airway adjuncts to help maintain the airway.

**Adjuncts**

Adjuncts are commonly used in the nasopharyngeal and the oropharyngeal airways. Used in conjunction with the manoeuvres described above, they are designed to prevent the tongue and upper airway tissues falling back and obstructing the airway.

**(i) The oropharyngeal or Guedel airway**

(USE IN COMATOSE PATIENTS ONLY)

The size is estimated by measuring the airway adjunct against the patient’s face from the corner of the mouth to the tragus of the ear. You should only use it in comatose patients as it may induce vomiting or laryngospasm in the presence of the laryngeal reflexes. The technique is to open the patient’s mouth, remove foreign materials if there are any and introduce the airway in the “upside-down” position. Slide the Guedel along the palate as far as the soft palate and then rotate it through 180 degrees before advancing till the flanged end rests between the incisors.

RECHECK AIRWAY PATENCY. If it is adequate, supply high flow oxygen via a non-rebreather mask.
(ii) The nasopharyngeal airway

This is better tolerated in patients who are not deeply unconscious and in whom the laryngeal reflexes are still present. The correct size as measured by its internal diameter roughly corresponds to the size of the patient’s little finger. Ensure adequate lubrication before insertion, attempting the right nostril first. Insert the bevel end first and gently slide along the floor of the nose with a slight twisting action. If unsuccessful, remove and try the left nostril. It is better avoided when a base of skull fracture is suspected.

Suction

A rigid wide bore catheter (Yankauer) should be used to remove liquid and semisolid from the upper airway. It should be inserted only as far as its tip can be visualised to prevent overzealous suctioning, which may result in hypoxia, bradycardia and hypotension.

Oxygen

Oxygen demand is increased in acute situations and a compromised airway results in a greatly diminished supply. The normal oxygen content of air is 21%. Attempts should be made to supply as high a percentage of oxygen as possible (in the absence of contraindications). A venturi mask delivers 24-60% oxygen, but a non-rebreather mask with a reservoir bag will deliver up to 85% with a high flow of 15 l/minute. This is the preferred choice in acute airway management.
Bag-valve-mask ventilation

If the patient is making insufficient respiratory efforts in the presence of a patent airway, this is the technique used to aid ventilation. For the best possible efficiency a tight seal around the face is required and you will need a second pair of hands to squeeze the self-inflating bag. You should expose the chest to observe chest wall excursion and auscultate to assure pulmonary gas flow.

Red flags

- A quiet respiration does not imply that all is well; it could signify a complete cessation of respiration.
- Always maintain in-line immobilisation when neck injuries are suspected.
- Do not agitate a patient with an upper airway obstruction. A partial blockage may precipitously become a completely blocked one, e.g. in epiglottitis and laryngotracheobronchitis.