

APLS: SIMULATION with SKILLS: basic airway in a child, oropharyngeal airway and bag/mask ventilation CASE I-1

History *{initial candidate briefing prior to arrival of child}*

An obese nine year old girl with cerebral palsy and epilepsy is brought by ambulance to the Emergency department. She has been convulsing for at least 30 minutes and has had rectal diazepam 10mg in the ambulance 10 minutes ago. Her parents are with her. They state that her usual medication is sodium valproate and a recent weight was 56 kg.

Initial Impression *{to tell candidate as child arrives}*

The child has a grand mal convulsion and is cyanosed despite high flow oxygen by face mask.

Additional History and Observations

She is significantly obese. Pulse 120 bpm, respiration irregular, SaO₂ 88% in 10L oxygen, BP 130/75, glucose 7.8mmol/

Clinical Course *{to be given to candidate as he/she progresses through the assessment and treatment of the child}*

She remains cyanosed until the airway is opened and loses the airway again unless it is stabilised with an oro-pharyngeal airway. IV access is gained and she is given IV lorazepam. After a few minutes the convulsion ceases but she becomes apneic.

After ventilation with a self-inflating bag and mask for a few minutes, respiration re-establishes satisfactorily but the grand mal convulsion re-occurs.

An infusion of phenytoin brings the convulsion to an end but she remains unconscious.

INSTRUCTORS INFORMATION

Key Treatment Points

Airway	Establish airway patency Place oropharyngeal or nasopharyngeal airway	<input checked="" type="checkbox"/>
Breathing	Ventilate with oxygen via self-inflating bag and mask until spontaneously breathing satisfactorily	
Circulation	IV-IO access	
Disability	Status epilepticus protocol	
	Seek anaesthetic help early, HDU/PICU care	

Diagnosis

Status epilepticus with benzodiazepine induced apnea

Skills to be practised and assessed in this simulation: basic airway in a child, oropharyngeal airway insertion and bag mask ventilation in a child. Instructors should slow the simulation down and ask candidates to show clearly how they are doing the skill.

Following the closure of the simulation with any teaching points clarified as necessary, all candidates should perform the basic airway, oropharyngeal airway and bag/mask ventilation skills only, until competent.

SKILLS TO BE DEMONSTRATED

BASIC AIRWAY POSITIONING AND CLEARANCE, EFFECTIVE BVM USE

Head tilt/chin lift

Place the hand nearest to the child's head onto the forehead
Apply pressure to gently tilt the head back to achieve the following degrees of tilt:

INFANT	CHILD
Neutral	Sniffing

Place the fingers of the other hand under the chin and lift gently upwards.

Jaw thrust

- Place two or three fingers under the angle of the mandible bilaterally.
- Lift the jaw upwards.

OROPHARYNGEAL AIRWAY INSERTION

If the gag reflex is present, it is best to avoid the use of an oropharyngeal tube or other artificial airway, since they may cause choking, laryngospasm or vomiting.

Non-expert practitioner – all children

- Select an appropriate size of Guedel airway.

Centre of the mouth to the angle of the jaw

- Open the mouth using the chin lift taking care not to move the neck if trauma has occurred.
- Use a laryngoscope blade or a tongue depressor to aid insertion of the airway 'the right way up'. This also provides the opportunity to examine the oropharynx for foreign material.
- Re-check airway patency and look for improvement.
- If necessary, consider a different size from the original estimate.
- Finally provide oxygen with a face mask and reservoir, consider ventilation by pocket mask or bag and mask.

It is reasonable to acknowledge that experienced anaesthetists often insert the Guedel airway in all ages of children, as described below 'expert practitioner'. However the technique described above may be less likely to cause harm in inexperienced hands.

Expert practitioner – all children

- Select an appropriate size of Guedel airway.

Centre of the mouth to the angle of the jaw

- Open the mouth using the chin lift taking care not to move the neck if trauma has occurred.
- Insert the airway concave upwards until the tip reaches the soft palate i.e. roughly half-way in.
- Rotate it through 180 degrees (concave side downwards) so that the natural curve of the Guedel airway follows the curve of the tongue and pharynx and slide it back over the tongue.

- Re-check airway patency.
- If necessary, consider a different size from the original estimate.
- Finally provide oxygen with a face mask and reservoir, consider ventilation by pocket mask or bag and mask.

BAG AND MASK VENTILATION

Sizing the mask: ensure that the mask adequately covers the nose and mouth, does not extend below the chin and does not cover the eyes.

Ensure that the equipment is properly assembled and functioning, that there is oxygen tubing connected to the in port and that a reservoir bag is in place to ensure high oxygen concentration.

- Apply the mask to the face, using either of the manoeuvres described below
 - Chin lift manoeuvre:* Place the thumb over upper margin of the mask (over the bridge of the nose), the middle finger under the tip of the chin, and the index finger around the lower margin of the mask. In this position the middle finger and thumb are apposed using a pincer movement. This opens the airway and secures the position of the mask allowing the other hand to be used to ventilate using the self-inflating bag.
 - Jaw thrust manoeuvre:* both hands are used to pull the jaw forward and secure the mask, whilst avoiding a rotating movement of the neck. Place the appropriate sized mask gently in its correct position on the face. Place the thumbs over the upper rim of the mask overlying the zygomatic arch on both sides. Place the 3rd or 4th fingers (depending on hand size) behind the angle of the mandible, while the index fingers are placed over the lower rim of the mask. If the fingers behind the mandible and the thumbs are now pulled towards each other, the jaw is pulled forward and the mask is firmly secured to the face without rotating the neck. Place the palms of the hands against the sides of the head to the head and neck (particularly if the elbows can rest on a firm surface). This is a two-person technique. One rescuer should maintain the mask seal with both hands, while the second person squeezes the self-inflating bag.
- Ensure an adequate seal.
- Squeeze the bag observing the resulting chest movement. Avoid excessive volumes or very rapid inflations as these will tend to inflate the stomach and increase the risk of regurgitation. If, despite a good seal, the chest is not inflating, the airway position should be adjusted without removing the mask from the patient's face.
- Ventilate at 15-30 breaths/minute depending on the age of the child.

It should be emphasised that bag and mask ventilation is the key skill for non-anaesthetists.