The Difficult Neonatal Airway

Background
Effective airway management includes anticipating and planning for problems. Difficulties with the neonatal airway can frequently occur as a result of patient characteristics that interfere with spontaneous breathing, bag-mask ventilation, laryngoscopy and/or intubation of the trachea. Identifying the characteristics of the difficult airway and developing a plan for managing problems are an essential part of providing neonatal care.

This guideline is intended to discuss some of the common difficulties encountered with the neonatal airway, to suggest strategies and equipment that may be used and to introduce a difficult airway pathway that can be adapted for use in each of the centres within the Wales Neonatal Network.

Definition
A difficult airway can be defined as any situation in which a clinician experiences difficulty with face mask ventilation, laryngoscopy or intubation.

Causes
Predictable difficulties (Normal airway)
- Large occiput affecting positioning
- Large tongue and small mouth making laryngoscopy difficult
- High and anterior larynx
- Large and floppy epiglottis

Congenital abnormalities
- Craniofacial anomalies e.g. Micrognathia, Pierre Robin sequence, Cleft lip/palate
- Vascular malformations
- Lymphatic malformations
- Other chromosomal abnormalities such as Trisomy 21

Scenarios (See also Airway Management Algorithm)

Note
It is well known that the majority of newborns will have some respiratory effort (even extreme preterms). The early elective use of non-invasive ventilatory techniques such as nasal CPAP in the delivery room could obviate the need for intubation and should be considered in any baby with some respiratory effort. Elective intubation is no longer the standard at any gestation.

Can ventilate; Can’t intubate
In this scenario, an infant may be apnoeic or have inadequate respiratory effort requiring respiratory support. Nasal CPAP has failed but facemask ventilation is effective (with good chest expansion and a rising heart rate) but cannot be sustained long term and intubation is attempted.

Each intubation attempt should be limited to 30 seconds to minimise risk of hypoxia. Each resuscitator should have a maximum of 2 attempts at intubation with no more than 4 attempts in total and ventilate between the attempts. This limits trauma to the airway which could convert a can ventilate, can’t intubate scenario into a “can’t intubate, can’t ventilate” life threatening scenario.

If intubation is unsuccessful the following could be considered:

1. Laryngeal Mask Airway (LMA)* – a size 1 LMA is suitable for any baby above 2kg and can be used as a rescue or short term solution.
2. Using a Video Laryngoscope – this is the gold standard for managing a difficult endotracheal intubation, however many Neonatologists are not yet skilled in using these devices. Help may be sought from either an experienced Consultant Neonatologist or a Paediatric Anaesthetist. Devices available for neonatal use are the Accutronic Infant View, Glidescope, the Storz C-Mac and the Airtraq optical laryngoscope.

**Can’t Ventilate; Can’t Intubate**
This is clearly a life-threatening situation and senior help should be called for immediately.

1. Optimise face mask ventilation
   - Neutral position
   - Correctly sized face mask
   - Jaw thrust (2-person technique)
   - Airway adjuncts e.g. Oropharyngeal (Guedel) or nasopharyngeal airway
   - Decompression of stomach with NG tube

2. Consider size 1 LMA in baby >2kg

3. Consider 2 further intubation attempts from senior trainee/Neonatologist:
   - Use Miller (straight blade) Laryngoscope
   - Cricoid pressure may be necessary

4. Call for ENT and Paediatric Anaesthetic support

**Considerations:**

1. Indirect (Video) Laryngoscopy
2. Use of Bougie or stylet with railroad technique**
3. Rescue techniques
   - Percutaneous tracheal puncture – 16G (grey) cannula connected to 3-way tap and green oxygen tubing
   - ENT may consider emergency tracheostomy

**Note**

Rescue techniques are not universally considered as acceptable in newborn infants; there are some documents which support their use and others which condemn their use.

**Laryngeal Mask Airway**
A laryngeal mask airway is a supraglottic airway device which can be used in babies weighing more than 2kg. A size 1 LMA is suitable for weights 2-5kg. There are 2 types available – those with an inflatable cuff and those without (iGel – pictured above). If there is one, check that the cuff inflates and deflates correctly.

1. Lubricate the LMA with water soluble gel
2. Hold the LMA “like a pen” in your dominant hand, with the opening in a forward facing position (i.e. towards the baby’s feet)
3. Position the head in a slightly extended position and introduce the LMA into the mouth. Slide the LMA downwards and backwards, along the hard palate, to reach a resting position beyond the base of the tongue. A slight resistance to further advancement will be felt
4. If there is an inflatable cuff it should be inflated at this point
5. The T-piece or inflatable bag should be attached to the LMA and ventilation continued
6. Secure the LMA in place using tape

**ETT railroad technique**

1. Insert bougie through vocal cords carefully, not more than 2cm beyond aperture opening
2. Keep bougie steady while colleague threads ETT over distal end of bougie and into trachea
3. Remove bougie whilst holding ETT in place
4. Secure ETT once position confirmed with auscultation, chest movement, HR response +/- capnography
5. Usually a two person procedure and can be done under direct vision or using a video laryngoscope, depending on visual field and availability of equipment

**Suggestions for Difficult Airway Equipment Box / Bag**

Oropharyngeal airways (Guedel) – 3 sizes

Nasopharyngeal airways

Laryngeal Mask Airway (size 1)

Introducers

Endotracheal tubes (uncuffed) size 2.0 – 4.5

Fixation equipment

Miller Laryngoscope and blades

Video Laryngoscope and blades

Bougies / tracheal tube guides – minimum size available is 2.5 mm
ET CO2 detector – (such as Pedicap colorimeter)

Magill’s forceps

Nasogastric tube, syringes, elastoplasts

References

1. Managing the newborn infant with a difficult airway: Johansen LC, Mupanemunda RH, Danha RF; Infant Volume 8 Issue 4 2012

2. Neonatal Difficult Airway – copyright MPROvE 2015. Dr A Sharma and colleagues (Neonatal Difficult Airway course)