

STPN Emergency Front of Neck Access (eFONA)

1. Background

Difficult airways in children are rare.

Usually, these can be anticipated, as they are due to obvious congenital airway abnormalities or acute airway pathology. When difficulty is expected, expert advice and assistance should be sought before any airway intervention or management.

Difficult ventilation in children without airway abnormality is most often secondary to laryngospasm or upper airway obstruction. These are reversible with appropriate management.

Can't Intubate, Can't Oxygenate (CICO) situations are life-threatening emergencies due to irreversible airway obstruction. They require Front of Neck Access (FONA) to the trachea. Emergency FONA (eFONA) is a potentially life-saving procedure. Even with training, eFONA is difficult to perform, especially in the paediatric population. Equipment required to perform eFONA must be readily available at all locations where intubation and airway management occur.

2. Emergency Front of Neck Access

In practice, there are three available techniques to provide oxygenation and/or ventilation via the front of neck in a CICO situation. These are:

- **Cannula Cricothyroidotomy**
- **Surgical Cricothyroidotomy**
- **Tracheostomy**

The choice of emergency front of neck access will depend on the situation and the expertise available.

If an ENT surgeon is not immediately available, responsibility for the front of neck access falls to the Anaesthetist or the most appropriate senior clinician. Adult literature suggests surgical cricothyroidotomy has the highest success rate, however, evidence in infant, babies and younger children is very limited and a cannula technique may be appropriate. We suggest training in both techniques so that all options may be considered based on the clinical scenario.

If an ENT surgeon is present, tracheostomy is likely to be the option with the highest chance of success.

2.1 Cannula Cricothyroidotomy

- This technique involves placing a cannula into the trachea and delivering oxygen via one of three methods:
 - Standard oxygen tubing and a 3-way tap
 - Rapid Insufflator Device
 - Jet Ventilator - ManuJet
- Cannula cricothyroidotomy is a temporising solution to provide oxygenation until a more definitive airway can be secured.
- It is associated with a high degree of failure due to cannula misplacement or kinking.
- Jet ventilation carries a risk of barotrauma.

2.2 Surgical Cricothyroidotomy “Scalpel, Bougie, Tube”

- This technique involves accessing the trachea through the cricothyroid membrane, introducing a bougie (or exchange catheter) into the trachea, and railroading an endotracheal tube into the trachea to secure the airway.
- It provides a more definitive airway than a cannula cricothyroidotomy and, when successful, allows for positive pressure ventilation.
- The cricothyroid membrane can be extremely difficult to identify in small children and babies, and the trachea is small, increasing the risk of tracheal injury.

2.3 Tracheostomy

- This technique involves making an incision in the neck, exposing the trachea, and placing an appropriately sized tracheostomy tube into it.
- This technique requires more equipment and set-up than cannula or surgical cricothyroidotomy and may take longer.
- It will, however, be more likely to result in a definitive airway and allow for positive pressure ventilation.

2.4 Choice of Technique and Age

- There is insufficient evidence or expert consensus to provide clear guidance on which technique to choose at which age.
- **In the event of CICO with ENT present, a surgical tracheostomy at any age is likely the most appropriate option.**
- When ENT are not present, the Anaesthetist should choose the option they feel has the best chance of success in their hands and in the situation, they are in.
- Surgical cricothyroidotomy may become less challenging as children get older. The Difficult Airway Society suggests that in children above 8 years; proceed with a surgical cricothyroidotomy and below 8 to use a cannula technique. In this guidance, we will provide suitable equipment sizes for both techniques across all age groups, as the realities of these situations are extremely complex and it is difficult to be completely prescriptive.

2.5 eFONA Packs (Appendix H)

- Pre-prepared packs of equipment for emergency front of neck access are extremely useful for ensuring appropriately sized equipment is available immediately.
- Each Trust should consider the best way to store this equipment and ensure its rapid availability in the event of an emergency.
- When using pre-prepared packs, it may be prudent to have the pack size above and below ready for use, especially for children on the cusp of the age ranges described.

3. Techniques and Equipment

3.1. Cannula Cricothyroidotomy

1. Equipment

- Cannula
 - Pre-term: 18G
 - Term baby to 1 year: 16G
 - Greater than 1 year: 14G
- 5ml luer lock syringe
- 10ml 0.9% Sodium Chloride

- Chlorhexidine wipe
- Means to oxygenate
 - Oxygen tubing, 3-way tap with extension (attach to O2 1l/min/kg up to 15L/min)
 - Rapid Insufflator (attach to O2 1l/min/kg up to 15L/min)
 - ManuJet – stages of set-up:



ManuJet box with instructions



ManuJet set-up



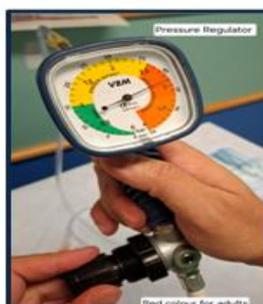
Pull the knob and rotate to adjust desired pressure



Green colour range for Baby



Yellow colour range for Infant



Red colour range for Adults



Squeeze trigger to deliver Jet

2. Procedure

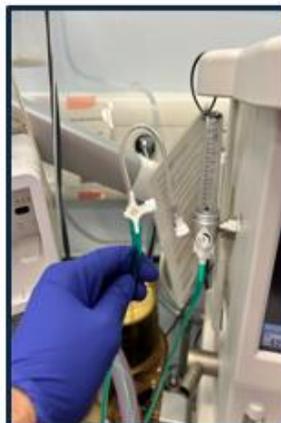
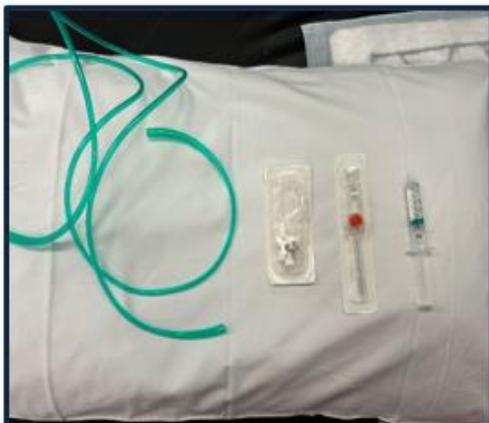
- Ensure muscle relaxation is given
- Ensure ENT are on their way
- Continue oxygenation attempts whilst equipment is prepared
- Stand on the patient's left (for right-handed operator)
- Fully extend the neck (use shoulder roll if required)
- Stabilise trachea with non-dominant hand
- Identify cricothyroid membrane (may be difficult under eight; if so, identify tracheal rings and the space between)
- Insert cannula at 45° angle caudal through cricothyroid membrane
- Confirm position through aspiration of air
- Attach to source of ventilation via Luer Lock
- Oxygenate via chosen source

3. Post Procedure

- Cautiously increase pressure or flow rate to achieve adequate chest expansion or oxygenation.
- Maintain upper airway patency to allow for full expiration.
- Wait for expiration before next inspiration.
- Expect this technique to fail even if initial success at oxygenation.
- Plan for next steps, i.e. tracheostomy when ENT arrive, surgical cricothyroidotomy in the event of further failed oxygenation.

Cannula Cricothyroidotomy

This set-up is for an approximate 6–7-year-old. Smaller equipment will be required in younger children – refer to the guideline for further information. **Cannula Cricothyroidotomy has a high failure rate and if successful should be seen as a temporising method before a definitive airway can be achieved.**



- Assemble equipment
- Cannula:
 - Pre-term: 18G
 - Term baby to 1 year: 16G
 - Greater than 1 year: 14G
- 5ml Syringe with 3ml Saline
- Oxygen Tubing, 3 Way Tap – connected to 1l/min/kg
OR – ManuJet / Rapid Insufflator
- **Continue oxygenation attempts whilst preparing.**
- **Ensure ENT team have been called.**



- Extend neck.
- Identify Cricothyroid Membrane.
- Stabilise trachea
- Approach at 45 degrees.



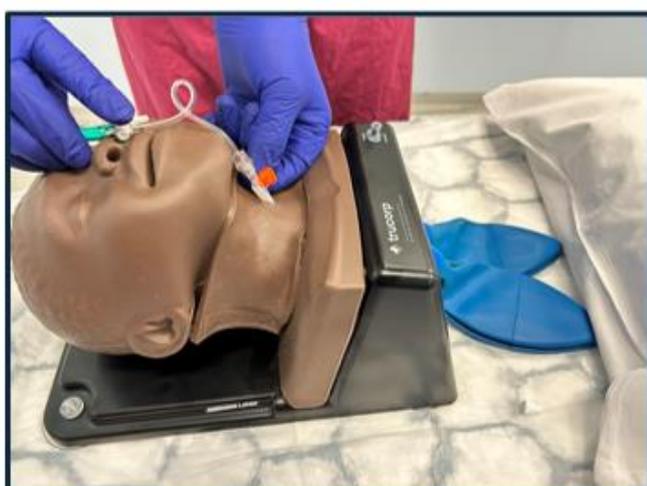
- Aspirate as you insert.
- Confirm position through aspiration of air.



- Slide off cannula into trachea.
- Stabilise the cannula.



- Assistant to attach 3 way tap and oxygen tubing / ManuJet / Rapid Insufflation Device.
- Keep cannula stabilised.



- Occlude 3-way tap (increase / pressure flow) to achieve chest expansion.
- Allow for passive expiration.
- Carefully examine neck for signs of incorrect placement (swelling, surgical emphysema).
- Carefully secure the cannula.
- If oxygenation achieved continue, paying careful attention to risk of cannula kinking or dislodgement.
- Plan for more definitive airway.
- **If incorrect placement or failure to oxygenate continue to Surgical Cricothyroidotomy or Surgical Tracheostomy.**

3.2. Surgical Cricothyroidotomy – Scalpel, Bougie, Tube

1. Equipment

There are multiple introducers available that may be used for the “bougie” or introducer part of the procedure. The advantages of the Cook Exchange Catheter and Frova Intubating Introducer are that they come with 15mm adaptors for oxygen delivery through the introducer. Standard bougies have the advantage of familiarity and availability in most settings. It is important to ensure the choice of introducer is compatible with the endotracheal tube size recommended for the patient.

Age Range	0-2 year	2-8 years	Above 8 Years
Scalpel	10 Blade	10 Blade	10 Blade
Bougie	8Fr	10Fr	14Fr
Cooks Exchange Catheter	8Fr	11Fr	14Fr
Frova Intubating Introducer	8Fr	8Fr	14Fr (Only for 6.0mm and above ETT)
Cuffed Oral Endotracheal Tube	3.0mm 4.0mm	4.0mm 5.0mm	5.0mm 6.0mm
Syringe for ETT Cuff	10ml	10ml	10ml
	Lubricating Jelly	Lubricating Jelly	Lubricating Jelly
Oxygen Delivery Device	Ayre's T Piece / Paediatric Anaesthetic Circuit	Ayre's T Piece / Paediatric Anaesthetic Circuit	Water's Circuit / Adult Anaesthetic Circuit

2. Procedure

- Ensure muscle relaxation is given
- Ensure ENT are on their way
- Continue oxygenation attempts whilst equipment is prepared
- Stand on the patient's left (for right-handed operator)
- Full neck extension (consider shoulder roll)
- Identify cricothyroid membrane
- Stabilise cricoid with laryngeal handshake
- Make a transverse stab incision through the cricothyroid membrane
- Turn blade 90°
- Slide tip of bougie / introducer along blade into trachea
- Railroad lubricated cuffed endotracheal tube into trachea
- Ventilate, inflate cuff, confirm position with capnography
- Secure tube

3. Post Procedure

- Positively pressure ventilate on 100% oxygenate and perform full clinical assessment.
- Perform chest x-ray if clinical stability allows.
- Discuss plan with ENT for definitive airway management, i.e. tracheostomy.

Surgical Cricothyroidotomy

“Scalpel, Bougie, Tube”

This set-up is for an approximate 6–7-year-old. Smaller equipment will be required in younger children – refer to the guideline for further information.



- Assemble equipment.
- 10Ch Bougie (11 Fr Cook Exchange Catheter), 10 Scalpel, Size 5.0 COETT, 10ml Syringe, Ayre's T-Piece.
- Have smaller ETT sizes available.
- Check cuff and lubricate bougie.
- **Continue oxygenation attempts whilst preparing.**
- **Ensure ENT team have been called.**
- Either a bougie or an exchange catheter may be used depending on local availability. Exchange catheters can also be used as bougies.



- Extend neck.
- Identify cricothyroid membrane.
- Stabilise cricoid.



- Transverse stab incision through the cricothyroid-membrane.



- Twist the scalpel through 90 degrees.



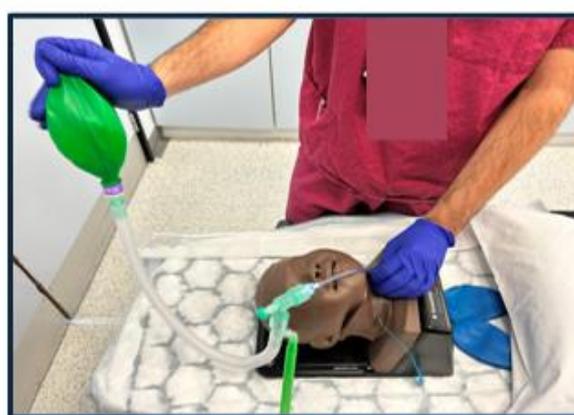
- Slide the tip of the bougie along the blade into the trachea (exchange catheter).



- Keep bougie stable.
- Load ETT and carefully advance.



- Keeping hold of the bougie advance ETT into trachea.



- Inflate cuff.
- Ventilate and conform position with capnography.

3.3. Surgical Tracheostomy

1. Equipment

- Suction and oxygen setup
- Scalpel (No.15), tracheal hook, artery forceps, tracheal dilator
- Tracheostomy ties, 3/0 silk stay sutures
- These refer specifically to Tracheostomy tubes:
 - Correct size and length (neonatal vs paediatric)
 - Have one size smaller as a backup
 - Generally, uncuffed in infants/children (to reduce mucosal injury)
 - Approximate uncuffed tube sizes:

2. Preparation

Indication:

“Cannot intubate, cannot ventilate” or upper airway obstruction when other manoeuvres fail.
Cricothyroidotomy is challenging in small children; emergency tracheostomy is the preferred surgical airway.

Position:

Supine with shoulder roll (neck extended - tape can be used to pull the chin and neck in a more extended position and taped to either side of the bed).

3. Landmarks & Incision

- Palpate cricoid cartilage and suprasternal notch
- Target: 2nd - 4th tracheal rings
- Midline incision from between cricoid / suprasternal notch (~2–3 cm)
- A vertical midline incision can allow rapid, safe midline access; a horizontal incision is usually reserved for elective cases where time and cosmetic considerations permit.
- In practice we would recommend the surgeon uses an incision direction that is familiar to them.

4. Dissection & Exposure

- Control bleeding quickly with bipolar diathermy
- Excise or retract subcutaneous fat pad in the midline to expose strap muscles (in an emergency, retraction may suffice, once the tube is inserted and the airway secured, it is important to remove sufficient fat pad to reduce the dead space for tube changes in the future)
- Separate sternohyoid / sternothyroid muscles in midline and retract laterally
- Identify and, if needed, divide/retract the thyroid isthmus
- Clear pre-tracheal fascia to expose tracheal rings.

5. Tracheal Entry

- Identify 2nd - 3rd tracheal rings
- Make a vertical incision in trachea (avoid excising a window)
- Expect air release / bubbling (confirmation)
- Place stay sutures on either side of incision and label “Right” / “Left” (in a time critical emergency, tube insertion may be required first- as below)

6. Tube Insertion

- Withdraw ETT slightly if in SITU
- Gently insert the appropriate tracheostomy tube into the tracheal incision
- If difficult: widen with dilator or artery forceps
- If no trach tube available: insert small ETT temporarily
- Confirm position:
 - Continuous capnography monitoring (CO₂ trace)

- Bilateral air entry on auscultation
- Chest rise / SpO₂ improvement
- Secure with cotton tracheostomy ties
- Tape stays sutures to chest and label

7. Immediate Post-Procedural Care

- Transfer to PICU for monitoring and respiratory support or transfer via retrieval service to tertiary centre). Ensure the child is in a safe place, appropriately sedated if required, and kept warm, following the completion of the pre-transport checklist (**Appendix I**)
- A post-operative chest x-ray should be obtained, especially in the context of difficulty and the need for an emergency tracheostomy
- Document: tube size, length, cuff status, and depth at skin
- Complete and display Bed-Head Tracheostomy card (per NCEPOD/NTSP): *Tube make, size, cuff status, depth*
- Airway plan / emergency algorithm
- Key contact numbers (e.g. ENT /anaesthetic teams)
- Keep tracheostomy emergency box at bedside
- First tube change after 7+ days by experienced airway team.

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