Guideline - Minimally Invasive Surfactant Treatment (MIST) Procedure

INDICATION

MIST is the preferred procedure for administering surfactant in infants ≥27 weeks but may be used from 25 weeks gestation to treat Respiratory Distress Syndrome (RDS) in infants on non-invasive ventilation, when other causes of deterioration (e.g pneumothorax) are felt to be unlikely.

Contraindications

- Infant that is rapidly deteriorating/escalation to invasive ventilation is imminent or likely

Cautions

- Congenital airway anomalies/other conditions (eg. pulmonary hypoplasia) contributing to respiratory status

PREPARATION

1) Is the infant an appropriate candidate for MIST? **This is at the discretion of the consultant neonatologist.**
2) Brief parents, wherever possible, regarding procedure.
3) Gather equipment – angiocath (Surfcath), surfactant, dressing pack, clean gloves, 5ml **Luer-lock syringe**, green needle. **Note – enteral syringes will not connect to the angiocath.**
4) MIST angiocaths are either pre-marked or have a kink at the current depth. Plan desired depth below vocal cords (*see table below*). **Ensure you bend the Surfcath catheter prior to procedure to allow better visualisation of cords.**
5) Draw up the surfactant (Curosurf) into a 3 or 5 mL IV **Luer-lock syringe**, using a green needle. The surfactant dose is **200 mg/kg** (2.5 mL/kg). Draw up 0.5 mL of air into the syringe, for the dead space of the catheter (~0.3 mL).
6) Atropine use is at the discretion of the intubator. This can be used prophylactically, or to treat bradycardia.
7) Perform MIST pause (***page 2***).

PROCEDURE GUIDE

1) Position the infant as for a standard intubation. Support with swaddling/non-nutritive sucking.
2) MIST should be performed with CPAP/HFNC prongs remaining in situ. Occasionally removing the CPAP prongs may improve the view of the vocal cords, but reapply prongs before instilling surfactant.
3) Perform direct laryngoscopy using a standard laryngoscope and blade or VideoLaryngoscope.
4) Insert the surfactant instillation catheter through the vocal cords to the desired depth. The laryngoscope should then be removed, while carefully holding the catheter in place at the corner of the lips with a finger.
5) If removed reapply the CPAP/HFNC prongs and ensure mouth closed to maintain pressure. The baby should be comfortably breathing.
6) The assistant should connect the syringe to the catheter hub, and instil the surfactant **slowly in 2–4 boluses over 30–120 seconds**. Time installation with initiation of inspiration and pause if desaturation occurs and stimulate the infant gently to breath. Flush final air in tube through to ensure no surfactant is left in the catheter. Remove the instillation catheter.
7) If on the first attempt catheterisation of the trachea is not possible within 20–30 seconds, remove the laryngoscope, allow recovery on NIV as required, and then attempt tracheal catheterisation once again. The maximum number of catheterisation attempts should be 3, after which the procedure should be abandoned.

SUGGESTED INSERTION DEPTH GUIDE FOR MIST CATHETER	
Weight guide	**Gestation guide (use if weight unknown)**
<1000 grams: 1.5 cm	25–26 weeks: 1 cm
1000-2000 grams: 2.0 cm	27–28 weeks: 1.5 cm
2000-3000 grams: 2.5 cm	29–32 weeks: 2 cm
>3000 grams: 3 cm	

POST-PROCEDURE

Once HR, SpO2 and respiratory effort are close to baseline values then turn infant prone, maintaining NIV with the same device and settings as prior to MIST procedure. Document the details of the procedure on Badger.

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Implementation date: 24/11/22 Review date 24 11 32

MIST Pause

Read out aloud before procedure.

CONFIRM

- Patient details, rationale for MIST and have parents been informed ?

EQUIPMENT

- Instillation catheter checked, planned insertion depth confirmed (*see table*) and **200mg/kg** surfactant drawn up into IV **Luer-lock** syringe?
- Ensure facemask of correct size available (*see table*)
- Is the Neopuff gas flow set between 6 – 8l/min?
- Is the oxygen blender on the Neopuff set to the same as baby is currently receiving?
- Is the Neopuff delivering 20/5 (preterm) or 30/5 (term), unless otherwise stated by senior staff?
- Is a self-inflating bag available in cot-space?
- Is the suction on, checked and working with catheter attached?
- Has the laryngoscope/video-laryngoscope been checked and is it working with a bright light?
    - Is an appropriate blade fitted? (Too small a blade may get you into trouble)
        - **Miller 1**: ~Term / **Miller 0**: ~Preterm / **Miller 00**: ~500g -Video-S0(1.25-2.5Kg) /S1>2.5Kg)
- What size of ET tube is required if need to revert to intubation? (*see table*)
    - Is this ETT (and +/- 0.5) available?
    - What length will the ETT be inserted to?
- Is the following equipment for checking and securing the ETT available if required?
    - Neofit ET tube fixation device
    - Paedicap CO_2 detector
    - Stethoscope
- Is a ventilator available, checked and working?

DRUGS AND MONITORING

- ECG and O2 monitoring?
- Gastric tube aspirated to empty stomach?
- Cannula checked and flushed?
- Atropine dose prescribed and checked as per Badger monograph?

Body wt (kg)	ETT Size (mm)	Length at lips (cm)	Blade size (Miller)	VL Size	F&P Mask size
0.5	2.5	6	00/000		35
0.75	2.5	6.5	0/00		35
1	2.5	7	0/00		42
1.5	2.5	7.5	0/00	S0	42
2	2.5/3	8	0/00	S0	42
2.5	3	8.5	1/0	S1/S0	50
3	3/3.5	9	1/0	S1/S0	50
3.5	3.5	9.5	1/0	S1/S0	50/60

ENVIRONMENT

- Thermal stability considered?
    - Doors into nursery closed/screens up/incubator ‘air boost’ on
    - Plastic bag if extreme preterm/IUGR
    - Baby swaddled in warm blankets

TEAM

- **Consultant and nursing Team Leader must be aware of procedure**
    - Who is inserting catheter?
    - Who is connecting surfactant and administering?
    - Who is passing equipment?
    - Who is ensuring CPAP/HFNC prongs are in place prior to surfactant administration?
    - Who is holding swaddled baby?

SAFETY NET

- Planned course of action if MIST is not successful?
- Is everyone happy to proceed?

APPENDIX

Figure 1 – Surfcath (Vygon)

Image: https://vygon.co.uk/product/respiratory/surfcath/