Less Invasive Surfactant Administration (L.I.S.A) Guideline

(Adapted with permission from Birmingham Women's Hospital by Consultant Paediatrician Liza Harry, Consultant Paediatrician Paul Watson and Advanced Neonatal Nurse Practitioner Linda McDonald)

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Contents

1 Introduction

Respiratory failure resulting from surfactant deficiency is a common cause of mortality and morbidity in preterm infants. Less invasive surfactant administration (LISA) is the method of administering intra- tracheal surfactant without inserting an endotracheal tube. Instead, a catheter specifically designed for this purpose is inserted through the vocal cords under direct vision, and surfactant is instilled slowly whilst the baby is breathing, and positive end- expiratory pressure (PEEP) is maintained via nCPAP. Without the intubating and administering invasive positive pressure ventilation to disperse the surfactant, the risk of vocal cord trauma, and lung damage from volutrauma or barotrauma is reduced.

Several randomised controlled trials and meta-analyses have demonstrated that the LISA technique is associated with a reduction in bronchopulmonary dysplasia and number of days of mechanical ventilation when compared with using nCPAP alone or by giving surfactant following intubation either via INSURE (intubate, surfactant, early extubation) or by keeping ventilated until weaning has demonstrated readiness for extubation (references 1-5).

The LISA catheter is a 13 cm long catheter with an outer diameter of 1.7mm, much thinner than endotracheal tubes. Markings from the tip are at 1, 2 and 3cm to aid positioning through the cords, and 5-9cm for marking at the lip to assist with ensuring no movement during procedure

2 Purpose

To guide decisions when to give surfactant via the LISA technique, and provide guidance how to do so.

3 Scope

3.1 Inclusion criteria:

- 27 weeks gestation and above
- FiO2 30% or higher (consider surfactant in context of clinical factors)
- Consultant decision

Evidence shows that the earlier LISA is administered, the higher the chance of success.
nCPAP should be used in favour of highflow.

3.2 Exclusion criteria:

- Infants <27weeks gestation – unless consultant decision
- Pneumothorax requiring drainage
- Prominent apnoea despite caffeine administration
- Not trained/competent to do LISA
- Alternative cause for respiratory distress (eg pneumonia, congenital lung or airway anomalies)

4 Duties

4.1 Duties within the Organisation

4.1.1 Consultant Paediatrician Dr Paul Watson and ANNP Linda McDonald are responsible for ensuring policy is followed within Neonatal Services in Women and Children's Directorate.

4.1.2 Neonatal medical and nursing staff

All neonatal medical and nursing staff are responsible for following the processes outlined in this document.

4.2 Identification of Stakeholders

This guideline applies to all neonatal staff working in neonatal intensive care unit.

5 Procedure

Preparation

1. Secure/ensure patent IV access
2. Give caffeine if <32weeks gestation (loading dose as per neonatal formulary)
3. Prescribe Fentanyl 1microgram/kg (half dose of normal intubation)
4. Prepare equipment:

- Suitable sized laryngoscope/Video laryngoscope (usually stored in obstetric theatre recovery)
- LISA Catheter (one size)
- 5ml/10ml syringe (BD clear IV syringe) and 19G needle for drawing up surfactant

- **NOTE – DO NOT USE THE PRE-PACKAGED SURFACTANT GIVING PACKS AS THE NG IS NOT USED, AND THE SYRINGE WILL NOT FIT THE CATHETER.**
- Gloves
- Sterile drape on trolley
- Surfactant **200mg/kg**
- Cardiorespiratory monitoring
- Have available:
    - Suitable sized mask
    - Appropriate sized ET tube, introducer, laryngoscope and laryngoscope blade
    - CO2 detector (unopened)

5. Draw up Fentanyl 1 micrograms/kg (half dose of normal intubation)

LISA procedure

This is a 3 person technique

- Only to be done on NICU
- Inform parents
- Identify roles
- Ensure oro-gastric tube is in-situ
- Prepare incubator as for intubation
- Position infant to enable easy visualisation of vocal cords
- Swaddle infant for comfort
- Maintain thermoregulation
- Maintain nCPAP with mask/prongs
- Draw up surfactant into 5 ml/10ml BD clear IV syringe
- Prepare LISA Catheter and have to hand

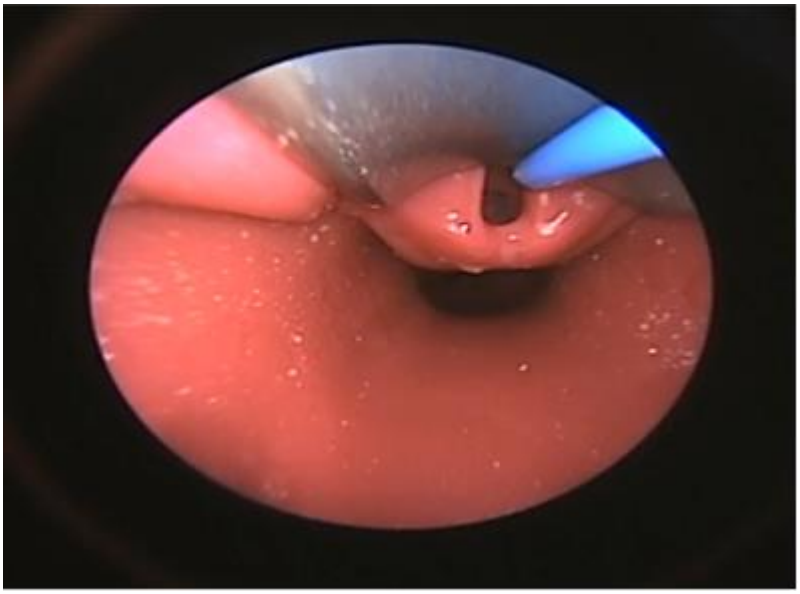
Person 1 (Nursing Staff)

- Ensure comfort of baby
- Administer sucrose prior to procedure
- Administer fentanyl IV slowly over 30 seconds
- Maintain swaddle
- Containment holding
- Observe baby and monitor throughout

Person 2 (Consultant, Registrar or ANNP with LISA experience)

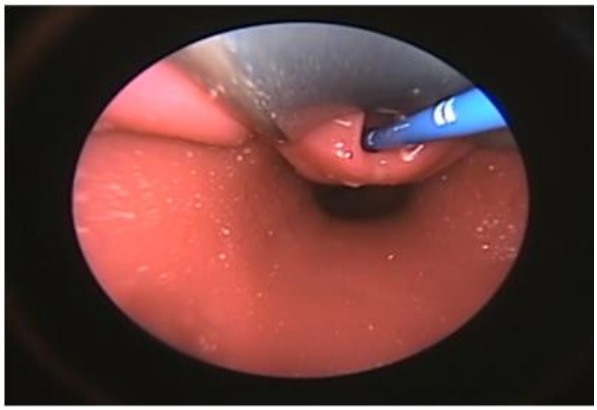
- Remove laryngoscope and close mouth to maintain PEEP
- Hold catheter in place with fingers whilst ensuring no movement
- Hold mouth closed
- Ensure nCPAP seal is maintained

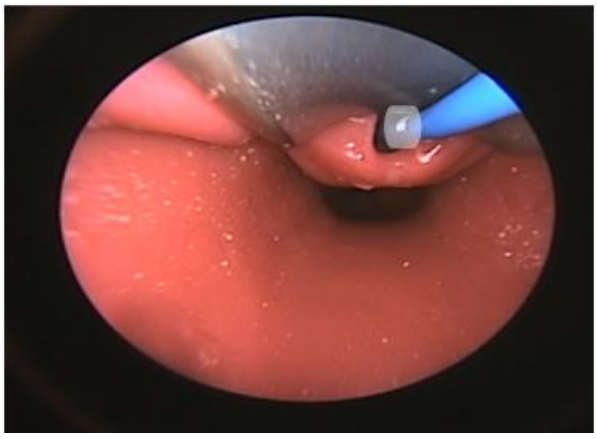
Visualise cords with laryngoscope (may need to remove CPAP briefly to insert laryngoscope)



Pass LISA Cath beyond vocal cords – note markings on catheter:

- 2cm >27 weeks
- 3cm >37weeks





Person 3 (QIS nurse and medical staff)

- Instil surfactant over at least 1 - 3 minutes
- After first minute aspirate NG tube to ensure surfactant not being administered into the stomach
- Encourage spontaneous breathing with gentle stimulation if necessary
- If surfactant reflux is seen or baby desaturates then slow the rate of administration, and encourage spontaneous breathing
- Once surfactant administered then flush catheter with air to ensure maximal administration
- Remove catheter and maintain PEEP

Post-procedure

- Avoid positive pressure ventilation and allow for transient physiological changes
- Increase FiO2 if consistently low
- Reduce FiO2 post-procedure according to saturations
- Return to normal position in incubator
- Continue cardio-respiratory monitoring
- Document procedure including lot number of surfactant

<u>If required, a second dose of 100 – 200 mg/kg surfactant can be given via LISA technique</u> (refer to surfactant administration guidelines)

<u>Adverse effects:</u>

- Oxygen desaturation
- Bradycardia
- Tracheal surfactant reflux
- Apnoea
- Coughing
- Choking
- Sneezing
- Unilateral surfactant administration
- Gastric surfactant administration
- Need for intubation
- Mucosal bleeding

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5) Wu et al. Pediatr Pulmonol. Surfactant administration via a thin endotracheal catheter during spontaneous breathing in preterm infants. 2017 Jun;52(6):844-854