

# **SURFACTANT REPLACEMENT THERAPY – INCLUDING LESS INVASIVE SURFACTANT ADMINISTRATION (LISA) TECHNIQUE**

- Early administration of natural surfactant decreases the risk of acute pulmonary injury and neonatal mortality
- Early CPAP and selective administration of surfactant is preferable to routine intubation and prophylactic surfactant
- Natural surfactant preparations are superior to protein-free synthetic preparations containing only phospholipids for reducing mortality and air leaks
- Poractant alfa (Curosurf®) at 200 mg/kg shows survival advantage compared to beractant or poractant alpha in a dose of 100 mg/kg
- Multiple rescue doses result in greater improvements in oxygenation and ventilatory requirements, a decreased risk of pneumothorax and a trend toward improved survival
- Use of Intubate–Surfactant–Extubate (INSURE) to CPAP or LISA (less invasive surfactant administration) or minimally invasive surfactant treatment (MIST) techniques for early surfactant administration reduce the need for ventilation and improve survival
- see **LISA** section below

## **INDICATIONS**

### **Prophylaxis (administration ≤15 min of birth)**

#### ***Babies born <28 weeks' gestation***

- **Routine intubation of these babies solely for the purpose of administration of surfactant is not necessary, and a policy of early CPAP with selective surfactant administration is preferred**
- If requiring intubation for respiratory support during resuscitation or if mother has not had antenatal steroids, give surfactant as prophylaxis
- Otherwise, institute early CPAP and administer surfactant selectively as per **Early rescue treatment**

#### **Early rescue treatment**

Preterm babies who require invasive ventilation for stabilisation should be given surfactant

#### ***Babies born ≤33 weeks' gestation who are not ventilated***

- If  $\text{FiO}_2 > 0.30$ , give surfactant using minimally/less invasive technique or after invasive ventilation

#### **Other babies that can be considered for surfactant therapy (after discussion with consultant)**

- Ventilated babies with meconium aspiration syndrome (may need repeat dose after 6–8 hr)
- Term babies with pneumonia and less compliant lungs

## **EQUIPMENT**

- Natural surfactant, poractant alfa (Curosurf®) 200 mg/kg (2.5 mL/kg) round to the nearest whole vial (prophylaxis and rescue doses can differ)
- Sterile gloves
- TrachCare Mac™ catheter (do not cut NGT) or specific surfactant administration set

## **PROCEDURE**

### **Preparation**

- Calculate dose of surfactant required and warm to room temperature

- Ensure correct endotracheal tube (ETT) position
- check ETT length at lips
- listen for bilateral air entry and look for chest movement
- if in doubt, ensure ETT in trachea using laryngoscope and adjust to ensure bilateral equal air entry
- chest X-ray not necessary before first dose
- Refer to manufacturer's guidelines and **Neonatal Formulary**
- Invert surfactant vial gently several times, without shaking, to resuspend the material
- Draw up required dose
- Administer via TrachCare Mac™ device or specific surfactant administration pack

### **Instillation**

- With baby supine, instil prescribed dose down ETT
- Wait for recovery of air entry/chest movement and oxygenation between boluses

### **Post-instillation care**

- Do not suction ETT for 8 hr following instillation of surfactant
- Be ready to adjust ventilator/oxygen settings in response to changes in chest movement, tidal volume and oxygen saturation. Use of volume-target ventilation can facilitate responsiveness to rapid changes in lung compliance following surfactant instillation. Be ready to reduce  $FiO_2$  soon after administration of surfactant to avoid hyperoxia
- Take an arterial/capillary blood gas within 30 min

## **SUBSEQUENT MANAGEMENT**

- If baby remains ventilated at  $FiO_2 >0.3$  with mean airway pressure  $>7$  cm  $H_2O$ , give further dose of surfactant 6–12 hr after first dose
- Third dose should be given only at request of attending consultant

## **DOCUMENTATION**

- For every dose given, document in case notes:
  - indication for surfactant use
  - time of administration
  - dose given
  - condition of baby pre-administration, including measurement of blood gas unless on labour ward when saturations should be noted
  - response to surfactant, including measurement of post-administration blood gas and saturations
  - reason(s) why second dose not given, if applicable
  - reason(s) for giving third dose if administered
- Prescribe surfactant on drug chart

## **LISA**

### **Definition**

- Method using a thin catheter to deliver surfactant in spontaneously breathing preterm infant with respiratory distress syndrome receiving non-invasive ventilator support
- continue non-invasive ventilator support during procedure

### **Indication**

- Suspected surfactant deficiency leading to respiratory distress syndrome on non-invasive respiratory support as evidenced by:
  - rapidly increasing oxygen requirements
  - $FiO_2 >0.3$
  - increased work of breathing (exclude pneumothorax by transillumination of chest)

## Surfactant replacement therapy 2019–21

- <33 weeks' gestation
- aged <48 hr

### Exclusion

- Persistent/worsening respiratory acidosis despite optimal non-invasive ventilation

### Equipment

- Laryngoscope/video laryngoscope
- Suction
- Sterile gloves
- LISA catheter (LISAcath<sup>®</sup>)
- Surfactant, and syringe and needle to draw up surfactant

### Drugs

- Fentanyl 0.7 microgram/kg (awake sedation)
- Atropine 20 microgram/kg
- Naloxone 100 microgram/kg (if poor respiratory effort after procedure)

### Emergency equipment

- Bag/valve/mask/T-piece
- Oxygen and air
- Stethoscope
- ETTs

### Procedure

- Determine and document indication for LISA
- Ensure baby is loaded/on caffeine (spontaneous breathing extremely important for LISA)
- Inform parents (if present)
- Ensure venous access (peripheral cannula)
- Ensure team of 3 for procedure (including at least 1 nurse and 1 doctor)
- Draw up surfactant 200 mg/kg
- Attach T-piece to end of syringe with Luer-lock system
- Wash hands
- Use sterile gloves
- Place baby supine, ensuring incubator doors do not limit movement of laryngoscope
- Minimise heat loss
  - if necessary increase incubator temperature, use blankets, swaddling and transwarmer
- Baby will remain on non-invasive ventilation support (CPAP/HFNC) during procedure – have naso-/orogastric tube *in situ* to help identify oesophagus
- Administer sedation: atropine and fentanyl IV
- Visualise vocal cords using laryngoscope/video laryngoscope (some gentle cricoid pressure may be necessary)
- Insert LISAcath<sup>®</sup> until required markings (see **Table 1** and **Image 1**)
  - tip should be 1.5 cm below vocal cords
- Other guidance according to gestational age and weight

**Table 1**

Gestational age (weeks)	Current weight (kg)	LISAcath <sup>®</sup> length at lips (cm)
23–24	0.5–0.6	5.5
25–26	0.7–0.8	6.0
27–29	0.9–1.0	6.5
30–32	1.1–1.4	7.0
32–33	1.5–1.8	7.5

## Surfactant replacement therapy 2019–21

- Close mouth around LISAcath<sup>®</sup> with your fingers, ensuring not to apply any pressure on soft tissue
- Maintain LISAcath<sup>®</sup> in midline position to avoid traumatising mucosal lining of trachea

***This is not an emergency procedure. Stop if you are having difficulty and consider alternatives***

**Image 1**



- Ask helper to administer surfactant in 4 aliquots very slowly (with gaps of 30 sec over 3–5 min), to avoid surfactant coming back up
- Remove LISAcath<sup>®</sup> and ensure baby clinically stable with normal cardiorespiratory parameters before repositioning baby and closing incubator
- Following procedure, document:
  - procedure
  - tolerance
  - FiO<sub>2</sub>