Less Invasive Surfactant Administration (LISA) - Full Clinical Guideline

Reference no.: CG-CLINI/4711/25

1. Introduction

It is well known that surfactant prevents Bronchopulmonary Dysplasia. Previously in UHDB our standard practice for surfactant administration has been intubation, surfactant administration followed by ventilation until such time as it is deemed appropriate to extubate. In many cases, this will still be the most appropriate intervention available for surfactant administration, particularly in extremely preterm babies and those with severe respiratory distress syndrome.

However, there is growing evidence that for some babies, less invasive methods of surfactant administration may offer a similar benefit, whilst reducing the risks associated with mechanical ventilation. Many centres have moved towards using Less Invasive Surfactant Administration (LISA) or similar minimally invasive methods.

A recent Cochrane review and meta-analysis of 10 studies (1324 infants) comparing LISA to endotracheal surfactant administration showed a reduction in composite outcome of death and BPD at 36 weeks corrected age of gestation[1]. Data also shows a significant reduction ($p<0.0001$; NNT=3) in mechanical ventilation in preterm babies (26-28 weeks) who received Less Invasive Surfactant Administration (LISA) versus normal standard of care[1] and also in extremely preterm infants[2]. The Cochrane review further emphasizes that LISA is associated with fewer severe intraventricular haemorrhages and lowers mortality before hospital discharge[1]. Data also shows improvement in long term morbidity.

2. Aim and Purpose

The aim of this guideline is to help clinicians identify the babies that are most likely to benefit from LISA, and guide the team through the process of safe LISA.

3. Definitions, Keywords

LISA - Less Invasive Surfactant Administration

CPAP - Continuous Positive Airway Pressure

FiO2 - Fraction of inspired oxygen

ETT - endotracheal tube

ETCO2 - end-tidal CO2

Surfactant

RDS - Respiratory Distress Syndrome

ACP - Advanced Care Practitioner

4. Main body of Guidelines

4.1. Identification of eligible babies

4.1.1. Consider LISA if the primary underlying pathology is most likely to be RDS, and:

- Infant is greater than 27 weeks gestation on non-invasive support and Fi02 is >0.3 by 2 hours
- Infant has good respiratory effort
- Infant is preferably within 24h of birth (but no more than 72h)

4.1.2. Contraindications to LISA:

- Infants with significantly increased oxygen requirement (FiO2>0.6), severe respiratory acidosis (pH <7.2) or where clinician feels intubation and ventilation is indicated
- Maxillofacial, tracheal or known airway and pulmonary abnormalities including pulmonary hypoplasia
- Pneumothorax requiring drainage
- Significant apnoea or irregular breathing despite caffeine administration
- Inexperienced staff

Any infant >32 weeks should have a chest x-ray (CXR) performed before LISA is attempted to exclude other causes of respiratory distress including pneumothorax. It is also important to transilluminate the chest as a second check for pneumothorax prior to starting the procedure in these infants if the CXR was more than 2 hours ago.

Please note LISA is not usually appropriate for term babies as RDS is unlikely to be the sole primary pathology.

All infants being considered for LISA must be discussed with the attending/on call consultant.

4.2. Preparation for LISA

4.2.1. Who can perform LISA?

- A practitioner who is already competent at intubation (higher specialist trainee, advanced care practitioner or consultant)
- If lower specialist trainee carrying out procedure, they should be directly observed by a consultant, senior trainee or ACP with experience in performing LISA
- Two main operators needed (one to pass and hold catheter in place and one to administer surfactant) as well as team members available to give drugs, soothe baby, pass suction catheters etc.

4.2.2. Set up the environment and prepare the baby:

Prepare as if baby is going to be intubated; ventilator should be available. Ensure good developmental care throughout the procedure e.g. swaddling, in a nest.

Ensure thermal control – consider use of a radiant heater, transwarmer etc. Continuous temperature monitoring should be used throughout.

Baby must have:

- IV access
- Monitoring: ECG, Saturations, temperature probe.
- Oro-/nasogastric tube in situ and aspirated

Baby must have good respiratory drive and have received caffeine (if less than 32 weeks) at least 30 minutes before the procedure.

If above 32 weeks, chest x-ray should have been performed in the last 6 hours to exclude other pathology e.g. pneumonia, pneumothorax, diaphragmatic hernia. If CXR was performed more than 2h ago, cold light transillumination of the chest should be done prior to the procedure.

4.2.3. Medication:

- Propofol 0.5mg/kg - have 2 doses drawn up. See separate drug monograph.
- Surfactant at 200mg/kg dose
- Intubation drugs prescribed

4.2.4. Equipment needed:

- Catheter - LISAcath or Vygon catheter
    - Calculate approximate length of insertion as per ETT length
    - Put Steristrip around catheter at length of insertion at lips as a guide
    - Gently bend the catheter to optimise passage through the cords
- All equipment for intubation including ETT tubes, stylet, ETCO2 detector, fixator and intubation checklist
- Suction working and appropriate size catheters
- Blue coloured leuer lock syringe (to reduce risk of inadvertent IV administration)
    - Draw up surfactant with at least 1 mL of air (Note: surfactant giving set is not needed) This should be attached to a short IV extension set to attach to the LISAcath to minimise dislodgement of the catheter during the procedure
- Laryngoscope - ideally video laryngoscope. This enables a second person to check that the catheter has definitely passed through the cords before instillation of surfactant
- Neopuff and mask for IPPV if needed
- Magill forceps (in case needed to assist with passing catheter)

4.3. Procedure

1. Start checklist/audit form (to be filled in contemporaneously by a member of the team)

2. CPAP must be continued throughout the procedure. If CPAP hinders passing the catheter it can be moved temporarily, however you must ensure it is repositioned before surfactant is administered
3. Maintain normothermia; continuous temperature monitoring
4. Aspirate oro-/nasogastric tube
5. Give premedications - Propofol 0.5mg/kg as per protocol and allow sedation to take effect
6. Gently visualise cords (ideally with video laryngoscope so other members of the team can confirm correct placement of the Lisacath)
7. Insert catheter through cords so cords are at level of black marker on catheter (Magill forceps may occasionally be needed). Steristrips (previously placed on catheter) can be used to help maintain correct positioning throughout procedure.
8. Remove laryngoscope from mouth
9. Operator to hold catheter in place whilst helper gives surfactant slowly over 2- 3 minutes ensuring baby breathing throughout with maintained respiratory support. Slow instillation prevents surfactant reflux
10. Keep baby's mouth closed throughout
11. If heart rate decreases or apnoeic consider slowing down or even pausing the rate of administration of surfactant
12. Aspirate NGT half way through and at the end of surfactant administration
13. At end of surfactant administration, remove catheter
14. Complete checklist/audit form

Failed procedure: if the procedure fails, consider intubation, surfactant and ventilation.

4.4. Post-procedure nursing care

- Optimise in prone position with NCPAP or HF via nasal cannula, leave undisturbed with continuous monitoring
- Avoid suction unless absolutely deemed necessary
- Some oropharyngeal reflux is expected post LISA procedure

4.5. If a second dose of surfactant is required, this should be done by intubation, surfactant and ventilation rather than repeating LISA.

5. References

1. Abdel-Latif ME, Davis PG, Wheeler KI, De Paoli AG, Dargaville PA. Surfactant therapy via thin catheter in preterm infants with or at risk of respiratory distress syndrome. Cochrane Database Syst Rev. 2021 May 10;5:CD011672. doi: 10.1002/14651858.CD011672.pub2.

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4. Rigo V, Lefebvre C, Broux I. Surfactant instillation in spontaneously breathing preterm infants: a systematic review and meta-analysis. Eur J Pediatr. 2016 ;175(12):1933-1942

5.Surfactant administration for respiratory distress. Yorkshire and Humber ODN pan network guideline. January 2022

6. Delivery of Less Invasive Surfactant Administration. Nottingham University Hospitals NHS Trust guideline. March 2023.

Adapted with kind permission from Dr Cath Harrison at Leeds Teaching Hospitals NHS Trust

6. Documentation Controls (these go at the end of the document but before any appendices)

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7. Appendices