Midazolam as premedication drug for Less Invasive Surfactant Administration (LISA): a prospective audit.

Dr Dina Sava[1], ANNP Liam Willgress[1] & Dr Paul Clarke[1,2]

1. Neonatal Intensive Care Unit, Norfolk and Norwich University Hospital NHS Foundation Trust
2. Norwich Medical School, University of East Anglia, Norwich, UK

Background:

Less invasive surfactant administration (LISA) to treat respiratory distress syndrome reduces mechanical ventilation and risk of bronchopulmonary dysplasia in preterm infants. Premedication can relieve procedural pain associated with laryngoscopy, thereby facilitating LISA, but may have side effects. The optimal premedication for LISA remains unknown. We reviewed our centre's use of midazolam as preferred LISA premedication drug.

Methods:

Prospective audit of neonates who routinely received midazolam for LISA within our tertiary-level NICU between July 2019 and December 2022. Under our Unit's guideline neonates received midazolam 50-100 µg/kg intravenously 2-5 minutes prior to laryngoscopy. Atropine 20 mcg/kg was optional. Surfactant (Curosurf) 200 mg/kg was administered via a dedicated LISA catheter (Surfcath or Vygon). Data regarding each LISA procedure were recorded contemporaneously by the operator on a bespoke audit proforma and in the medical records. We reviewed rates of procedural success (defined as successful LISA catheterisation and surfactant administration), physiological stability, and side effects during the LISA procedures, and numbers needing endotracheal intubation within 24 hours.

Results:

61 neonates received midazolam premedication for LISA in the study period: n=36 received 50 µg/kg; n=24 received 100 µg/kg in total; n=1 received 150 mcg/kg in total. Median gestational age was 29.4 weeks (IQR: 28.0-33.6, range 24.2-39.0 weeks). Median postnatal age at LISA was 6 (IQR: 3-10.5) hours. Median FiO_2 immediately preceding LISA was 0.42 (IQR: 0.36-0.50) and 1-hour post LISA was 0.30 (IQR: 0.26-0.40). For 60/61 (98%) the procedure was deemed successful. In the sole case where it was considered unsuccessful, a 34.6 week gestation baby, 100mcg/kg provided inadequate sedation and LISA was abandoned after two attempts. Only 2 babies required endotracheal intubation and ventilation within 24 hours of first LISA dose. Rates of recorded side effects during LISA were: surfactant reflux n=8 (13%); bradycardia (heart rate <100/min) n=11 (18%); apnoea n=17 (28%); oxygen desaturation (SaO_2 <80%) n=31 (51%).

Discussion:

The use of premedication for LISA remains varied in neonatal units who have adopted the technique and is inconsistently reported in many studies on LISA[1]. A Recent survey suggests just under half of all UK neonatal units using LISA do not use premedication and the other units use a variety of medications including fentanyl[2]. The successful administration of pulmonary surfactant using the LISA/MIST technique whilst also maintaining the neonate's comfort and physiological stability remains a significant clinical challenge[3].

Conclusion:

In our experience routine Midazolam premedication for LISA was safe, well tolerated, and was associated with a high rate of procedural success. Midazolam may be a worthy candidate for formal study in future comparative trials of LISA premedication drugs, and against non-pharmacological LISA administration.

References

1. Aldana-Aguirre J.C., Pinto M., Featherstone R.M. & Kumar M. (2017) 'Less invasive surfactant administration versus intubation for surfactant delivery in preterm infants with respiratory distress syndrome: a systematic review and meta-analysis'. *Archives of Disease in Childhood Fetal & Neonatal Edition.* Volume 102. F17-23.
2. Jeffreys E., Hunt K., Dassios T., & Greenough A. (2019) 'Uk survey of less invasive surfactant administration'. *Archives of Disease in Childhood Fetal & Neonatal Edition.* 0:F1 doic 10.1136.
3. Lau C.S.M., Chamberlain R.S., & Sun S. (2017) 'Less Invasive Surfactant Administration Reduces the Need for Mechanical Ventilation in Preterm Infants: A Met-Analysis'. *Global Pediatric Health.* Volume 4. Page 1-9.