

Appraisal

Critically appraised paper: Nasal continuous positive airway pressure for infants with meconium aspiration syndrome reduces the need for mechanical ventilation in the first seven days of life

Synopsis

Summary of: Pandita A, Murki S, Oleti TP, Tandur B, Kiran S, Narkhede S, Prajapati A. Effect of Nasal Continuous Positive Airway Pressure on Infants With Meconium Aspiration Syndrome: A Randomized Clinical Trial. *JAMA Pediatr.* 2018;172:161-165.

Question: Does nasal continuous positive airway pressure reduce the need for mechanical ventilation in the first 7 days of life in neonates with respiratory failure due to meconium aspiration syndrome? **Design:** Randomised controlled trial with concealed allocation and blinded outcome assessment. **Setting:** Three tertiary care neonatal intensive care units in India. **Participants:** Inclusion criteria were infants: born with meconium staining of amniotic fluid; > 35 weeks' gestation and birth weight > 2000 g; admitted to the neonatal intensive care unit in the first 24 hours of birth due to respiratory distress; and chest radiograph suggestive of meconium aspiration syndrome. Exclusion criteria were: intubation at admission; severe asphyxia (5-minute Apgar score < 3 and cord potential of hydrogen level < 7); pneumothorax and/or air leak (visible on the admission chest radiograph); and major malformations. Randomisation of 135 participants allocated 67 to an intervention group and 68 to a control group. **Interventions:** The intervention group was started on a bubble nasal continuous positive airway pressure generator (Fisher and Paykel Care) using short binasal prongs. The starting pressure was 5 cmH₂O. Both the pressure and the fraction of inspired oxygen were adjusted to maintain target oxygen saturation between 90% and 95%. The neonate

was weaned from nasal continuous positive airway pressure when oxygen saturation was consistently > 90%, the fraction of inspired oxygen < 0.25 and there was no respiratory distress (respiratory rate < 60 breaths/minute, and no grunting). After weaning, oxygen was administered, if needed, via a hood or binasal oxygen prongs. The control group was started on hood oxygen, administered at 5 to 10 l/minute. Infants whose hood oxygen failed (ie, oxygen saturation < 90% for > 15 minutes on fraction of inspired oxygen = 1) were rescued either with nasal continuous positive airway pressure or mechanical ventilation. **Outcome measures:** The primary outcome was the need for mechanical ventilation in the first 7 days of life. Secondary outcome measures included need for surfactant. **Results:** A total of 135 participants completed the study (67 in the intervention group and 68 in the control group). At 7 days, the intervention group had reduced need for mechanical ventilation (odds ratio [95% CI], 0.09 [0.02 to 0.43]) and reduced need for surfactant (0.24 [0.05 to 0.87]). **Conclusion:** Compared with hood oxygen, starting nasal continuous positive airway pressure early in neonates with meconium aspiration syndrome reduced the need for mechanical ventilation and surfactant.

Provenance: Invited. Not peer reviewed.

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Commentary

Respiratory management of meconium aspiration syndrome is complex, as the syndrome involves a combination of atelectasis, airflow obstruction and lung inflammation, along with the high risk of coexistent pulmonary hypertension.¹ Whilst most neonates with meconium aspiration syndrome will have the mild form, when severe it can affect morbidity and mortality.²

Given that atelectasis is one of the main complications, the role of early nasal continuous positive airway pressure in the management of infants with mild/moderate respiratory distress to prevent the need for mechanical ventilation warrants further investigation. This well designed, multi-centre, moderate size randomised controlled trial examined the role of early continuous positive airway pressure (administered within a mean of 1.2 hours after birth) compared with standard care. The intervention considerably reduced the need for mechanical ventilation, showing that with every five newborns with meconium aspiration syndrome started on early nasal continuous positive airway pressure, one was protected from requiring mechanical ventilation. It should be noted that treatment was not without complication: one of the two infants in the intervention group went on to require mechanical ventilation and sustained a pneumothorax.

Although cost-effectiveness analysis was not part of this study, the use of continuous positive airway pressure compared with more intensive care involving mechanical ventilation may reduce costs to

the healthcare system, especially in lower resourced settings. It is also less invasive for the neonates and their families. However, it remains controversial as to whether nasal continuous positive airway pressure will become routine management for all neonates with meconium aspiration syndrome who do not require ventilation at birth, as some may see that this is increased intervention compared with current standard care, where most infants only require head-box oxygen.¹ Further research to determine which neonates with meconium aspiration syndrome would benefit from nasal continuous airway pressure would be beneficial given the spectrum of the severity.

Provenance: Invited. Not peer reviewed.

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