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[Intervention Review]

Early nasal intermittent positive pressure ventilation (NIPPV) versus early nasal continuous positive airway pressure (NCPAP) for preterm infants

Brigitte Lemyre¹, Matthew Laughon², Carl Bose², Peter G Davis³

¹Division of Neonatology, Children's Hospital of Eastern Ontario, Ottawa, Canada. ²Department of Pediatrics, Division of Neonatal-Perinatal Medicine, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA. ³The University of Melbourne, Melbourne, Australia

Contact address: Brigitte Lemyre, Division of Neonatology, Children's Hospital of Eastern Ontario, 401 Smyth Road, Ottawa, ON, K1H 8L1, Canada. blemyre@ottawahospital.on.ca.

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ABSTRACT

Background

Nasal continuous positive airway pressure (NCPAP) is a strategy for maintaining positive airway pressure throughout the respiratory cycle through the application of bias flow of respiratory gas to an apparatus attached to the nose. Treatment with NCPAP is associated with decreased risk of mechanical ventilation and might be effective in reducing chronic lung disease. Nasal intermittent positive pressure ventilation (NIPPV) is a form of noninvasive ventilation during which patients are exposed intermittently to higher levels of airway pressure, along with NCPAP through the same nasal device.

Objectives

To examine the risks and benefits of early NIPPV versus early NCPAP alone for preterm infants at risk of or in respiratory distress within the first hours after birth.

Primary endpoints are respiratory failure and the need for intubated ventilatory support during the first week of life. Secondary endpoints include chronic lung disease (CLD) (oxygen therapy at 36 weeks' postmenstrual age), air leaks, duration of respiratory support, duration of oxygen therapy, intraventricular hemorrhage, and incidence of mortality.

Search methods

We used the standard search strategy of the Cochrane Neonatal Review Group to search the Cochrane Central Register of Controlled Trials (CENTRAL; 2015, Issue 9), MEDLINE via PubMed (1966 to September 28, 2015), Embase (1980 to September 28, 2015), and the Cumulative Index to Nursing and Allied Health Literature (CINAHL; 1982 to September 28, 2015). We also searched clinical trials databases, conference proceedings, and the reference lists of retrieved articles for randomized controlled trials and quasi-randomized trials. A member of the Cochrane Neonatal Review Group handsearched abstracts from the European Society of Pediatric Research (ESPR). We contacted the authors of ongoing clinical trials to ask for information.

Selection criteria

We considered all randomized and quasi-randomized controlled trials. Studies selected compared NIPPV versus NCPAP treatment, starting at birth or shortly thereafter in preterm infants (< 37 weeks' gestational age).

Data collection and analysis

We performed data collection and analysis using the recommendations of the Cochrane Neonatal Review Group.

Main results

Ten trials, enrolling a total of 1061 infants, met criteria for inclusion in this review. Meta-analyses of these studies showed significantly reduced risk of meeting respiratory failure criteria (typical risk ratio (RR) 0.65, 95% confidence interval (CI) 0.51 to 0.82; typical risk difference (RD) -0.09, 95% CI -0.13 to -0.04) and needing intubation (typical RR 0.78, 95% CI 0.64 to 0.94; typical RD -0.07, 95% CI -0.12 to -0.02) among infants treated with early NIPPV compared with early NCPAP. The meta-analysis did not demonstrate a reduction in the risk of CLD among infants randomized to NIPPV (typical RR 0.78, 95% CI 0.58 to 1.06). Investigators observed no evidence of harm. Review authors graded the quality of the evidence as moderate (unblinded studies).

Authors' conclusions

Early NIPPV does appear to be superior to NCPAP alone for decreasing respiratory failure and the need for intubation and endotracheal tube ventilation among preterm infants with respiratory distress syndrome. Additional studies are needed to confirm these results and to assess the safety of NIPPV compared with NCPAP alone in a larger patient population.

PLAIN LANGUAGE SUMMARY

Early nasal intermittent positive pressure ventilation (NIPPV) versus early nasal continuous positive airway pressure (NCPAP) for preterm infants

Review question: Does NIPPV confer greater short-term and long-term benefits without harm to preterm infants with or at risk of respiratory distress compared with NCPAP?

Background: Some evidence suggests that nasal intermittent positive pressure ventilation (NIPPV) increases the effectiveness of nasal continuous positive airway pressure (NCPAP) in preterm babies who have respiratory difficulties or are at risk of such difficulties. Preterm babies with breathing problems often require help from a machine (ventilator) that provides regular breaths through a tube in the windpipe. Pediatricians caring for these preterm infants try to avoid use of ventilators, as they can damage the growing lung. NCPAP and NIPPV are ways of supporting babies' breathing in a less invasive way - the tubes are shorter and go only to the back of the nose, thereby causing less damage to the lungs. NCPAP and NIPPV may be used early after birth to reduce the number of babies needing to go on a ventilator. NCPAP provides steady pressure to the back of the nose that is transmitted to the lungs, helping the baby breathe more comfortably. NIPPV provides the same support but also adds some breaths through the ventilator.

Study characteristics: We searched scientific databases for studies comparing NCPAP with NIPPV in preterm infants (born before 37 completed weeks of pregnancy) who need respiratory support shortly after birth. We looked at breathing problems, the need for a breathing tube and ventilator, and side effects. The evidence is current to September 2015.

Key results: We found nine trials comparing NCPAP with NIPPV. When analyzing all trials, we found that NIPPV reduces the risk for respiratory failure and the need for a ventilator. Additional studies are needed to determine how NIPPV can be best delivered to infants.

Quality of the evidence: The overall quality of the studies included in this review was good.