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Introduction: Sodium bicarbonate (NaHCO₃) correction of metabolic acidosis in preterm neonates is a controversial practice. Physiological changes associated with early postnatal administration of NaHCO₃ have not been well studied. Objective: To determine the hemodynamic effects of NaHCO₃ in extremely premature newborns in the first 24 hours of life.

Methods: This retrospective study included premature neonates 23-30 weeks gestational age who underwent continuous cardiac and cerebral monitoring as participants in a cord milking trial at our institution, and who received NaHCO₃ for the correction of metabolic acidosis in the first 24 hours of life. Blood pressure (BP), heart rate (HR), cardiac output (CO), SpO₂, and cerebral oximetry (StO₂) were captured every 2 seconds. A baseline recording averaged over 10 minutes prior to NaHCO₃ administration was compared with measurements over 10 minute epochs until 80 minutes post administration. Arterial blood gases prior to and within 1 hour of administration were also recorded and compared. Significance was set at p<0.05. The incidence of vasopressor use and intraventricular hemorrhage (IVH) were also recorded.

Results: 28 subjects received NaHCO₃ (1.3±0.3 meq/kg) in the first 24 hours (12±8) of life. NaHCO₃ administration increased pH (7.23 vs 7.27, p=0.01), and decreased the base deficit (-8.4 vs -6.7, p=0.01)

with no effect on pCO₂ (46 vs 45 mm Hg, p=0.80). There was a transient decrease in StO₂ that returned to baseline within 50 minutes post administration. It was observed that the BP, HR, CO, and SpO₂ were not significantly different over time with NaHCO₃ administration. Sixty-one percent were treated with vasopressors and twenty-five percent developed IVH.

Conclusion: Early postnatal NaHCO₃ administration for metabolic acidosis does not acutely improve cardiac output, but does cause a transient decrease in cerebral oxygenation which implies fluctuations in cerebral tissue oxygen extraction. Whether these short term fluctuations are associated with any short or long term harms needs further study.