Hemodynamic Changes During Weaning From Nasal Continuous Positive Airway Pressure

BACKGROUND. Nasal continuous positive airway pressure is frequently used to support preterm infants with respiratory distress syndrome. Little is known about the hemodynamic changes that occur, particularly during the weaning phase when lung compliance has improved and most of the airway pressure can be transmitted to the heart and major blood vessels.

METHODS. We conducted a prospective study on preterm infants (gestational age 32 weeks) with resolving respiratory distress syndrome, who were receiving nasal continuous positive airway pressure of 5 cm H2O and 21% oxygen. While cycling nasal continuous positive airway pressure, we performed 2-dimensional M-mode and pulsed Doppler echocardiography on all infants during nasal continuous positive airway pressure and 1 hour after being off nasal continuous positive airway pressure.

RESULTS. A total of 25 preterm infants were studied. The use of nasal continuous positive airway pressure significantly decreased right ventricular output (320 ± 22.7 vs 410.5 ± 44.1 mL/kg per min); right ventricular end diastolic diameter (6 ± 0.7 vs 6.4 ± 0.4 mm), left ventricular end diastolic diameter (11.6 ± 0.9 vs 13.6 ± 0.7 mm), left ventricular end systolic diameter (7.1 ± 0.6 vs 8.3 ± 0.4 mm), left atrial diameter (6.3 ± 0.5 vs 8 ± 0.5 mm), aortic root diameter (6.4 ± 0.3 vs 6.6 ± 0.4 mm), superior vena cava flow (70.2 ± 8.5 vs 91.1 ± 4 mL/kg per minute), and pulmonary maximum velocity (0.6 ± 0.1 vs 0.7 ± 0.1 m/seconds). It significantly increased mean inferior vena cava diameter (4.3 ± 0.5 vs 3.5 ± 0.6 mm), whereas nasal continuous positive airway pressure did not influence left ventricular output, aortic maximum velocity, fractional shortening, heart rate, or mean arterial blood pressure. Changes associated with nasal continuous positive airway pressure were similar in infants with (n = 8) and without (n = 17) patent ductus arteriosus.

CONCLUSIONS. In infants with resolving respiratory distress syndrome, nasal continuous positive airway pressure can impede systemic and pulmonary venous return, but it does not compromise systemic arterial pressure or heart rate. It is not clear whether the degree of these hemodynamic changes can affect the success of weaning off nasal continuous positive airway pressure. Pediatrics 2008;122:e1086–e1090
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3- 

A randomized study of the effects of perioperative i.v. lidocaine on hemodynamic and hormonal responses for cesarean section

Abstract

Purpose. Intravenous infusion of lidocaine attenuates the stress response to surgery. We aimed to evaluate the effects of perioperative lidocaine on the hemodynamic and hormonal responses for cesarean delivery.

Methods. After the gaining of ethical approval, 90 patients scheduled for elective cesarean delivery were randomly allocated to receive either lidocaine 1.5 mg/kg?1 i.v. bolus 30 min before induction, followed by an infusion of 1.5 mg/kg?h?1 until 1 h after surgery (n = 45), or saline placebo (n = 45). Anesthesia was maintained with 50% nitrous oxide in oxygen with 0.7% isofl urane. Hemodynamic variables, plasma cortisol,
maternal and neonatal lidocaine concentrations, Apgar scores at 1 and 5 min, neonatal acid-base status, and the neurologic and adaptive capacity score (NACS) were recorded.

Results. After induction, patients receiving lidocaine had a smaller increase in heart rate and mean arterial blood pressure (P < 0.02) and lower plasma cortisol concentrations (31.1 ± 9.11 μg/dL vs 45.6 ± 8.43 μg/dL; P < 0.001). There were no differences between the two groups in Apgar scores, NACS, or neonatal acid-base status. After delivery, maternal and umbilical venous concentrations and umbilical vein-to-maternal vein ratios of lidocaine were 2.05 ± 0.42 μg/mL and 1.06 ± 0.31 μg/mL, and 0.52 ± 0.07, respectively.

Conclusion. Perioperative lidocaine is safe and effective in attenuating the maternal stress response to surgery for cesarean delivery.

4-

Myocardial Performance in Asphyxiated Full-Term Infants Assessed by Doppler Tissue Imaging

Abstract The aim of this study was to assess myocardial performance of full-term infants with perinatal asphyxia using Doppler tissue imaging (DTI) and to correlate it with serum cardiac troponin T (cTnT) concentrations. Twenty-five asphyxiated and 20 nonasphyxiated term infants were investigated. Serum cTnT concentrations were measured between 12 and 24 h of life. Conventional two-dimensional Doppler echocardiography and DTI were done during the first 72 h of life. Right ventricular (RV) and left ventricular (LV) Tei indexes were significantly higher in asphyxiated neonates (mean ± SD: 0.45 ± 0.05 vs. 0.28 ± 0.05, P<0.001 and 0.51 ± 0.04 vs. 0.38 ± 0.04, P<0.001, respectively). Mitral and tricuspid systolic (Sm) velocities were significantly lower in asphyxiated neonates (mean ± SD: 5.06 ± 0.89 vs. 6.89 ± 0.94 cm/s, P<0.001 and 5.78 ± 0.58 vs. 6.69 ± 0.87 cm/s, P<0.001, respectively). cTnT concentrations were significantly higher in asphyxiated neonates [median (range): 0.17 (0.05–0.23) μg/l, P<0.001], and they correlated positively with the LV Tei index (r = 0.67, P<0.001) and the RV Tei index (r = 0.68, P<0.001) and negatively with the mitral systolic (Sm) velocity (r = -0.68, P<0.001) and tricuspid systolic (Sm) velocity (r = -0.41, P = 0.01). A higher cTnT was a significant predictor of mortality, whereas fractional shortening (FS) and DTI measurements did not show any significant predictive value. The DTI technique appears to be more sensitive than conventional echocardiography in the early detection of myocardial dysfunction.
induced by perinatal asphyxia in full-term infants.

5-

**A randomized study of the effects of preoperative ketorolac on general anaesthesia for caesarean section**

**Background:** Ketorolac may attenuate the maternal stress response to tracheal intubation, while avoiding opioid-induced neonatal depression. We aimed to evaluate the haemodynamic and hormonal effects of prophylactic ketorolac on surgical stress and analgesia after caesarean delivery.

**Methods:** After ethical approval, 90 patients scheduled for elective caesarean delivery were randomly allocated to receive either ketorolac 15 mg i.v. bolus 20 min before induction, followed by an infusion of 7.5 mg/h (n = 45), or saline placebo (n = 45). Anaesthesia was maintained with 50% nitrous oxide in oxygen with 0.5% isoflurane. Haemodynamic variables, plasma cortisol concentrations, uterine relaxation, need for supplementary doses of oxytocin, peri-operative blood loss, haematocrit, Apgar scores at 1 and 5 min, postoperative pain scores at rest and movement, and tramadol consumption were recorded.

**Results:** After induction, patients receiving ketorolac had a smaller increase in heart rate, systolic and mean arterial blood pressure (P < 0.001) and lower plasma cortisol concentrations, (32.2 ± 7.61 vs. 45 ± 15.1 µg/dL, P < 0.05), lower pain scores at rest and movement for the first two postoperative hours (P < 0.001) and a longer time to first request for analgesia. Fewer patients in the ketorolac group received tramadol in the four hours after surgery (7 (15.6%) vs. 14 (31.1%), P = 0.004). There were no differences between groups in peri-operative blood loss, vomiting or Apgar scores. There was no echocardiographic evidence of premature closure of the ductus arteriosus in the newborns.

**Conclusion:** Prophylactic ketorolac is safe and effective in attenuating the maternal stress response to intubation and improves the quality of analgesia after caesarean delivery.

6-

**Myocardial performance in asphyxiated full term infants**

The aim of this study was to assess myocardial performance of full-term infants with perinatal asphyxia using Doppler tissue imaging (DTI) and to correlate it with serum cardiac troponin T (cTnT) concentrations. Twenty-five asphyxiated and 20 nonasphyxiated term infants were investigated. Serum cTnT concentrations were measured between 12 and 24 h of life. Conventional two-dimensional Doppler echocardiography and DTI were done during the first 72 h of life. Right ventricular (RV) and left ventricular (LV) Tei indexes were significantly higher in asphyxiated neonates.
Myocardial dysfunction in neonatal sepsis: A tissue Doppler imaging study

OBJECTIVES: To assess myocardial performance in septic full-term infants and to correlate it with serum cardiac troponin T concentrations.

DESIGN: Prospective, case-control, clinical study.

SETTING: Neonatal intensive care unit in a university hospital.

PATIENTS: Twenty septic and 20 nonseptic full-term neonates.

INTERVENTIONS: None.

MEASUREMENTS AND MAIN RESULTS: Conventional echocardiography, tissue Doppler imaging, and serum cardiac troponin T concentration tests were performed as soon as diagnosis was made. On tissue Doppler imaging measurements, right ventricular and left ventricular Tei indexes were significantly higher in septic neonates compared to nonseptic neonates (mean ± sd: 0.51 ± 0.09 vs. 0.28 ± 0.05, p < .001, and 0.56 ± 0.07 vs. 0.39 ± 0.04, p < .001, respectively). Mitral and tricuspid annular systolic velocities were significantly lower in septic neonates (mean ± sd: 4.35 ± 0.68 vs. 6.89 ± 0.94 cm/sec, p < .0001, and 5.55 ± 0.66 vs. 6.69 ± 0.87 cm/second, p < .0001, respectively). On conventional echocardiography measurements, left ventricular internal diameter at end-diastole was significantly higher in septic neonates (p = .04), whereas cardiac index and left ventricular and right ventricular diastolic functions were not significantly different between septic and nonseptic neonates. Cardiac troponin T concentrations were significantly higher in septic neonates (median [range], 0.19 [0.12-0.32] vs. 0.03 [0-0.07] μg/L, p < .0001), and they correlated positively with left ventricular Tei index (r = .80; p < .0001) and right ventricular Tei index (r = .73; p < .0001), and correlated negatively with mitral annular systolic velocity (r = -.70; p < .0001) and tricuspid annular systolic velocity (r = -.39, p = .012). Nonsurvivors had significantly higher serum cardiac troponin T concentrations and left ventricular Tei index.

CONCLUSIONS: Neonatal sepsis is associated with systolic and diastolic myocardial dysfunction.
dysfunction. This study provides proof-of-concept data for the use of tissue Doppler imaging in assessment of myocardial dysfunction in septic neonates. Tissue Doppler imaging appears to be more sensitive than conventional echocardiography in the detection of this dysfunction. Serum cardiac troponin T and left ventricular Tei index may have prognostic value in these patients.