September 16th, 2021 15:00 - 17:00

PARALLEL SESSION 19 - LUNG 4

ID 318. Left ventricular diastolic function in very preterm infants

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BACKGROUND

Pulmonary vascular disease contributes to the pathophysiology of bronchopulmonary dysplasia (BPD), but the specific role of postcapillary pathophysiology and left diastolic dysfunction as modulators of BPD is unclear. We aimed at 1) describing the trajectories of left heart diastolic function and 2) evaluating the association between left ventricular diastolic function and respiratory outcomes in very preterm infants.

METHODS

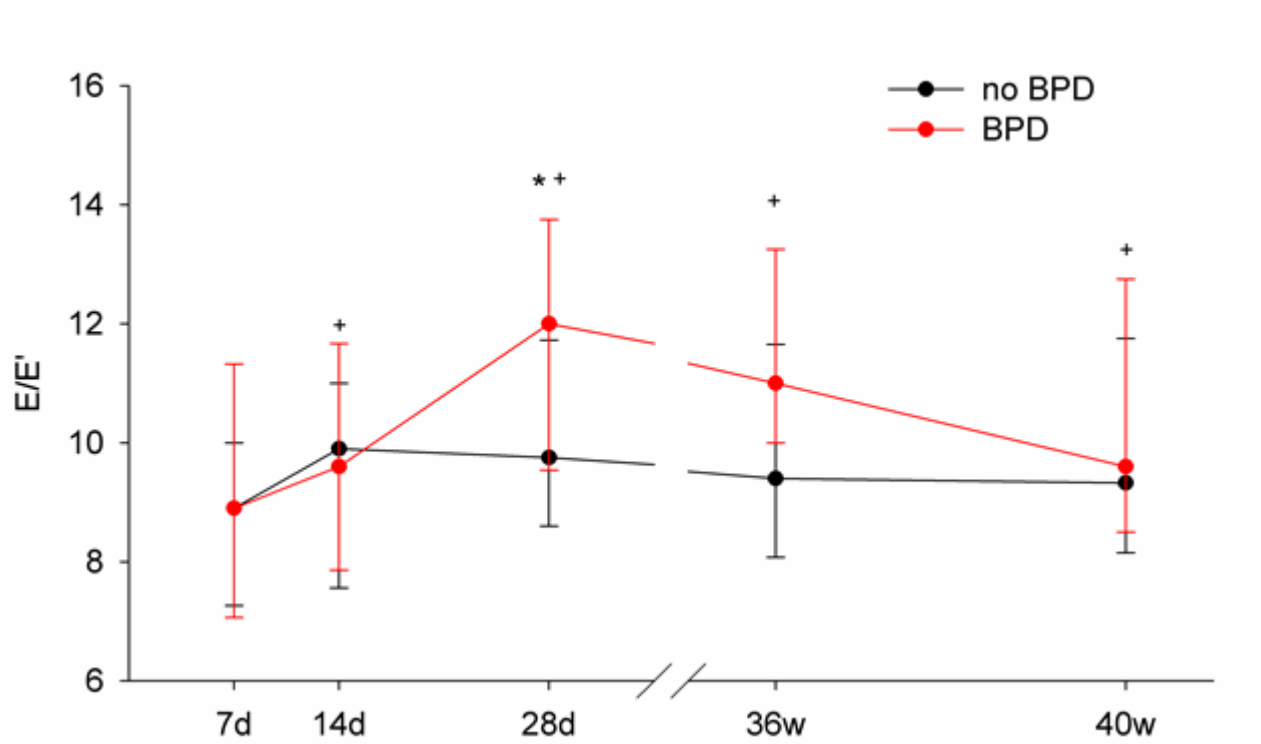
We retrospectively analyzed data of 50 infants < 32 weeks' gestation who underwent echocardiogram evaluations at 7, 14, 28 days of postnatal age (PNA) and 36 and 40 weeks postmenstrual age (PMA). We assessed diastolic function by the E/E' ratio. We compared E/E' over time in infants with and without BPD using two-way ANOVA for repeated measurements. We assessed the association between E/E' at 28 days and respiratory outcomes by linear regressions.

RESULTS

We included 50 infants in the analysis (GA = 28.4 ± 2.3 weeks, birth weight = 1089 ± 366 g), 23 (46%) of whom developed BPD. In infants who developed BPD, E/E' increased over time and was significantly higher at 14, 28 days PNA, 36 and 40 weeks PMA than at 7 days PNA (Figure 1). E/E' at 28 days PNA was significantly higher in infants with than without BPD, and it was significantly associated with the total duration of respiratory support (p = 0.003) and oxygen therapy (p = 0.003).

CONCLUSION

Our data suggest that left ventricular diastolic dysfunction may contribute to the pathophysiology of BPD and that serial echographic assessments of E/E' may allow the identification of infants at risk of worse respiratory outcomes.



E/E' in infants with and without BPD. Data expressed as medians and IQR. *: p < 0.05 vs no BPD, +: p < 0.05 vs day 7 within BPD.

None declared

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ID 296. THE GRADIENT OF ARTERIAL CARBON DIOXIDE TO END-TIDAL CARBON DIOXIDE LEVELS OVER THE FIRST WEEK AFTER BIRTH IN VENTILATED NEWBORN INFANTS

Doctor Nadja Bednarczuk[1], Doctor Emma Williams[1], Doctor Theodore Dassios[2], Professor Anne Greenough[1]
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BACKGROUND
Monitoring of exhaled carbon dioxide levels by capnography is becoming routine in neonatal intensive care. The gradient of arterial carbon dioxide (PCO_2) to end-tidal carbon dioxide ($EtCO_2$) levels may be utilised to monitor patterns over time. In mechanically ventilated children, this relationship has been utilised during invasive ventilation demonstrating greater divergence in worsening pulmonary disease. The aim of this study was to establish whether similar changes occurred within the neonatal population and to describe the trends between PCO_2-$EtCO_2$ values during the first week after birth in infants of differing gestational ages.

METHODS
A retrospective cohort study of infants who required invasive mechanical ventilation between January 2020-January 2021 was undertaken. Preterm infants required ventilatory support for pulmonary insufficiency and term infants were mechanically ventilated due to poor perinatal adaptation. There was no neonatal mortality before 28 days. Infants were ventilated with the SLE6000 ventilator and sidestream end-tidal capnography monitoring was incorporated into the circuit. Baseline demographics and ventilatory requirements were collected. The difference between simultaneously measured PCO_2 and $EtCO_2$ values were calculated and averaged per day of ventilation in the two gestational age groups.

RESULTS
Sixty infants were included. Thirty preterm infants had a median (range) gestational age of 27.0 (22.6-30.6) weeks and birthweight of 890 (540-1785) grams and the 30 term infants had a median gestational age of 40.0 (37.3-41.9) weeks and birthweight 3330 (2455-4420) grams. The average PCO_2-$EtCO_2$ gradient during the first week after birth in preterm infants was 14.3 mmHg and in term infants 6.89 mmHg ($p<0.001$). On day one after birth, the PCO_2-$EtCO_2$ gradient in preterm infants was 10.7 mmHg higher than in term infants (22.0 versus 11.3 mmHg). At day seven, this difference reduced to 4.6 mmHg (11.1 versus 6.5 mmHg). This longitudinal convergence was likely due to improving respiratory status in the preterm infants (Figure 1).

CONCLUSION
In both groups, the gradient decreased over the first week after birth. An increase in the PCO_2-$EtCO_2$ gradient then could act as an early warning sign of respiratory deterioration and therefore alert clinicians to consider further investigation.

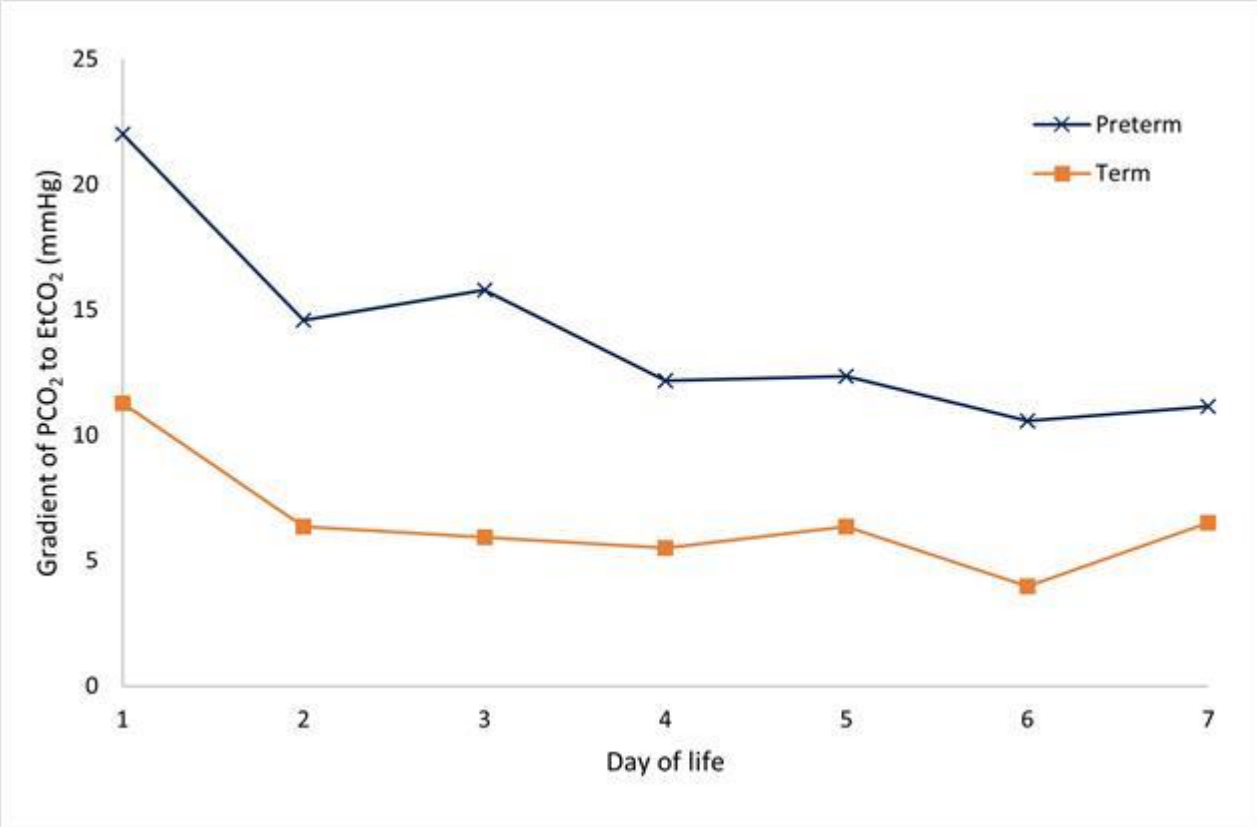

Figure 1. Trend in PCO_2-$EtCO_2$ gradient during the first week after birth.

None declared.

ID 516. NASAL HIGH FLOW TO OPTIMISE STABILITY DURING INTUBATION IN NEONATES: RESULTS OF THE NOSI PILOT TRIAL

Doctor Jason Foran[1], Dr Carmel Moore[1], Shirley Moore[1], Dr Jyothsna Purna[1], Dr Anna Curley[1]
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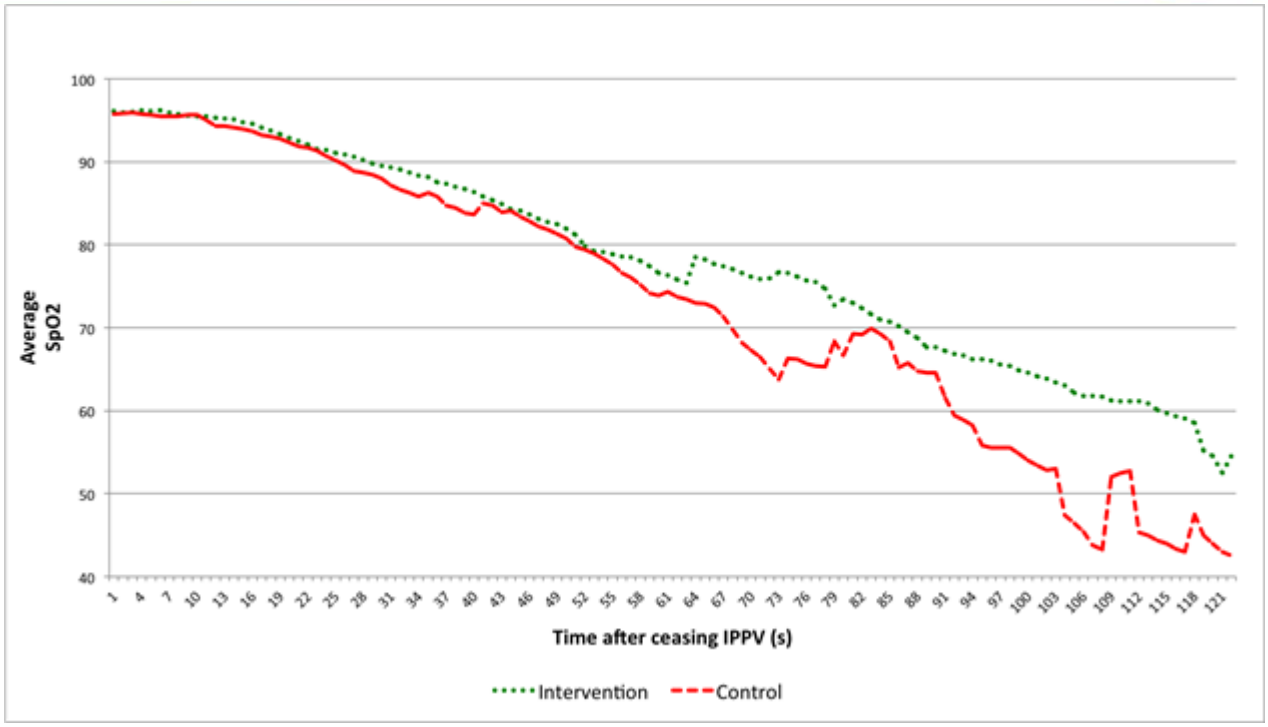
Background: Adult studies of patients with acute respiratory failure requiring intubation, have demonstrated that high-flow heated and humidified oxygen via nasal cannulae (HFNC) during intubation reduces oxygen desaturation. We hypothesised that in neonates requiring intubation the use of HFNC at 6L/min and FiO2 of 1 would decrease the duration of hypoxia.

Methods: Setting: Tertiary neonatal unit. All babies requiring intubation in the neonatal unit included. Randomised controlled two-arm trial (RCT). Computer-generated randomization sequence used. Ethics committee approved deferred consent as intubation is an emergency procedure. Premedication with fentanyl, atropine and suxamethonium. Real time second by second data retrieved from clinical monitor. Intervention: pre-oxygenation/ventilation with Neopuff Infant Resuscitator device followed by HFNC 6L/min, FiO2=1, at time of laryngoscopy. Control:pre-oxygenation /ventilation with Neopuff then HFNC applied with zero flow. Primary outcome: cumulative duration of hypoxaemia <75% up to (ETC02 detector confirmed) successful intubation. Study blinded to data collector/analyst. Simultaneous running of suction adjacent to baby blinded intubators to potential sound of HFNC at nares. Secondary outcome variables included oxygenation quality, time to SpO2<65%, 75%, 85%, lowest oxygen saturation and complications related to intubation. Mann Whitney U test used for analysis of primary outcome.

Results: 36 babies enrolled ; 24 preterm <34 weeks gestation, 12 ≥34weeks. Within the preterm cohort median cumulative time <75% oxygen was 39s vs 42s, intervention vs control, p=0.99. In the group> 34 weeks median was zero seconds in both groups. Mean time to reach 75% in preterm group was 62.6s vs 53.8s intervention vs control, p=0.11. Group ≥34 weeks mean was 37.7s vs 45.5s (p=0.37). Preterm: Mean time to < 60% saturation was 90.3s vs 63.6s in the control arm p=0.04. Babies showed increased instability in control group following attempts lasting >1 minute (see figure).

Conclusion: We demonstrated that this HFNC trial was feasible. Although this pilot study did not detect a significant difference in time below 75% the trial has provided baseline data to adequately power a RCT of HFNC with a similar primary outcome. We noted that use of HFNC resulted in a statistically significant, reduced rate of desaturation (averaged over 10s) within infants <34 weeks.



Average SpO2 from cessation of IPPV for intervention and control arms of <34+0 week infants

None Declared

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ID 429. FETAL PREDICTORS OF NEONATAL RESPIRATORY FAILURE IN CONGENITAL PULMONARY MALFORMATIONS.

Doctor Caroline Archambeau[1,3], Professor Jean-Marc Biard[1], Professor Eddy Bodart[2], Professor Olivier Danhaive[1]

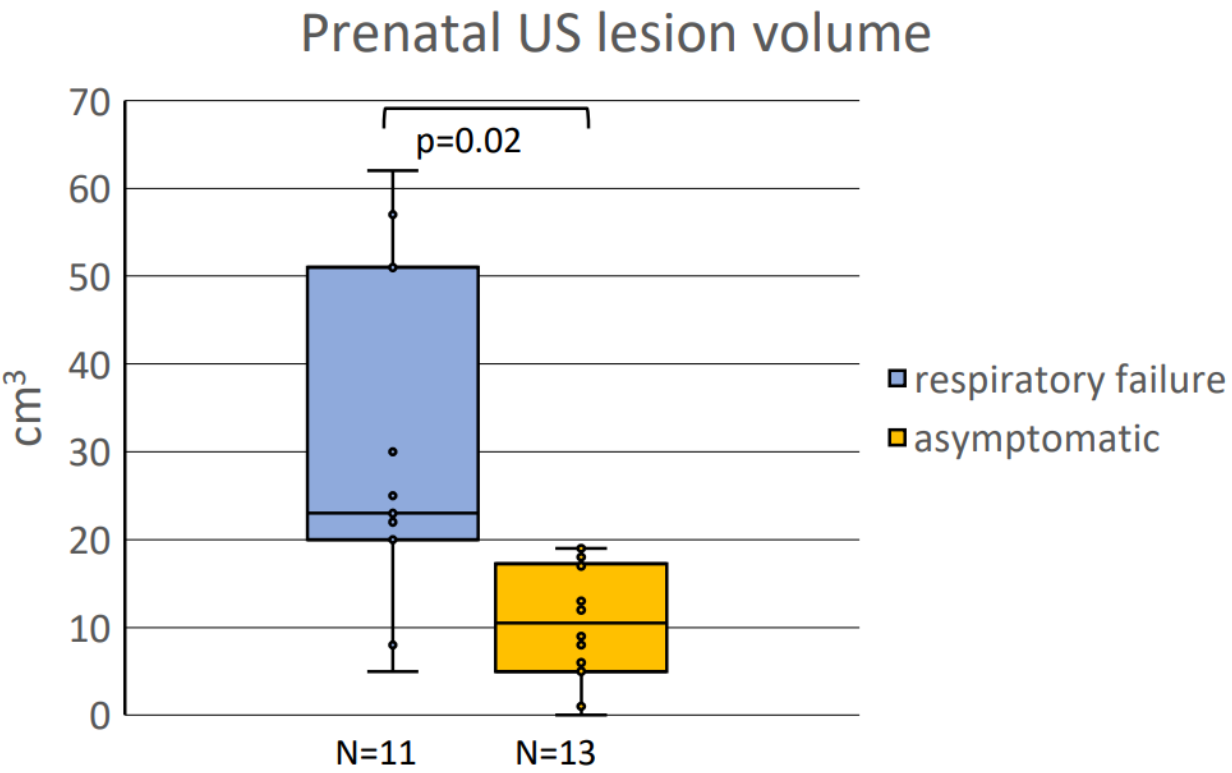
[1]Saint-Luc University Hospital, Brussels, Belgium, [2]CHU UCL Namur - site de Godinne, Yvoir, Belgium, [3]Jolimont Hospital, La Louvière, Belgium

Background:
Congenital pulmonary malformations may result in severe respiratory symptoms at birth in a subset of cases. Our aim was to identify antenatal factor predicting such risk.

Methods:
The study cohort included 39 cases of congenital pulmonary airway malformations (CPAM), pulmonary sequestration (PS) and other lung focal developmental anomalies diagnosed prenatally and treated from 2008 to 2019 at Saint-Luc University Hospital, a level IV national reference center; infants with congenital diaphragmatic hernia, tracheal defects and multiple congenital anomalies were excluded. When available, estimated lesion volume on fetal US were compared between the groups of infants with neonatal respiratory failure and those asymptomatic at birth.

Results:
Gestational ages were 35.5+-4.1 weeks (mean+-SD) for the respiratory failure group vs. 38.9+-1.2 weeks for the asymptomatic group (Student's T-test, p=0.005). Birthweight z-scores were similar for both groups. The male/female ratio was 54%. 12 infants (31%) required a NICU hospitalization for respiratory failure. Two required invasive ventilation, seven non-invasive ventilation, one nasal canula O2 and two home monitoring for persisting tachypnea and occasional desaturations. One infant had a pneumothorax. Four required neonatal surgery, two of which died.
Fetal predicting factors: Lesion volume on fetal US was significantly larger in the respiratory failure group (29.5 +-11.6 cm3) than in the asymptomatic group (19.0 +- 5.6 cm3) (Student's T-test, p=0.02), see figure. These lesions were predominantly CPAM in the respiratory failure group (10 CPAM/3 PS), and PS in the asymptomatic group (11 CPAM/13 PS/1 lobar emphysema/1 bronchogenic cyst) (Fisher's test, p=0.1). Six infants in the whole cohort required invasive fetal intervention for significant mediastinal shift and/or hydrops (thoraco-amniotic shunts and/or thoracocentesis): five of these ended up in the respiratory failure group vs. one in the asymptomatic group (Fisher's test, p<0.001); two were delivered prematurely (29 and 30 weeks).

Conclusion:
The main predictor of neonatal respiratory failure was the size of the lesion on fetal US and the presence of significant mediastinal shift or hydrops. Our data suggest that fetuses with congenital pulmonary malformations >20cm3 and/or requiring fetal intervention should be delivered in level III/IV centers with NICU and neonatal surgery services available.



Prenatal US lesion volume
None Declared