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OBSTETRICAL COMPLICATIONS ASSOCIATED WITH PRETERM DELIVERY AND INTRAVENTRICULAR HAEMORRHAGE IN PRETERM INFANTS: RESULTS FROM THE FRENCH NATIONAL COHORT EPIPAGE 2

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Backgrounds and aim Despite the improvement in neonatal care, intraventricular haemorrhage (IVH) remains an important cause of neurodevelopmental anomalies in preterm infants (PI). This event is usually associated with gestational age (GA). Others factors like maternal complications associated with preterm delivery could be implicated. We studied the association between these maternal complications and IVH in a large cohort of PI.

Methods The data were extracted from the national Epipage 2 study, which included PI born before 32 weeks gestation during the year 2011 (n = 3492). Neonatal and Obstetrical data were collected from the medical records including the postnatal cerebral ultrasound results. We used a polytomous logistic regression to compare the risk of the different grades of IVH according to the usual obstetrical complications associated with preterm birth.

Results The incidence of grade 1 IVH was 16.7% [95% CI: 15.2–17.7], grade 2 was 10.5% [95% CI: 9.6–11.6], grade 3 was 5.6% [95% CI: 4.8–6.3] and grade 4: 3.7% [95% CI: 3.1–4.3%]. Infants born when preterm labour with inflammatory syndrome was present had significantly more grade 3 and IV IVH than those exposed to maternal vascular disease (respectively 12.6% and 7.3% vs 1.8% and 3.4%). After adjustment for GA and others confounding factors, grade 4 IVH was strongly associated with preterm labour with inflammation (OR: 1.56 [95% CI: 1.3–18.5]) and placental abruption (OR: 2.3 [95% CI: 1.7–38.0]). Grade 3 IVH was only associated with placental abruption (OR: 4.6 [95% CI: 1.3–16.8]).

Discussion This study demonstrates that IVH is associated with other factors independent of GA, as well as certain maternal complications. These results are useful for the management of preterm birth and help better understand the mechanisms of IVH.

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LARYNGOSCOPE BURNS IN NEONATAL INTUBATION

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Introduction There is a paucity of information about the light and heat output of laryngoscopy equipment. We became concerned about the potential of a laryngoscope blade burn following an episode during intubation. We mounted an *in-vitro* study of laryngoscopes to determine the temperatures reached during clinical use.

Methods The temperature of the incandescent light bulb from ten different laryngoscopes was measured using a Real Time controller from National Instruments for data logging into a PC.

A second set of tests were performed using two fibre optic laryngoscope head designs. The temperature was measured every half a second for ten minute duration from the point in time at which the light was turned on in all devices. The temperature fall times from closing and simultaneous turning off of the laryngoscope light were also recorded.

Results Peak temperature was found to be consistently above 50 °C in four different brands of light bulb protruding laryngoscope heads. On closing the laryngoscope temperatures were all below 30° at a one minute interval. In comparison, the fibre optic laryngoscope heads did not reach temperatures higher than 27.5°C.

Discussion The findings from our study indicate that within 30 seconds all ten laryngoscopes, with light-bulb sources, had gained significant heat to cause thermal injury to neonatal skin. LED laryngoscopes did not.

Conclusions We recommend that the laryngoscope blade is not left open prior to intubation and that it is closed between intubation attempts.

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NON-INVASIVE ESTIMATION OF THE PACO₂ WITH VOLUMETRIC CAPNOGRAPHY IN CHILDREN MECHANICALLY VENTILATED

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Background In paediatric intensive care unit (PICU), the relationship between end-tidal partial pressure of carbon dioxide (PetCO₂) and arterial partial pressure of carbon dioxide (PaCO₂) may vary dramatically (PetCO₂-PaCO₂ difference between -36 and 63 mmHg) (1). The aim of our study was to develop a model using volumetric capnography (VolCap) to better predict PaCO₂ in mechanically ventilated children.

Material and methods We conducted a prospective clinical study that included all children admitted at Ste-Justine hospital, age 3 kg, mechanically ventilated > 12 h, with an arterial cannula. After literature review, we collected specific data from medical record including demographic data, clinical informations, ventilation, VolCap (NM3, Respirationics, Philips, USA) and biological parameters. VoCap was recorded 15 min before an arterial blood gas and analysed breath-by-breath using a specific software (FlowTool, Philips, USA). The predictive model for PaCO₂ was developed using a linear multivariable regression with the best determination coefficient (R²).

Results 43 children (26 boys, 60%) age of 52 [9–137] months were included. Children with Tidal volume less than 30 ml were excluded because of technical bias in VolCap interpretation by the software. In linear multivariable regression, the best model included the mean airway pressure (p = 0.01), PetCO₂ (p₂ (p = 0.014) and the capnographic index (100*Slope SIII/Slope SII) (p = 0.003) with a R² = 0.85.

Conclusion Our preliminary results show that VoCap can help to improve the non-invasive estimation of PaCO₂. Further research is necessary to validate the accuracy of our model.

REFERENCE

1 McDonald *et al.* *Pediatr Crit Care Med* 2002;3:244-249

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ASSOCIATION OF E-NOS GENE POLYMORPHISM IN DEVELOPMENT OF BRONCHOPULMONARY DYSPLASIA

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Background and aims Bronchopulmonary dysplasia (BPD) is an important morbidity in premature infants with an multifactorial aetiology. In recent years, both genetic and epigenetic mechanisms were suggested to play an important role in BPD development. NO (Nitric Oxide) which is produced along with L-Citrulline by the oxidation of L-Arginine and catalysed by three different isoforms of NOS (NOSynthase), is a short-lived free radical involved in diverse physiological and pathological processes. It consists of 3 types such as neuronal NOS, endothelial NOS and inducible NOS. All the NOS genes are expressed in airway epithelial cells and they are important for physiological functions in the airways. The aim of this study was to investigate possible association between eNOS gene polymorphism and development of BPD in preterm infants.

Methods One hundred and twenty two blood samples DNA isolation was carried out using the PureLink™ Genomic DNA Mini Kit and the concentration of the DNA samples was measured by nanophotometer Implen P 300. For the SNP analysis of eNOS (*rs1799983*) optimised primers were used. Real Time Polymerase Chain Reaction (QRT-PCR) was carried out in a CFX96 thermocycler. Chi-square χ^2 test, Fisher's exact test, the odds ratio and confidence intervals were calculated for the comparisons of allelic and genotype frequencies.

Results Comparison of the allele frequency distribution revealed the presence of G allele as a highly significant risk factor for development of BPD ($p = 0.000^*$; OR 4.07, 95% CI 2.066–8.009) compared to the T allele. The distribution of the T allele in eNOS was found to be similarly distributed amongst BPD (51.9%) and healthy control groups (48.1%). This study demonstrated that the frequency of the GG genotype (25.37%) of the eNOS gene was higher in babies with BPD rather than TT (53.6%) and TG (59.4%) genotype, when these genotypes were compared with the healthy control groups. No healthy infants were seen to carry the GG genotype ($p = 0.000^*$; OR 1.89, 95% CI 1.514–2.148). The TT genotype ($p = 0.019^*$, OR 0.39, 95% CI 0.180–0.870) also displayed a susceptibility for developing BPD. Heterozygous TG genotype ($p = 0.631$; OR 0.63, 95% CI 0.527–2.873) was not associated with the development of BPD.

Conclusion To our best of knowledge, no investigation of the eNOS gene polymorphism has previously been documented in BPD. The findings of this study demonstrated that the GG genotype in eNOS gene was highly significant for BPD.

ESPR – Young Investigators Presentations

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GROWTH TRAJECTORIES AND BONE MINERAL DENSITY IN CHILDREN WITH SUBCLINICAL CELIAC DISEASE: THE GENERATION R STUDY

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Background Positive anti-tTG levels have been associated with reduced weight and bone mineral density (BMD) in clinical celiac disease (CD). However, effects in subclinical CD are not known.

Objective To assess associations between anti-tTG levels, growth and BMD in children with subclinical CD.

Methods In a population-based prospective cohort study, serum samples were analysed for anti-tTG levels at 6 years of age. ($n = 4,442$) Children were categorised into 2 groups: negative (< 7 U/ml, $n = 4,249$), or positive anti-tTG (> 7 U/ml, $n = 57$). Positive tTG levels were further categorised into 2 categories based on the > 10 times upper limit of normal (ULN) levels (70 U/ml). Height, weight and BMI z-scores were obtained using Dutch reference growth charts. BMD was measured by Dual-energy X-ray absorptiometry (DEXA). Multivariable linear regression and linear mixed models were performed.

Results Delayed growth in weight SDS/year (-0.05 ; 95% CI $-0.09, -0.01$) and BMI SDS/year (-0.10 ; 95% CI $-0.18, -0.01$) from 6 months until 6 years was observed in children with positive anti-tTG levels. Height growth tended to be delayed over time (-0.02 SDS/year; 95% CI $-0.06, 0.02$). A lower height (-0.29 ; 95% CI $-0.55, -0.04$), weight (-0.38 ; 95% CI $-0.64, -0.12$), BMI (-0.26 95% CI $-0.49, -0.03$) and BMD (-0.26 ; 95% CI $-0.45, -0.08$) at 6 years of age was found in children with positive anti-tTG levels.

Conclusion Positive anti-tTG levels in children without gastrointestinal symptoms at 6 years of age were associated with reduced BMD and delayed growth trajectories until 6 years. This suggests that subclinical CD has consequences for BMD and normal growth.

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NECROTIZING ENTEROCOLITIS IS ASSOCIATED WITH HIPPOCAMPAL NEURON LOSS, MICROGLIAL ACTIVATION AND INCREASED IL-8 LEVELS IN PRETERM PIGS

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Background and aims Preterm birth predisposes to neurological sequelae. Necrotizing enterocolitis (NEC) may further increase the susceptibility to neurological damage, possibly via gut-derived inflammatory signals. To investigate this, we test if NEC severity and intestinal permeability in formula-fed preterm pigs is associated with histopathology, microglial activation, and increased proinflammatory cytokine levels in the hippocampus.

Methods Forty-four preterm piglets were fed increasing doses of formula and euthanized on day five. Macroscopic NEC lesions were scored in five regions of the gut (stomach, proximal, middle, and distal small intestine, colon). Intestinal permeability was assessed by urinary lactulose-mannitol-ratio. Hippocampal IL-1 β and IL-8 levels were determined by ELISA. Histopathology, neurodegeneration, and microglia were investigated by analyses of hematoxylin-eosin, Fluoro-jade B (FJB), and Iba-1 stained coronal sections, respectively.

Results Proximal, middle, and distal small intestinal NEC score, and intestinal permeability correlated positively with IL-8 levels (all $p < 0.05$) but not with IL-1 β . In preterm piglets with severe NEC lesions, numerous shrunken, hyperchromatic neurons were observed. Neurodegeneration was confirmed by positive FJB staining. Iba-1 positive cells with a morphology resembling