

401 VENTILATION PARAMETERS DURING RESUSCITATION: COMPARISON OF TWO DIFFERENT DEVICES IN A MANNEQUIN MODEL WITH AND WITHOUT DISTRACTION

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Background and Aims Positive pressure ventilation is a common intervention in neonatal resuscitation. Distraction, type of device and experience may influence performance. Studies have not included self-inflating bags (SIB) equipped with a PIP manometer and expiratory PEEP valve. We aimed to compare clinicians' ability to ventilate a mannequin using a SIB with additional manometers against a T-piece (TP), with and without distraction.

Method 50 medical and nursing staff were tested using standardised case scenarios with a leak free intubated mannequin. Participants targeted PIP 30 cmH₂O, PEEP 5 cmH₂O, inflation rate (IR) 60 inflations/minute with both devices in randomised order. We analysed PIP, PEEP, IR, expired tidal volume (Tve), professional group and compared devices during baseline and 3 minutes of distraction.

Results 12,981 inflations were analysed. Mean (SD) ventilation parameters are shown in table.

Abstract 401 Table 1

Parameter	Baseline		Distraction	
	TP	SIB	TP	SIB
PIP	29.3 (0.6)	29.0 (2.3)	29.3 (0.7)	28.9 (3.5)
PEEP	4.2 (0.6)	5.5 (0.9)	4.2 (0.6)	5.5 (0.9)
IR	53.6 (10.3)	56.6 (11.7)	53 (13)	56.2 (13.5)
Tve	10.2 (1.8)	9.7 (0.9)	10.3 (1.9)	9.6 (1.5)

When analysed by operator, more variation was observed in IR (P=0.029) and Tve (P=0.002) with SIB during distraction.

Conclusions Clinicians' general performance when using a SIB where PIP and PEEP are displayed is comparable to a T-Piece, however more variation in IR and Tve occurs under distraction. This may be relevant in a real resuscitation.

402 EFFECT OF ANTENATAL CORTICOSTEROIDS IN ACTIVITY AND EXPRESSION OF SECRETORY PHOSPHOLIPASE A2 AND TNF ALFA IN LUNG OF NEWBORN RATS

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Introduction The sPLA2 plays an important role in the development of acute respiratory distress syndrome. It is regulated by many factors including steroids and TNF α . Antenatal corticosteroids are recommended for preventing respiratory distress syndrome in preterm infants. Recent studies suggest that betamethasone might be a better choice than dexamethasone. The aim of this study is evaluate differences between both antenatal corticosteroids in the regulation of sPLA2 and TNF α .

Methods Dexamethasone, betamethasone or saline were administered intravenously to pregnant Wistar rats on the 20th and 21st days of gestation. We evaluated pulmonary sPLA2 and TNF α mRNA in newborn rats at birth by RT-PCR. We also evaluated sPLA2 activity

by an ultrasensitive non-radioactive method on microplate and the TNF α protein expression by ELISA. Differences between the groups were determined by one way ANOVA (p<0.05).

Results We observed a statistically significant decrease in the sPLA2 mRNA in the betamethasone (0.61) and dexamethasone (0.26) groups respect the control (1.05) group and a decrease in the sPLA2 activity in the betamethasone group (33.78) respect the control group (50.74). We observed a statistically significant decrease in the TNF α protein in the betamethasone group (472.61) respect the dexamethasone group (768.65).

Conclusions Antenatal glucocorticoids inhibits the expression of sPLA2 through the reduction of TNF α in the lung of newborn rats. These potential beneficial effects are more evident in the group treated with antenatal betamethasone. Our studies also support the notion that betamethasone could be the drug of choice for treating pregnant women at risk of preterm delivery.

403 SURFACTANT DISATURATED-PHOSPHATIDYLCHOLINE KINETICS IN PNEUMONIA BY STABLE ISOTOPES

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Background and Aim Whether pulmonary surfactant deficiency or dysfunction contributes to the pathogenesis of neonatal pneumonia is still debated. Aim of our study was to measure surfactant disaturated-phosphatidylcholine (DSPC) kinetics and surfactant specific proteins A and B (SP-A, SP-B) amount in term newborns with pneumonia using stable isotopes as tracers.

Methods Twenty-seven term newborns (GA 39.0±1.5 weeks, BW 3165±602 g) requiring mechanical ventilation were studied. Twelve had severe pneumonia and 15 no lung disease. All newborns received intra-tracheally 2 mg/kg U¹³C-DPPC mixed with 2 mg/kg of exogenous surfactant. Isotopic enrichment of DSPC palmitate was measured from tracheal aspirates by mass spectrometry and kinetic data calculated. Surfactant proteins were measured by ELISA. Data were expressed as median (interquartile range) and comparisons were performed by Mann-Whitney test. p<0.05 was regarded as statistically significant.

Results DSPC pool size (PS) was 9.3 mg/kg (3.1–30.2) in newborns with pneumonia and 38.0 mg/kg (24.9–124.6) in controls, p=0.016. DSPC half-life (HL) was 12.7 h (5.2–20.2) and 25.6 h (18.5–65.6) in newborns with pneumonia and in controls, respectively (p=0.004). Analysis for SP-A and SP-B are in progress. In newborns with pneumonia a correlation was found between DSPC kinetic parameters and oxygen requirement (DSPC PS and mean FiO₂, R= -0.61, p=0.047; DSPC HL and mean FiO₂, R= -0.54, p=0.086).

Conclusions Surfactant DSPC kinetics was found to be markedly impaired in term newborns with pneumonia. Preliminary data suggest that these alterations correlate with disease severity; thus, studies on exogenous surfactant therapy and on the effect on surfactant metabolism are needed.

404 DSPC-PALMITATE KINETIC IN A MODEL OF LUNG UNILATERAL ACID INJURY

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Aspiration of gastric (acid) content is a major cause of acute respiratory failure that occurs in children with severe gastroesophageal reflux, gastrointestinal malformations, and neurologic impairment. Alveolar surfactant alterations were demonstrated in diseases with similar aetiology like ARDS and meconium aspiration syndrome. To understand if the surfactant system is modulated locally or if an unilateral injury influences both lungs, we measured alveolar surfactant DSPC in a murine model of unilateral acid injury.

We developed a mouse model of acid lung injury confined in a single lung (right). Deuterated water was injected 18 h after the lung injury and DSPC-palmitate deuterium enrichment was measured for the next 24 hours in BAL and tissue. MPO and total protein analysis was performed separately to each lung to assess the inflammatory status.

Inflammatory status of both lungs was markedly increased in the injured (right) lung. DSPC content was not significantly different between the two lungs in tissue homogenates at all time points (1.83 ± 0.3 vs. 1.75 ± 0.6 $\mu\text{mol/g}$ of lung). Conversely, DSPC content in BAL was significantly increased in the not-injured lung (1.00 ± 0.36 vs. 1.49 ± 0.5 $\mu\text{mol/g}$ of lung, $p=0.008$). Fractional synthetic rates did not significantly change in both homogenates and BAL between the two lungs.

These preliminary data suggest that surfactant system is likely to be regulated at the whole lung level. The not-injured lung seems to increase the amount of DSPC in the alveolar space as a compensatory mechanism for the damage in the contralateral lung.

405 CLINICAL EFFECTIVENESS OF EARLY ADMINISTRATION OF CAFFEINE AND LOW-DOSE HYDROCORTISONE TO PRETERM NEWBORNS WITH A HIGH RISK OF BPD DEVELOPMENT

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Because intrauterine and/or early postnatal inflammation play(s) an important role in the pathogenesis of bronchopulmonary dysplasia (BPD) early administration of anti-inflammatory therapy to high-risk preterm newborns is theoretically substantiated. In a randomised study we evaluated the clinical effectiveness of early administration of caffeine and hydrocortisone to very preterm newborns that required mechanical ventilation (MV) shortly after birth. **Methods** 120 very low birth weight newborns (gestational age < 32 wks.) on MV were randomly assigned on the first day of life to one of the 2 groups depending on administration of caffeine and hydrocortisone. 60 infants with gestational age of 28.02 (1.9) wks. were treated with caffeine (20/5 mg/kg/day) and hydrocortisone (1 mg/kg/day) for 12 days. 60 babies with gestational age of 28.4 (1.8) wks. in the control group were managed according to standard guidelines. The primary study outcome was the incidence of mortality and BPD at 36 weeks' corrected age. BPD was defined according to the NIH consensus definition in modification of Walsh et al. (2003).

Results BPD developed in 19 (35%) infants treated with caffeine and hydrocortisone and in 20 (37%) babies from the control group ($p>0.05$). The composite outcomes (death plus BPD) (26 [43%] vs. 27 [45%] accordingly; $p>0.05$) and incidences of severe BPD were not different between the groups either. Early anti-inflammatory therapy reliably facilitated extubation but did not reduce the duration of the initial period of MV.

Conclusions Early administration of caffeine and hydrocortisone did not prevent BPD development in very preterm newborns requiring MV.

406 THE COMBINED EFFECTS OF ANTENATAL INFLAMMATION AND BETAMETHASONE ON LUNG MORPHOMETRY IN A RAT

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Aim To investigate the effects of antenatal maternal glucocorticoids on fetal lung inflammation by determining lung morphology and inflammatory cell influx in bronchoalveolar lavage fluid.

Methods Rat pups were divided into four experimental groups: vehicle (Control; $n=18$), maternal betamethasone administration (Beta; $n=16$), intra-amniotic lipopolysaccharide administration (LPS; $n=18$), or both betamethasone and lipopolysaccharide administration (Beta+LPS; $n=20$). The changes of lung morphometry were examined on day 5 and 14 and total and differential white cell counts were performed on the bronchoalveolar lavage (BAL) fluid at day 2 and 5.

Results The Beta+LPS group showed marked inhibition of alveolarization, which was characterized by the larger and fewer distal air spaces at day 7 and sustained at day 14. The combination of betamethasone and LPS had significantly larger air spaces than the control, Beta and LPS groups and lower alveolar surface area than the control and LPS groups on day 14. Combination of betamethasone and LPS significantly decreased neutrophil counts in BAL fluid compared with LPS alone group on day 2, but the neutrophil counts were no longer decreased with a delayed clearance of the inflammation ($P = 0.041$). On day 5, the Beta+LPS group had significantly more neutrophils compared to the LPS group in BAL fluid ($P = 0.004$).

Conclusion Our results suggest that concurrent exposures of both betamethasone and LPS in the fetal lung may modulate inflammatory responses to continal resulting in bronchopulmonary dysplasia.

407 IS THE ASSOCIATION BETWEEN CHORIOAMNIONITIS AND ADVERSE REPIRATORY OUTCOMES A MYTH IN THE ERA OF ANTENATAL CORTICOSTEROIDS?

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Background and Aims Chorioamnionitis has historically been associated with adverse neonatal respiratory outcomes. The outcomes of very low birthweight (VLBW) babies born in the UK with histological chorioamnionitis and treated with antenatal corticosteroids has not been examined. Our aim was to determine if there was an association between histological chorioamnionitis and adverse respiratory outcomes in our population of VLBW infants who received antenatal corticosteroids.

Methods 294 VLBW babies born between Jan 2001 and Dec 2010 who had received antenatal corticosteroids and had placental histology performed were identified. Infant characteristics and outcomes were as described by Vermont-Oxford. Analysis was performed using chi square, student t-test and logistic regression.

Results 97 babies out of 294 babies (33%) had histological chorioamnionitis (58 had funisitis). Chorioamnionitis was associated with ventilation 73 (85%) v 117 (69%), $p=0.006$, surfactant 72 (84%) v 112 (66%), $p=0.003$, RDS 75 (87%) v 120 (71%), $p=0.004$, Steroids for CLD 6 (7%) v 11 (7%) $p=0.788$, All discharges on O_2 (transfers & home 02) 44 (51%) v 57 (33%), $p=0.007$. Chorioamnionitis was associated with the need for oxygen at 36 weeks (52% v 31%, OR 2.4, $p=0.015$). However the group of infants with chorioamnionitis were