

1788 EFFECT OF PATENT DUCTUS ARTERIOSUS (PDA) & RESPIRATORY SUPPORT ON OXYGEN SATURATION IN PRETERM BABIES?

doi:10.1136/archdischild-2012-302724.1788

¹S Gupta, ²P Suresh, ¹P Mallaya, ¹C Harikumar. ¹Neonatology & Paediatrics, University Hospital of North Tees, Stockton-on-Tees; ²Medical School, Newcastle University, Newcastle upon Tyne, UK

Background Oxygen saturations in premature babies are targeted between 91–94%. However presence of a PDA and respiratory support have been attributed to fluctuations in oxygen saturations.

Aim To study the effect of PDA and respiratory support on frequency and duration of desaturations in premature babies.

Methods Babies <32 weeks' gestation admitted to the tertiary level neonatal unit were included in this prospective study. Saturations were recorded using the Masimo® pulse oximeters that recorded data every 2 seconds. The data was downloaded and analysed using SPSS® version 19. Babies were divided into 4 groups based on the presence of a PDA (>1.5 mm) and respiratory support (ventilation/CPAP) (Table 1).

Results Thirty six (~6 hour each) recordings were made and ~500,000 records captured.

In babies with a PDA the duration of desaturations was significantly longer.

Babies on respiratory support had significantly lower saturations and also significantly longer periods of saturation < 90% or < 86%.

Abstract 1788 Table 1: Pulse oximetry data in four study groups

Study group	No. of measurements	Saturation: Mean(SD)	Dips/hr: Mean(SD)	Average duration of dips (sec): Mean(SD)	Sats<90 (% of recording duration): Mean(SD)	Saturations< 86% (% of recording duration)	Pulse rate: Mean(SD)
(1) PDA+ Resp. support +	117,000	92.60 (2.16)	14.04 (12.67)	30.50 (12.16)	14.7(12.4)	6.8(7.7)	153(14)
(2) PDA+ No resp. support	97,000	95.49 (1.79)	11.77 (7.90)	24.50 (10.95)	4.8(8.9)	1.8(3.4)	147(11)
(3) No PDA Resp. support +	64,800	93.64 (3.08)	22.40 (26.30)	14.17 (8.38)	14.9(17.3)	5.7(7.8)	147(16)
(4) No PDA No resp. support	169,200	94.07 (2.22)	36.51(9.53)	12.07 (6.08)	8.5(9.1)	2.8(4.0)	154(5)

Conclusions In babies with PDA the desaturation episodes are significantly longer but the saturations are consistent.

Babies on respiratory support have lower saturations and frequent fluctuations in saturations as compared to babies not on any support.

1789 BRONCHOALVEOLAR INTERLEUKIN-1 BETA: A MARKER OF BACTERIAL BURDEN IN LONG TERM MECHANICAL VENTILATION NEWBORN WITH VENTILATOR-ASSOCIATED PNEUMONIA

doi:10.1136/archdischild-2012-302724.1789

D Dmytriiev, O Katilov, O Mazulov, K Dmytriieva. Anesthesiology and Intensive Care, Vinnitsa National Medical University, Vinnitsa, Ukraine

Objective To assess the relationship between concentrations of bronchoalveolar cytokines and bacterial burden (quantitative bacterial count) in long term mechanical ventilation newborn with a presumptive diagnosis of ventilator-associated pneumonia.

Interventions According to the time course of ventilator-associated pneumonia at the time of study with bronchoalveolar lavage, 44 newborn were divided into two subgroups: referral (n=18), and treated (n=26) ventilator-associated pneumonia. Bronchoalveolar lavage was performed in the most abnormal area on chest radiograph by fiberoptic bronchoscope. Bronchoalveolar lavage fluid was processed for quantitative bacterial culture. The concentrations of

bronchoalveolar lavage cytokines (tumor necrosis factor-alpha, interleukin-1 beta, interleukin-6) also were measured.

Measurements and Main Results 26 patients had a positive bacterial culture (bronchoalveolar lavage > or = 10 colony-forming units/mL), and made up 79% of pathogens recovered at high concentrations. The concentrations of bronchoalveolar lavage interleukin-1 beta were 200.4 +/- 22.4 and 44.8 +/- 14.2 pg/mL (mean +/- se) in the newborn with positive and negative bacterial culture, respectively (p<0.001). Bronchoalveolar lavage interleukin-1 beta was significantly higher in the newborn with a high bacterial burden (p<0.001), with mixed bacterial infection (p<0.001), and with ventilator-associated pneumonia (p<0.001), compared with values in patients without these features.

Conclusions Since the concentration of bronchoalveolar lavage interleukin-1 beta was correlated with bacterial burden in the alveoli, it may be a marker for progressive and ongoing inflammation in long term mechanical ventilation newborn.

1790 OXIDATIVE STRESS AND CLINICAL OUTCOME OF PRETERM INFANTS RESUSCITATED WITH DIFFERENT CONCENTRATIONS OF OXYGEN

doi:10.1136/archdischild-2012-302724.1790

¹S Aversa, ¹L Marseglia, ¹A Arco, ¹M Manfreda, ²C Salpietro, ¹I Barberi, ³RJ Reiter, ¹E Gitto. ¹Neonatal Intensive Care Unit, Department of Paediatrics; ²Genetics and Paediatric Immunology, Department of Paediatrics, University of Messina, Messina, Italy; ³Department of Cellular and Structural Biology, The University of Texas Health Science Center, San Antonio, TX, USA

Background and Aims Preterm infants are more sensitive to oxidative stress than older humans. Hyperoxic exposure, although essential for survival of neonates, induces excessive production of reactive oxygen metabolites which could be responsible of morbidities in these babies. Aims of this study were to evaluate the incidence of mortality and bronchodysplasia in preterm infants resuscitated at birth with different concentrations of oxygen. Secondary outcome was to evaluate the serum level of oxidative stress markers in the same population of infants.

Methods A randomized clinical trial has been performed in NICU of University of Messina, Italy.

Results 60 preterm infants (gestational age < 32 weeks) were recruited and randomly divided into three groups (40%, 60% and 100% of fractional inspired oxygen). We didn't find difference in mortality (p 0,877), but bronchodysplasia was represented only in the group of 100% oxygen (p<0.01). These newborns had also a longer time of ventilation (p 0,001) and hospitalization (p 0,007) and a higher incidence of pneumothorax (p<0.01). Serum levels of Interleukin-1β and nitrosylated protein were higher in preterm infants resuscitated with 100% oxygen in comparison with the other two groups of infants, which instead presented a significant reduction of interleukin-10 levels.

Conclusions In our study, the exposure of preterm infants to higher oxygen concentrations at birth is correlated with poor respiratory outcome without influencing neonatal mortality. Imbalances between pro- and anti-inflammatory cytokines may therefore be early indicators of developing chronic lung disease.

1791 COMPARISON BETWEEN HELIOX AND STANDARD OXYGEN-AIR MIXTURE FOR AEROSOLIZED ALBUTEROL SULFATE DELIVERY UNDER NEONATAL MECHANICAL VENTILATION CONDITIONS-IN VITRO STUDY

doi:10.1136/archdischild-2012-302724.1791

¹J Mazela, ¹T Szczapa, ¹K Chmura, ²M Kulza, ²E Florek, ³T Sosnowski, ³A Moskal, ¹J Gadzinowski. ¹Department of Neonatology; ²Environmental Toxicology Lab, Poznan University of Medical Sciences, Poznan; ³Warsaw University of Technology, Warsaw, Poland

Background and Aims Helium-oxygen gas mixture (heliox) has been utilized for ventilatory support of infants with respiratory failure. Therapies which potentially could improve aerosol delivery to ventilated infants are needed. The aim of the study was to assess heliox utilization in delivery of aerosolized albuterol sulfate to a model of ventilated newborn.

Methods A neonatal system was assembled utilizing an Avea ventilator, test lung and vibrating mesh nebulizer Aeroneb placed within inspiratory arm of the ventilator circuit. Pressure controlled mode (SIMV) was used with a rate of 40 bpm, IT of 0.35s and inspiratory pressures of 20cmH₂O with two different ET tubes: 3.0 and 2.0. The study was conducted with heliox and air-oxygen gas mixtures at FiO₂=0.21. Albuterol sulfate (0.25mg/mL) was aerosolized and captured on HME low volume filter located at the end of the ET tube and upstream from the test lung. Emitted dose of the nebulizer was determined by exposing 3 filters to the aerosolized albuterol at the 'Y' and end of the ET tube. Filters were collected, extracted and albuterol quantified using high performance liquid chromatography.

Results No significant difference between heliox and air-oxygen was found in albuterol sulfate delivery at the Y-connector and ET tube 3.0. For smaller tube heliox was inferior to air (p<0.05).

Conclusions Due to its lower density, heliox flow rate at a given driving pressure will be higher than the air-oxygen flow rate. Increased inspiratory flow rate in a patient ventilated using artificial airway may not be beneficial for aerosol delivery. Differences in flow rates between heliox and air-oxygen in the study might have outweighed the previously reported beneficial effects of heliox on aerosol delivery.

1792 DIFFERENT ENDOTRACHEAL TUBES, DIFFERENT CONNECTORS, DIFFERENT LENGTHS: IMPACT ON RESISTANCE AND DEAD SPACE

doi:10.1136/archdischild-2012-302724.1792

E Kazanci, F Kulali, N Altuntas, S Unal, S Aktas, E Ergenekon. *Pediatrics, Newborn Medicine, Gazi University Hospital, Ankara, Turkey*

Background and Aims During ventilation, size and length of endotracheal tube affects the dead space (DS) and resistance which is considered important for preterm infants. We aimed to investigate impact of the tube type, length, connector and size on DS and resistance when all variables are controlled on a manikin.

Methods We ventilated a newborn manikin with Draeger Babylog 8000 using regular and surfactant tubes, regular and closed system aspiration connectors. Pressures, inspiratory time and flow were kept constant. Measurements were made at full length of the tubes and after shortening (11 and 13 cm for 2.5–3.0 and 3.5–4.0 mm tubes respectively) when tidal volume (TV) and resistance displayed on the ventilator were recorded. Differences in TV represented differences in DS.

Results With the use of closed system aspiration connector resistance was elevated by 12 % in all tubes and DS of all tubes except 3.0 mm tube were increased by 10 %. Shortening the tube reduced DS by 1–10 % in all sizes except 2.5 mm tube. Resistance was higher in long tubes by 4–27 % however this was less than expected. Resistance of 2.5 and 3.5 mm regular tubes were 2–48 % higher and 3.0 mm tube was 1–17.6 % lower than surfactant tubes. Resistance was higher in smaller tubes but the magnitude of difference was not as big as the theoretical assumption about the impact of radius to the 4th power.

Conclusion Many variables impact DS and airway resistance during ventilation some of which maybe important for preterm newborn.

1793 EFFECT OF CHEST COMPRESSIONS ON MASK LEAK DURING NEONATAL RESUSCITATION: A MANIKIN STUDY

doi:10.1136/archdischild-2012-302724.1793

¹B Schwaberg, ^{1,2}GM Schmölzer, ¹C Binder, ¹W Müller, ¹B Urlesberger, ¹G Pichler. ¹Department of Paediatrics, Medical University of Graz, Graz, Austria; ²Department of Pediatrics, University of Alberta, Edmonton, AB, Canada

Background Chest compressions during neonatal resuscitation are an infrequent event during neonatal resuscitation.

Objectives To investigate if chest compressions (CC) during simulated neonatal cardio-pulmonary resuscitation affect percentage of mask leak.

Methods 21 neonatal staff members (11 Neonatal nurses, 10 Neonatologists) delivered positive pressure ventilation (PPV) to a modified, leak-free manikin via face mask using a Neopuff T-piece device. After 90 seconds of PPV-only (baseline) an assistant provided chest compressions (CC) at a ratio of 3:1 chest compressions to inflations for further 90 seconds (PPV+CC). Mask leak was measured with a Florian respiratory function monitor. Results between PPV-only and PPV+CC were compared using dependent t-test for paired samples.

Results A total of 2726 ventilations and 3058 chest compressions were analyzed. Overall the mean (SD) mask leak during PPV-only and PPV+CC was similar 35 (±30)% versus 40 (±33)% (p=0.2). However, in the neonatal nurse group mask leak significantly increased from 27 (±26)% in the PPV-only group to 43 (±35)% in the PPV+CC group (p=0.04). In comparison, mask leak was similar in the neonatologist group in the PPV-only and PPV+CC group 42 (±33)% and 37 (±34)% (p=0.65), respectively.

Conclusions Overall, mask leak did not change once chest compressions were started. However, mask leak significantly increased in the neonatal nurse group once chest compression were provided, but remained similar in the neonatologist group.

1794 DOES SITE OF PULSE OXIMETER PROBE PLACEMENT AFFECT OBSERVED SATURATION VALUES IN BABIES WITH PDA OR RESPIRATORY SUPPORT?

doi:10.1136/archdischild-2012-302724.1794

¹P Suresh, ²W Cheadle, ^{2,3}S Gupta. ¹Medical School, Newcastle University, Newcastle-upon-Tyne; ²Neonatology & Paediatrics, University Hospital of North Tees; ³School of Medicine & Health, Durham University, Stockton-on-Tees, UK

Background Pulse oximetry is routinely utilised for monitoring oxygen saturations in newborn babies. The site for pulse oximeter probe placement is randomly selected and saturations targeted according to the unit policy.

Aim To study whether site of pulse oximeter probe placement would affect observed saturation values in preterm babies on respiratory support and or having patent ductus arteriosus (PDA)?

Methods Babies born < 32 weeks gestation and admitted to the tertiary level neonatal unit were randomly included in this prospective pilot study. They were allocated to one of 4 groups (Figure 1). One probe was placed on right upper limb (pre-ductal) and other on lower limb (post-ductal). Simultaneous continuous saturation recording was done for at least 6 hours using Radical-7, Masimo® pulse oximeters that recorded data every 2 seconds. At the end of the recording period data was downloaded using the software and analysed using SPSS® version 19.

Results Twenty babies were enrolled in this study and ~500,000 data points recorded.