1237 HYPEROXEMIA AND INCREASED MORTALITY IN PREMATURES. Dietrich W. Roloff (Spon. by William F. Howatt). University of Michigan Medical Center, Department of Pediatrics, Ann Arbor, Michigan.

Records of 159 premature infants with the following criteria were reviewed: BW 750 - 1500 g, no malformations, survival at least 24 hours. The highest PO_2 value for each infant from routine blood gas determinations was selected and tabulated as to survival:

		survived	died	
max PaO_2	<140 mm Hg	73 (86%)	12	p <0.005
	>140 mm Hg	48 (65%)	26	

This unexpected effect was largely independent from the associated alveolar-arterial O_2 gradient or FiO_2. For patients with $A\text{-}aDO_2$ <200 mm Hg and FiO_2 <0.60:

		survived	died	
max PaO_2	<140 mm Hg	68 (96%)	3	p <0.05
	>140 mm Hg	21 (75%)	7	

Infants with PO_2 >140 mm Hg were less mature and included more with resuscitation, anemia, RDS, intracranial hemorrhage, PDA, and there were more late deaths. Among the explanations for this phenomenon are the possibilities that hyperoxemia triggers fatal pathological processes and that hyperoxemia signifies a labile ventilation/perfusion relationship.

1238 EFFECT OF CPAP VIA ENDOTRACHEAL TUBE ON ORGAN BLOOD FLOWS IN NEWBORN LAMBS. Charles R. Rosenfeld, David E. Fixler, Giorgio Gabriele, Mickey Wheeler and John West, Univ. Tex. Health Sci. Ctr., Dept. of Ped., Dallas, Texas.

Although CPAP is widely used in newborns, little is known of its effects on organ blood flows. We have shown head-box CPAP with a loose neck collar adversely affects cardiac output (C.O.) and retinal and renal blood flows in newborn lambs. The purpose of this study was to evaluate changes in C.O. and organ flows during endotracheal CPAP. Organ blood flows were measured with labeled 25 μ microspheres at CPAP pressures of 0, 6, 11, and 0 mmHg in 8 spontaneously breathing lambs, 3 to 8 days old. Twenty-three to 44% of the airway pressure was transmitted to the esophagus. Heart rate, left ventricular pressure and arterial blood gases were unchanged. Cardiac output (ml/min·kg) fell from a control of 248 ± 22 (mean ± SE) to 206 ± 11* and 202 ± 15† at 6 and 11 mmHg, respectively. Central venous pressure (CVP, mmHg) rose from 7.0 ± 1.4 to 10.9 ± 3.1* and 12.0 ± 2.7*, and jugular venous pressure (JVP) from 11.5 ± 1.8 to 13.9 ± 2.1† and 15.3 ± 2.2* at 6 and 11 mmHg, respectively. Blood flow to spleen, heart, brain, and choroid-retina did not change. Renal and gastrointestinal blood flows were unchanged at 6 mmHg, but fell 16.6 ± 5.1%* and 23.9 ± 6.4%* at 11 mmHg. These data show that endotracheal CPAP caused moderate falls in C.O. and renal and gastrointestinal flows. However, endotracheal CPAP did not result in the fall in ocular blood flow or the extreme rise in CVP and JVP observed with head-box CPAP.
* $p < 0.05$, † $0.10 > p > 0.05$.

1239 LAMELLAR BODIES AND SURFACTANT PHOSPHOLIPIDS AFTER PULMONARY ARTERY OCCLUSION AND REPERFUSION. Brian S. Saunders, John W. Shepard, Jr., and Louis Gluck. University of California, San Diego, Department of Pediatrics, La Jolla.

22 dogs were anesthetized (sodium pentabarbital), intubated with a Carlens double lumen endotracheal tube and ventilated mechanically (V_t=15ml/kg) in the supine position. Nine animals underwent 2 to 24 hrs of balloon left pulmonary artery occlusion (LPAO), 8 had LPAO of 2 to 12 hrs followed by 6 hrs of reperfusion, and 5 served as controls. PaCO2, pH and PaO2 were maintained in the normal range. At necropsy the right and left lungs were lavaged with 0.9% NaCl and tissue was obtained for phospholipid analysis and electron microscopy (EM). Phospholipids were separated by 2 dimensional thin layer chromatography on silica gel H. Phosphatidylcholine, phosphatidylserine, phosphatidylinositol, phosphatidylethanolamine, phosphatidylglycerol and sphingomyelin were measured as phosphate and by densitometry.

Results: 1. No animal developed atelectasis. 2. There were no qualitative differences in phospholipid composition, either between study animals and controls or between non-occluded, occluded or reperfused lungs of the same animal. 3. Depletion of lamellar bodies (LB) from type II pneumocytes within 2 hrs of LPAO, followed by reappearance in 12-24 hrs was demonstrated by EM. 4. Six hrs of reperfusion was associated with reappearance of LB. We conclude that LPAO produces temporary cellular depletion of LB lasting from 2 to 12 hrs and that no qualitative alterations in the phospholipid composition of tissue or alveolar wash result from LPAO.

1240 ATOPY IN CYSTIC FIBROSIS(C/F). Robert H. Schwartz, Lois A. Nelson, Mary Lou C. Callarame and Janice D. Van Ess. Univ. of Rochester School of Medicine, Rochester, N.Y.

Atopy has been said to make C/F clinically both better and worse. Since many of the symptoms of C/F resemble respiratory allergy, it is difficult to determine the presence of atopy in C/F on clinical grounds alone. Thirty-two C/F patients (13 males, 19 females; 7-23 yrs.) of varying severity (scores 47-94) were studied to determine the presence of Type I (IgE mediated) hypersensitivity. Scratch and intradermal tests with 40 allergens (epidermoids, dust, mite, pollens, molds), peripheral eosinophil and basophil counts, and serum IgE levels (PRIST) were done. Sputum was cultured for fungus.

Eight (25%) patients were sensitive to grass and/or ragweed. Twenty-three (72%) were sensitive to mold spores. Thirteen (41%) were sensitive to Aspergillus fumigatus. Eight (8/26=31%) had positive sputum cultures for Aspergillus fumigatus. Five (16%) had serum IgE levels greater than normal (>122 U/ml.).

Patients were grouped according to severity (I) n=11, score <80; (II) n=21, score >81. There was no relationship between IgE levels, eosinophil or basophil counts and severity of disease. Group I was more atopic when one of the criteria used for determining atopy was 5 or more positive skin tests ($p < .05$). These were usually due to mold allergens.

Atopy occurs frequently in C/F and more commonly in the more severe C/F patients. Whether atopy is the cause or result of C/F severity remains to be determined. If the result, then a damaged and colonized respiratory tract may facilitate the development of atopy in C/F.

1241 PULMONARY FUNCTION STUDIES FOLLOWING BILATERAL LUNG LAVAGE IN PREMATURE LAMBS. Thomas H. Shaffer, James D. Ferguson, and Maria Delivoria-Papadopoulos. University of Pennsylvania School of Medicine, Department of Physiology, Philadelphia, PA 19174.

The effect of bilateral lung lavage with FC-80 fluorocarbon on pulmonary function was studied in 7 premature lambs, 134 days gestation. The lambs were mechanically ventilated (F_IO_2 = 1.0) and had arterial and venous catheters. Measurements of transpulmonary pressure, air flow, tidal volume, and functional residual capacity (FRC) enabled calculations of lung compliance (C_L), specific compliance (C_S), inspiratory (R_I) and expiratory (R_E) resistance, and work of breathing (W). Following baseline measurements the lambs were lavaged with warm (39°C) FC-80 liquid (P_{O_2}>500 mm Hg). The liquid was removed by postural draining, and pulmonary function was monitored for 1 hour. Mean control measurements were as follows: C_L = 0.89±0.18 SE ml/cm H_2O/Kg; C_S = 0.044±0.009 SE ml/cm H_2O/FRC; FRC = 23.0±4.3 SE ml/Kg; R_I = 44.5±8.3 SE cm H_2O/l/sec; R_E = 105.1±17.4 SE cm H_2O/l/sec; W = 78,000±32,000 SE erg/Kg; PaO_2 = 317±45 SE mm Hg; $PaCO_2$ = 26±7 SE mm Hg; pH = 7.46±0.07 SE. Immediately post-lavage, C_L decreased significantly by 43% from control values and R_I, R_E, W, $PaCO_2$ and pH did not change significantly from pre-lavage values. These data indicate that adequate PaO_2 levels can be maintained in premature lambs during and after bilateral FC-80 lavage with relatively small changes in lung mechanics. Pulmonary lavage with FC-80 may prove feasible as a method for alveolar debridements such as in aspiration syndromes.
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1242 INSTRUMENTATION FOR MEASURING FUNCTIONAL RESIDUAL CAPACITY IN NEWBORN INFANTS AND SMALL ANIMALS. Thomas H. Shaffer, Peter A. Koen, and Maria Delivoria-Papadopoulos. University of Pennsylvania School of Medicine, Department of Physiology, Philadelphia, PA 19174.

A system for measuring functional residual capacity (FRC) by the dilution method was designed and evaluated to determine its suitability for use in neonates and small animals. The instrumentation makes use of rapid (3 to 4 m sec), automatically triggered valves with minimum dead space (3.4 ml), low flow resistance (9.8 cm H_2O/l/sec) and quiet operation, and is compatible with spontaneous and forced ventilation both with and without end distending pressure. In vitro experiments were conducted using the described system on calibrated volumes (150 to 300 ml) ventilated at tidal volumes of 10 to 30 ml and at frequencies of 30 to 100 bpm. Results of theoretical analysis and in vitro tests indicate that the measuring error of FRC by the dilution technique is related to the ratio of breathing bag volume to FRC. With a 200 ml rebreathing bag volume one standard error of the calculated error was 16% for a 50 ml, 9.1% for a 100 ml, and 5.8% for a 200 ml FRC. Experimental results with simulated lung volumes were in close agreement with theoretical predictions. We have successfully used this system with initial rebreathing bag volumes (100 to 200 ml) to measure FRC (50 to 150 ml) in experimental animals and in newborn infants.
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