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MANUAL VENTILATION WITH AND WITHOUT PEEP IN RDS.
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Until recently commercially available manual resuscitators were not equipped with PEEP function. A recent development of a manual resuscitator with a PEEP valve attachment (Puritan Bennett and Ambu) offers more physiologic ventilation in surfactant deficient preterm infants. 19 RDS infants (m GA 30 wks, m BW 1279 gms) were studied to see their response to manual ventilation with and without PEEP. A Litton transcutaneous monitor was used to record $tcPO_2$ fluctuation during study. Procedures: 1. Remove patient from respirator, 2. Ventilate manually with no PEEP for 3 min., 3. Attach PEEP valve, ventilate for 3 more minutes (PEEP set at 6 cm H_2O), 4. Place infant back on respirator. Throughout the procedures patient were kept on the same FiO_2 , PIP and RR, therefore the only variable was the presence and absence of PEEP. Nine infants were pavalonized, ten were not. Every patient was studied twice, once with PMR-2 and once with Ambu resuscitator.

Baseline	No PEEP	Decrease PEEP	Regain
No PO_2 (torr)	PO_2 (torr)	PO_2 (torr)	PO_2 (torr)
19	58	44±17	-14.1
			57±17
			+12.7

There was significant decrease in $tcPO_2$ (-14.1 torr) after manual ventilation without PEEP in all patients. ($p < 0.02$) Three subsequent minutes of manual ventilation with PEEP enabled all patients to regain their PO_2 to approximately baseline level. Manual ventilation with no PEEP may be harmful to surfactant deficient infants.

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REAL TIME ECHOCARDIOGRAPHIC DEMONSTRATION OF INTRA-CARDIAC AND EXTRACARDIAC (PDA) RIGHT TO LEFT SHUNT IN RESPIRATORY DISTRESS SYNDROME Shyan Sun, Tzong Wei, Vang Kamtorn, Wen Lin (Spons. F. Behrle) UMD-New Jersey Medical School, Div., Neonatal Perinatal-Medicine, Newark, N.J.

It is not clear whether intracardiac or extracardiac (PDA) Rt to Lt shunt exists in respiratory distress syndrome. The purpose of this study is to use contrast echocardiography to demonstrate Rt to Lt shunt, if any, through foramen ovale (FO) and patent ductus arteriosus (PDA) in infants with RDS. ATL Mark III Real Time Ultrasound with 5 MHz scan head was used. The scan head was placed under xyphoid process to obtain a 4 chamber view. Two ml of normal saline was shaken before injecting into umbilical venous catheter placed at inferior vena cava (10 cases) or scalp vein when UV line was not available. The study was positive when both Rt and Lt atrium were opacified simultaneously. To study Rt to Lt PDA shunt, scan head was placed at lateral abdomen to visualize descending aorta. The study was positive when echodensity was visualized moving along aorta caudally. Twelve infants (m GA 30.3 wks, m BW 1607 gms) were studied. All were mechanically ventilated with FiO_2 higher than 40%. Each patient was studied daily until shunt no longer existed. F.O. shunt was evident in all 12 patients who needed more than 40% of O_2 . Only 2 out of 12 patients had positive FO shunt at FiO_2 of 30%, below which no shunt was visualized. PDA Rt to Lt shunt was visualized in 3 of 5 patients who required $FiO_2 > 60\%$. No PDA shunts were seen below FiO_2 of 60%. This study indicates that Rt to Lt shunting via FO and PDA exists in RDS.

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LUNG LYMPH STUDIES IN NEWBORN LAMBS WITH HYALINE MEMBRANE DISEASE (HMD). Hakan W. Sundell, Jorge Rojas, Jens Groggaard, Petaiah Mohan, and Kenneth L. Brigham, Vanderbilt University School of Medicine, Dept. of Pediatrics and Medicine, Nashville, TN.

HMD is associated with clinical evidence of pulmonary edema. Previous studies have shown that lungs from lambs with HMD have increased extravascular water content and decreased permeability-surface area (PS) for ^{14}C Urea indicating a decreased surface area (Pediatr. Res. 15:731, 1981). In order to examine if increased vascular permeability is present in HMD, lung lymph was collected from 5 lambs with histologically confirmed diagnosis of HMD and from 5 lambs without HMD. All lambs were delivered prematurely (0.87 to 0.95 of term gestation) by cesarean section and were studied for 2 hours before and 4 hours after birth. Normalization to fetal values, mean lymph flow (QL) tripled at 1 hour after birth in lambs without HMD and decreased thereafter to 1.6 times the fetal value. QL in HMD lambs increased progressively to 3.3 times the fetal value. Mean lymph/plasma protein ratio decreased with time in both groups of lambs. Lymph protein clearance (CLP) for total protein and smaller protein fractions increased progressively in lambs with HMD but decreased between 1 and 4 hours in lambs without HMD. Post mortem lung water was higher in lambs with HMD. At 3 and 4 hours after birth, lambs with HMD had significantly* higher QL and CLP, equal lymph/plasma ratios and only slightly higher pulmonary arterial pressure. These results combined with the earlier reported decreased surface area in HMD would indicate delayed fetal lung fluid absorption and increased vascular permeability for proteins in pulmonary exchange vessels in lambs with HMD. * $p < 0.05$ (Supported by HL 14214)

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CAUSE OF DEATH IN VERY LOW BIRTH WEIGHT PREDOMINANTLY HISPANIC POPULATION: RELATIONSHIP TO BIRTH WEIGHT AND GESTATIONAL AGE. Annabel Teberg, Satit Hotrakitya, Paul Y.K. Wu, Sze-ya Yeh. Univ. of So. Calif. Sch. of Med., Los Angeles County-USC Med. Ctr., Depts. of Peds. and OB/GYN, L.A.

Although mortality rate has been reported to be directly related to birthweight (BW) and gestational age (GA), there is little data regarding the impact of these factors related to cause of death in the very low BW infants of Hispanic heritage. During the 18 month period from January 1982 to July 1983 there were 22,903 deliveries at the LAC/USC Medical Center, a tertiary perinatal center with a predominantly (87%) Hispanic population. There were 289 live born infants with BW between 500-1500 g. One hundred twenty five or 43% of these infants died. Among the non-survivors, 60% were male, Apgar score of ≤ 5 were found in 88% and 60% at 1 and 5 minutes respectively, 80% required assisted ventilation and 60% had respiratory distress syndrome (RDS). In infants with BW $\leq 1000g$ the mortality was 73% and the major causes of death were immaturity (48%), birth asphyxia (19%) and RDS (15%). In infants with BW 1001-1500g the mortality was 20% and the major causes of death were congenital anomalies (25%), intraventricular hemorrhage (25%) and RDS (22%). The mortality of the infants ≤ 28 weeks gestation was 76% compared to 27% in infants > 28 weeks. When infants weighed $\leq 1000g$, survival was independent upon GA rather than BW. However, when infants weighed $> 1000g$, GA was not a factor since the outcome was similar in all categories. We conclude that the reduction of nursery mortality in our center is quality dependent upon the prevention of extreme prematurity (GA < 28 wks.) rather than upon $BW < 1000g$.

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THE EFFECT OF MATERNAL AND PERINATAL FACTORS ON SURVIVAL OUTCOME OF THE VERY LOW BIRTH WEIGHT INFANT. Annabel Teberg, Satit Hotrakitya, Paul Y.K. Wu, Sze-ya Yeh. Univ. of So. Calif. Sch. of Med., LA County-USC Med. Ctr., Depts. of Peds. and OB/GYN, Los Angeles.

Relationship of maternal and perinatal factors to survival outcome of 289 infants with birth weight (BW) from 501-1500g born from January 1982 to June 1983 was evaluated. Fifteen infants with lethal anomalies were excluded. One hundred sixty-four (60%) infants survived (S), 110 (40%) infants expired (E). The surviving infants were larger (mean $BW_S = 1189g$, $E = 885g$) and more mature (mean GA: $S = 30.3$ wks, $E = 26.5$ wks) than infants who expired. There were no differences in sex, small for gestational age, multiple births, significant obstetrical history, maternal age, gravidity, illness or pregnancy problems between survivors and non-surviving infants. C-Section for maternal problem without fetal compromise was associated with improved survival ($S = 31\%$, $E = 8\%$, $p < .01$). Perinatal factors associated with decreased survival and mortality rate for these factors are shown in the table. In summary, when maternal and perinatal factors were evaluated, the mode of delivery and condition of infant at birth relate to survival outcome in the very low birth weight infant.

Factor	Mortality (%)	Survived (%)	Expired (%)
Apgar 1' < 5	54	52	88
Apgar 5' < 5	72	15	60
Intubation at Birth	49	52	93
Initial pH < 7.2	62	14	42+
Ventilatory Care	39	69	81+

†exclude 22 infants who expired shortly after birth

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A NEW METHOD FOR PARENTERAL CALCIUM AND PHOSPHORUS ADMINISTRATION IN THE NEWBORN. Jeffrey E. Thompson, William H. Bergstrom and Margaret L. Williams, Dept. of Pediatrics, SUNY, Upstate Medical Center, Syracuse, New York.

The low solubility of calcium phosphate makes it difficult to maintain normal bone mineralization in low birthweight infants during prolonged parenteral alimentation. We postulated that alternating calcium (Ca) and phosphate (P) administration at short intervals might permit substantial accretion of both without excessive fluctuations in serum concentration. We used two solutions of 2.1% amino acid in 5% dextrose; one had 50mEq of calcium per liter and the other 28mEq of phosphorus per liter. These were given alternately for one hr periods by infusion pump to anesthetized lambs. Serum calcium and phosphorus were measured hourly in 5 lambs, weighing 2.3-4.0 kg for a total of 33 periods. Ca was given at 5-10 mg/kg/hr and P at 4-8mg/kg/hr. Serum Ca changed less than 1.2 mg/dl during 15 Ca infusions and 15 P infusions. During one phosphorus period Ca decreased 1.4 mg/dl. Serum phosphorus was not significantly changed by either Ca or P infusions. Urine Ca analyses indicated that 87% of the Ca given was retained. Ca infusion at 10 mg/kg/hr for 12 hrs daily would thus give a balance of 120 mg/kg/d x .87 = 104 mg/kg/d accretion rate.

If alternating calcium and phosphorus administration is tolerated by human infants with similarly small fluctuations in serum calcium it will be possible to more closely approximate intrauterine mineral accretion rates during parenteral alimentation.