

AN EXPERIMENTAL MODEL FOR EVALUATION OF TREATMENT OF MECONIUM ASPIRATION. Norman L. Virnig, Gary R. Geller, Michael V. Severson, Barbara A. Burke and John W. Reynolds. Depts. of Peds., St. Paul-Ramsey Hosp., St. Paul and Univ. of Minn., Mpls.

An experimental model for the study of meconium aspiration has been developed, consisting of injection of 4 ml of a 25% wt/vol suspension of sterile meconium into the trachea of adult rabbits. All lived for 24 hours. The effects of meconium aspiration alone, and aspiration followed by tracheal suction with and without saline lavage were compared to controls who underwent saline lavage and suction, but with no meconium instillation. The groups were compared by measurements of sequential arterial pO₂, pH and pCO₂, and, after sacrifice at 24 hr., by in situ lung pressure volume curves, total lung volumes, lung wt/body wt ratios and lung anatomy.

Animals given intratracheal meconium had lower pO₂ values and higher lung wt/body wt ratios than did control animals. No differences in any measurement were found between the groups who had undergone meconium instillation, regardless of the therapeutic approach tested.

ASSISTED MECHANICAL VENTILATION IN 303 NEWBORNS. John F. Vogt, Luis A. Cabal, and Bijan Siassi (Intr. by Joan E. Hodgman), Dept. of Pediatrics, LAC-USC Med. Ctr., Los Angeles.

From Jan., 1972 to Dec., 1973, 303 newborns required assisted ventilation. Weights ranged from 660-5030 Gm (mean 1731) with 148 infants <1500 Gm. Ninety-seven infants were outborn. Birth weight, pulmonary pathology, survival and incidence of pneumothorax were analyzed.

| % Survival | No. | 1972 | | 1973 | | Two Yrs. |
|---------------------------|-----|---------|---------|---------|---------|----------|
| | | Jan-Jun | Jul-Dec | Jan-Jun | Jul-Dec | |
| HMD <1500 Gm | 129 | 28% | 24% | 20% | 31% | 24% |
| HMD >1500 Gm | 91 | 38% | 52% | 75% | 65% | 58% |
| All Ventil. | 303 | 34% | 40% | 51% | 51% | 40% |
| Incidence of Pneumothorax | 68 | 31% | 29% | 18% | 13% | 23% |

In spite of no change in criteria for ventilation, there has been a steady increase in overall survival, especially in infants over 1500 Gms with HMD. This has been accompanied by a reduction in incidence of pneumothorax. This reduction has been associated with a) appropriate ventilator for specific requirements of each infant, b) maintaining I:E ratio of 1:2 or greater, and c) aggressive care to avoid obstruction. Pneumothorax is associated with a high mortality, especially in infants <1500 Gm. Prevention of pneumothorax will improve survival with assisted ventilation.

AUTONOMIC CONTROL IN NEWBORN INFANTS. S.Waldman, P.A.M. Auld, A.N.Krauss, Dept. Peds., Cornell Un. Med. Coll. 1300 York Ave. NYC

Peripheral blood flow (PBF) measurements can be used as an index of autonomic control. Tilting from a recumbent position should produce an increase in PBF in dependent limbs by gravitational effects but for vasoconstrictive effects mediated by autonomic baroreceptors. Non-invasive venous occlusion plethysmography using an air-filled latex cuff was used to detect PBF changes following tilting in a group of 17 infants: 12 under 1500 gm. at birth, 8 of whom had HMD as determined by x-ray, blood gas, and lung volume measurements, and 5 healthy term infants >2500 gms. Serial studies were performed at birth and at weekly intervals. Presence of baroreceptor activity was determined by tilting the infant to a 45° angle, head up, and measuring PBF at 15", 30", and 60", and 1 min. intervals for 5'. A fall in PBF determined by the rate of change in limb volume after venous occlusion suggests an intact baroreceptor reflex. Percent change from control:

| | | | |
|---------------------|-----|-----|-----|
| Group Time: | 15" | 2' | 4' |
| Term (n=5) | -10 | +5 | -10 |
| Healthy prem. (n=4) | -22 | +3 | -11 |
| Sick prem(A) (n=4) | +32 | +20 | +53 |
| Sick prem(B) (n=4) | -29 | -2 | -10 |

The greater fall in PBF in premature and some sick premature infants, the rise in PBF with tilting in other sick infants suggest lack of autonomic control of PBF in these infants. This lack may influence their adaptation to extrauterine life and their response to illness.

COR PULMONALE AS A COMPLICATION OF ASSISTED MECHANICAL VENTILATION IN NEWBORNS. Irwin J. Weinfeld, Luis A. Cabal, and Bijan Siassi (Intr. by Joan E. Hodgman), Dept. of Pediatrics, LAC-USC Med. Ctr., Los Angeles, California.

4 newborn infants requiring prolonged assisted mechanical ventilation (mean 64 days) developed cardiopulmonary complications consisting of: progressive pulmonary air trapping, interstitial emphysema, pneumothorax, and clinical signs and symptoms of right heart failure. The diagnosis of cor pulmonale was confirmed by cardiac catheterization and cineangiography in 3 of the 4 cases. Each infant had one or more of the following patterns of assisted mechanical ventilation: high peak inspiratory pressure, prolonged positive end expiratory pressure, or prolonged total duration of positive pressure. Three infants died; two had autopsies with evidence of bronchopulmonary dysplasia and cor pulmonale. The surviving infant ventilated for meconium aspiration, now two years old, has persistent pulmonary hyperexpansion and has been readmitted twice for respiratory insufficiency and right heart failure. It is likely that the incidence of cor pulmonale subsequent to pulmonary hyperaeration is higher than currently identified. Limitation of amount and duration of positive pressure may prevent the development of this complication of assisted ventilation.

GROWTH OF VERY LOW BIRTHWEIGHT (VLBW) INFANTS: EFFECTS OF ACIDOSIS, CALORIC INTAKE AND HYPONATREMIA. D.M. Willis, N.R. Roy, C.W. Chance, I. Ackerman, E. Park, I.C. Radde (Intr. by A. Sass-Kortsak), Dept. Paediatrics, Univ. Toronto; Research Inst. Hosp. Sick Children (Div. Neonatology & Endocrinology), Toronto Canada.

Our aim is to achieve a growth rate comparable to that in utero in the VLBW (<1.3 kg). Sixty-seven infants were grouped according to gestational age (GA) and birthweight, and studied from age 14 days to weight 1.8 kg. Weight, length, head circumference and skinfold thickness were measured serially. Prevention of metabolic acidosis led to a 21% greater length growth (p<0.02). Increased caloric intake from 130 to 150 cal/kg/day led to greater gains in length (to 1.08 cm/wk), body weight, and skinfold thickness (p<0.05). Plotting postnatal weight against length, curves of individuals, initially >97th centile, approached the 75th centile at 1.8 kg. Episodic hyponatremia (Na <130 mEq/l) in some infants fed "Improved" SMA S-26, 150 cal/day, was associated with decreased length growth (p <0.05 in appropriate GA infants). Increasing Na intake from 2 to 3 mEq/kg/day prevented hyponatremia without expansion of ECF space. Increased caloric intake to 180 cal/kg/day led to weekly length increments of 1.2 cm (= 50th intrauterine centile), weight increments of 200 g/week (= 45th centile, p <0.05), and a slight increase in head circumference compared to infants fed 150 cal/kg/day. Thus, by carefully controlling metabolic acidosis, hyponatremia and caloric intake intrauterine growth rates could be maintained after age 14 days in the VLBW.

EPIDEMIOLOGY OF RESPIRATORY DISTRESS SYNDROME (RDS). Robert E. Wood and Philip M. Farrell, (intr. by Paul A. di Sant'Agnes), NIH, Bethesda, Md.

Neonatal mortality due to RDS or hyaline membrane disease (HMD) has never been precisely determined, but merely estimated on the basis of small samples skewed by local factors and not representing the national picture. Due to the long lead time for collection and coding of death certificates, the necessary data for 1968 have only recently become available from the National Center for Health Statistics. These statistics, the first national figures for RDS, were stored on magnetic tapes which were then computer processed by us. Our analysis showed RDS or HMD to be the underlying cause of death in 8273 cases and a major contributing factor in 2724 more, a total of 19.3% of all neonatal deaths. The RDS mortality rates for whites compared to non-whites were 2.30 vs. 2.68 per 1000 live births and 32.4 vs. 19.5 per 1000 premature (less than 2.5 kg) births, respectively.

RDS deaths were evenly distributed throughout the year. The male/female ratio was 1.76 compared to 1.41 for all neonatal deaths. Age at death conformed to clinical experience: 46% on day 1, 26%-day 2, 15%-day 3, 5%-day 4, and 2% on day 5. Comparison of RDS mortality rates with overall neonatal mortality rates for each state showed general agreement except for a few states in which the RDS rates were significantly different. These data will be useful in planning regional neonatal intensive care facilities and will provide a baseline for later evaluation on a national basis of newer therapeutic methods.