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The excretion pressure of alveolar fluid - an additional factor in the expansion of the lung at birth?

The fact, that the alveolae in children succumbed to laryngeal atresia are not collapsed but expanded, suggests, that tracheobronchial fluid is excreted into the alveolae under pressure.

To test this hypothesis the left main bronchus was ligated a few days before term in rabbit foetuses, without interrupting the pregnancy. Some hours after delivery the offspring was sacrificed and the respiratory tract examined. On the ligated side the alveolae were found to be expanded by fluid, while the bronchi remained in the contracted foetal state. The contralateral lung, which had supported life between delivery and sacrifice, was histologically normal.

Bronchography carried out on foetal sheep in utero accordingly revealed contracted bronchi and a flow directed from the alveolae towards the trachea, whereas the bronchi after the first breath attained the normal postnatal width.

119 M.GABRIEL*, M. ALBANI* and F.J. SCHULTE. Universitäts-Kinderklinik Göttingen, Germany. Neurogenic apnea in preterm infants.

The incidence of periodic breathing, apnea and bradycardia in 8 otherwise "normal" preterm infants was correlated to sleep states by means of long term polygraphic surveillance (EMG, EEG, respiration, eye movements, spontaneous motor and monosynaptic reflex activity). There was a significant coincidence between episodes of bradycardia and periodic breathing or apnea. Periodic breathing (recurrent pauses < 10 sec), apneas (> 10 sec) and episodes of bradycardia with and without respiratory arrest occurred predominantly in active or REM (rapid eye movement) sleep, when monosynaptic reflex responses were reduced, indicating brain stem inhibitory influence to spinal motoneurons. In preterm infants during their long lasting REM sleep periods descending inhibition on respiratory and other spinal motoneurons and their proprioceptive control as well as the reduction of preganglionic sympathetic activity facilitate apneic spells and/or bradycardia. Under the influence of barbiturates the amount of REM sleep decreases together with a reduction of apneic spells.

120 P. JOLLY*, E.O.R. REYNOLDS, and L.P. SOUTTER*. Depts of Medical Physics & Paediatrics, University College Hospital & Medical School, London, England. Comparison of transcutaneous oxygen tension (tcPO₂) and arterial oxygen tension (PaO₂) in newborn infants.

tcPO₂ recorded by a Dräger electrode, manufactured as described by Huch et al(1), was compared with PaO₂ in 23 newborn infants (birth wt. 994-3706g, mean 2112 g; gestation 27-40w, mean 33w) with respiratory illnesses, aged 2h-7d. The tcPO₂ electrode was heated to 43°C; higher temperatures were not used because they produced skin changes which prevented continuous monitoring. Two studies were done. 1. tcPO₂ was compared with the PaO₂ of arterial blood samples measured with a Radiometer Type E5046 electrode. 2. Comparisons were made, at 1/2h intervals, of simultaneous records of tcPO₂ and PaO₂ measured with an umbilical artery catheter-tip electrode(2), over periods of 1-16 1/2h (median 2 1/2h). Over the PaO₂ range 20-350 mmHg, 180 (82%) of 219 comparisons agreed within 20 mmHg and 139 (53%) within 10 mmHg. In 24 comparisons, most of which were in seriously ill infants being treated by mechanical ventilation, tcPO₂ underestimated PaO₂ by 20-258 (median 36 mmHg), even though skin blood flow, as judged by the heating power consumed by the electrode, appeared to be maintained. We conclude that tcPO₂ gives an estimate of PaO₂ that is usually adequate for clinical management except in some severely ill infants.

(1) Huch et al. Arch.Gynäk., 1969

(2) Conway et al. Pediat., 1976

121 L.P.ALLEN*, D. INGRAM*, E.O.R. REYNOLDS and P.D. WIMBERLEY*. Depts of Medical Physics and Paediatrics, University College Hospital and Medical School, London, England.

Computer processing of data from newborn infants with respiratory illnesses.

During a 14-month period, a computerised record-keeping system processed information from 119 babies with respiratory illnesses consecutively admitted to a neonatal intensive care unit. FIO₂, PaO₂, PaCO₂ acid-base data, values for continuous positive airway pressure, and mechanical ventilator variables were entered, usually by the medical staff, into the system through a keyboard terminal installed in the unit. This terminal is connected to a remotely sited PDP.11/45 computer which is simultaneously used for other clinical applications. The data are displayed as graphs on 2 television screens attached to the terminal. Displays for up to 6 babies are available at any time. When an infant is discharged, files of data, which include a brief case history, are stored and can be retrieved and plotted at the terminal. Hard-copy graphs and printed summaries are generated at the computer site. A 40% saving of time versus the manual recording of the same data was demonstrated. The system also proved useful for handing-on information when staff changed shift, and for teaching and research purposes.

122 M. MOYA* and M. VENTO*. (Intr. by Prof. A. Ballabriga). Dep. of Pediatrics. Facultad de Medicina. Valencia, Spain. Effects of low calcium diet over pregnant rats and offsprings calcium contents.

Ten pairs of adult Wistar rats were divided in two groups. Group I received a diet containing Ca 0.78% and in group II calcium content was 0.03%. Parturition took place after 30±1.8 days in group I; after 29±2 d in three animals of group II (IIa) and after 57.5±2.12 in two animals of the same group II (IIb). After birth all males and females were killed, both femurs removed and ashed and blood samples taken. Intact fetuses were killed and ashed for calcium stimulation. In group I (control), results were calcemia 10.86±.20 mg/dl and in bone: ash weight 27.70±.75 mg; total calcium 8.56±.32 and calcium content in 100 mg of ash (Ca/100mg ash) 37.25±.69 mg. Females with short hypocalcic diet differ in ash weight 25.81±3.14 (P<0.01) and total calcium 9.91±1.24 (P<0.005). Females with long hypocalcic diet differ in ash weight 28.27±0.33 mg (P<0.001). Total calcium 10.25±.20 mg (P<0.001) and Ca/100 mg ash 35.37±.42 mg (P<0.005). In males same parameters showed a worse adaptation to hypocalcic diet. Number of fetuses in each litter of group II was significantly lower (≤5). In fetuses the most reliable parameter was Ca/100 mg ash and its results were; pups from: group I, 17.59±.62 mg; group IIa 17.78±.42 (P<0.001, vs.I) and group IIb, 12.84±1.08 mg (P<0.001 vs. IIa). In conclusion low calcium diet, without conspicuous changes in the mother will affect the fetus.

123 Joy DAUNCEY*, J.C.L. SHAN and J. URMAN*. Dept. of Paediatrics, University College Hospital, Gower Street, London, W.C.1.

Iron absorption by low birth weight infants from pasteurised human breast milk.

Six preterm infants (< 1.5Kg B.Wt & < 31 wks gest.) and two light for dates infants (< 1.5Kg B.Wt & > 37 wks gest.) were studied by serial metabolic balances for 20 to 70 days. Iron was added to the milk from day 30 onwards. Iron analyses of diet, stool, and urine were made by atomic absorption spectrometry. The six preterm infants, when fed unsupplemented milk (iron = 0.043mg/100ml) were in small -ve iron balance (mean, -0.13 mg/Kg.day). The two light for dates infants were in a small +ve iron balance (mean, +0.084 mg/Kg.day). Augmenting the milk iron (mean 3.8 mg/100 ml) on day 30 led to increased iron absorption in all the preterm infants on day 30 (mean 2.4 mg/Kg.day, mean % absorption, 33%). After day 30 the absorption was very variable. In two infants who received no blood transfusions iron absorption from day 30 onwards averaged 33% (mean 3.0 mg/Kg.day). Three infants received blood transfusions and following each transfusion iron absorption fell, and in two infants it became -ve, becoming +ve again when the haemoglobin concentration fell below 12g/100 ml. These data suggest that a controlling mechanism for iron absorption is present in preterm infants. In one case far more iron was absorbed than was required for erythropoiesis indicating perhaps immaturity of the control of iron absorption.