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HYPERGLYCEMIA IN STRESSED SMALL PREMATURES. L.D. Lilien, R.L. Rosenfield, M.M. Baccaro and R.S. Pildes. Cook County Hosp., Univ. of Ill. and Univ. of Chicago, Depts. of Ped., Chicago, Ill.

The metabolic responses to a constant glucose infusion (4.3±.2 mg/kg/min) were measured in 30 premature, 700-1559g. The study included 18 stressed infants who needed assisted ventilation (Grp A) and 12 controls (Grp B). Plasma samples for glucose, insulin, cortisol, and glycerol were obtained from cord blood, just prior to glucose infusion at 2.1±.2 hr (mean ± S.E.) and 5.5±.4 and 25.6±1.0 hr after start of glucose infusion. Metabolic responses were similar in both groups in the cord and preinfusion samples. In the first post-infusion sample, glucose (p<.01), cortisol (p<.05), and glycerol (p<.01) were higher in A than in B. Insulin values correlated with glucose values (p<.001) and I/G were not significantly different between A and B. Hyperglycemia (plasma glucose >145mg/dl) was seen in 10 of A and 1 of B infants (p<.025). Infants in A who became hyperglycemic in the first post-infusion sample (Grp A₁) were then compared with stressed euglycemic infants (Grp A₂). Insulin levels were higher (42.2±13.9 VS 9.4±2.5uU/ml, p<.05), glycerol levels similar (8.6±1.6 VS 8.8±1.4mg/dl), but cortisol levels lower (15.3±4.2 VS 28.0±2.4ug/dl, p<.05) in A₁ than A₂ infants. There was no difference in mortality between A₁ and A₂ infants; stress, rather than hyperglycemia was related to mortality. In summary, cortisol and glycerol responses were higher in stressed neonates. However, hyperglycemia in stressed infants could not be attributed to any of the metabolic factors evaluated.

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ISOLATED PULMONARY HYPERTENSION FOLLOWING SEVERE POSTNATAL SHOCK. James E. Lock, Bradle P. Fuhrman, Michael L. Epstein, Russell V. Lucas, Univ. of Minnesota Hospitals, Dept. of Pediatrics, Minneapolis.

Four term neonates 3-14 days old had isolated pulmonary hypertension (PH) 2-10 days following postnatal hypotensive shock (BP<25 mmHg flush, pH-6.94-7.17, Base deficit=17-26 mEq/L, and consumption coagulopathy). Shock was due to coarctation in 2 infants, E. coli sepsis in one, and severe cold stress (rectal temp.=94°F) in one. Unlike infants with persistence of fetal circulation (PFC), pre- and perinatal histories were normal: Apgars = 8-10, Birth Weight = 3.2-4.2 kg. No infant was cyanotic (pO₂>110 in O₂); none had symptoms in the first 2 days of life.

After resuscitation and successful medical and/or surgical therapy of the underlying disorder, each infant developed heart failure (CHF), right ventricular hypertrophy (RVH), and X-ray signs of pulmonary edema. Catheterization 2-10 days after the shock revealed PH at or above systemic levels (systolic pressure = 60-100 mmHg), but no anatomic heart disease. CHF requiring digitalis persisted for 6-12 months: RVH persisted for 1-3½ years. All 4 children were asymptomatic by 2 yrs. with normal intracardiac pressures at followup catheterization (1-2½ yrs.).

The findings in these infants differ from those reported with PFC or 1° PH, and support the hypothesis that severe shock, with but hypoxemia, may result in prolonged but reversible PH. The direct cause may be related to acidemia, tissue hypoxia, micro-emboli, or hypotension itself. The findings also suggest a possible contribution of shock in the genesis of other neonatal forms of PH.

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CAPILLARY VENOUS HEMATOCRIT DIFFERENCE IN NEWBORN INFANTS: RELATION TO BLOOD VOLUME, PERIPHERAL BLOOD FLOW, AND ACID BASE STATUS. Otwin Linderkamp, Hans T. Versmold, Irmela Strohacker, Karin Messow-Zahn, Klaus P. Riegel, Klaus Betke (spon. William H. Tooley) Univ. Munich, Department of Pediatrics, Federal Republic of Germany.

The difference between capillary and venous hematocrits of newborn infants can be large and its extent cannot be predicted simply. We, therefore, examined the relationship of the capillary-venous hematocrit difference to acid base values, blood pressure, blood volume and red cell mass (¹²⁵I-albumin dilution; Linderkamp et al, Eur.J.Pediatr. 125:143, 1977; 125:135, 1977), and peripheral blood flow (venous occlusion plethysmography). We studied these variables simultaneously in 92 infants with gestation of 26-41 wks within 6 hrs after birth.

The capillary/venous hematocrit ratio (Hct_c/Hct_v) was >1.00 in 89/92 infants and there was a significant inverse correlation between Hct_c/Hct_v and pH (r=-0.82), standard bicarbonate (r=-0.73) systolic blood pressure (r=-0.61), and peripheral blood flow (r=-0.70). 18/22 infants with Hct_c/Hct_v ≥1.20 had red cell mass values of <35 ml/kg indicating hypovolemia at birth. Hct_c/Hct_v did not correlate with the actual blood volumes. Gestational age of ≤ 30 wks was associated with a high Hct_c/Hct_v.

These data indicate that a high Hct_c/Hct_v ratio occurs with disturbed microcirculation and in the sickest newborn infants skin prick hematocrits often overestimate the blood oxygen carrying capacity and red cell mass. Supported by Deutsche Forschungsgemeinschaft (SFB 147).

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COMMON POSTPARTUM RECOVERY: OBSERVATIONS ON IMPLEMENTATION AND UTILIZATION George A. Little, Barbara Harrison (Intro. by Saul Blatman) (Dept. of Maternal and Child Health, Dartmouth-Hitchcock Medical Center, Hanover, N. H.)

A common recovery (CR) policy designed to create an atmosphere for relaxation of parents with their baby while testing the concept that more comprehensive nursing care can be maintained was instituted 12/1/76. This elective alternative is offered as part of a family-centered maternity program with parents advised prenatally. A 6-hour period was arbitrarily fixed by physicians and nurses while defining physical setting, equipment, admission and discharge, maternal and infant care criteria and policies. CR takes place in single patient labor rooms supervised by labor and delivery nurses who have received instruction in neonatal risk identification and care. When rooming-in is also elected, an infant may not need to enter the nursery.

In a group of 95 families, average CR stay was 3.3 hours. 19 elected to terminate early due to fatigue. Five newborn complications of temperature instability (2), tachypnea (1), cardiac disease (1), hypoglycemia (1) and four maternal complications, postpartum hemorrhage (3) and hematoma (1) caused interruption. Gravity and parity did not seem to influence outcome. No significant nursing, physician or parental incidents have been reported. We conclude that CR, utilizing labor rooms and allowing high quality risk identification by nurses while facilitating family interaction can be safely instituted, even in hospitals of relatively small size, when appropriate staff interest, policies, and education are present.

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BLOOD PO₂ ANALYSIS AT BEDSIDE. John G. Long, Albert Huch, Renate Huch, Elisabeth Bodefeld, and Jerold F. Lucey. Dept. of Pediatrics, Univ. of Vermont, Burlington, and Dept. of Obstetrics & Gynecology, University of Marburg, W. Germany.

Current methods for blood oxygen tension analysis require the use of large, expensive equipment by specially trained personnel, both of which are often located in a central laboratory. Results are communicated by phone or runner. Delays and transmission errors can occur resulting in suboptimal care.

We have modified the transcutaneous O₂ electrode for use on 0.1 ml. blood samples at the bedside. This device requires little technical skill to use. It is compact (the size of a small book), portable, inexpensive and highly accurate.

A comparison of 125 paired blood samples analysed by the Huch "trough" electrode and the Radiometer ABL-1 Analyser demonstrated a correlation coefficient of 0.99 with a standard error of approximately 3 torr over the range of 30-189. Results with the Huch device were clinically available in 90 seconds versus an average delay of 18 minutes before a report was received from the central laboratory.

We believe this simple device will have a major impact on improving patient care and reducing laboratory costs. Its use will be demonstrated at the time of presentation.

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A COMPARISON OF TRANSCUTANEOUS OXYGEN (TcPO₂) MONITORING AND CONVENTIONAL TECHNIQUES FOR DETECTING HYPOXEMIA AND HYPEROXEMIA. John G. Long, Alistair C.S. Philip and Jerold F. Lucey, Dept. of Pediatrics, University of Vermont, Burlington.

Non-invasive, continuous TcPO₂ monitoring has revealed that neonatal arterial O₂ tension is very labile and is inadequately monitored by periodic arterial oxygen sampling and apnea monitoring with impedance pneumography. "Intensive care" results in multiple diagnostic, therapeutic and nursing procedures, many of which cause hypoxemia unsuspected and undetected by present techniques. Our hypothesis is that continuous TcPO₂ monitoring will minimize "iatrogenic" hypoxemia and hyperoxemia. To date we have studied 15 conventionally monitored infants (780-2280 grams, 28-36 weeks) and 15 TcPO₂ monitored infants (1030-2380 grams, 29-36 weeks). We have found that infants in our nursery are handled 50-52 times in a 20-hour period, 10% of these handlings result in a drop of TcPO₂ of greater than 20 torr and recovery takes 4.4 minutes per episode. A mean time of 40 min. per 20 hours was spent in an "undesirable" range (TcPO₂ less than 40 torr or greater than 100). Fifty-two per cent of this "undesirable time" was associated with iatrogenic disturbances. Blood gases and apnea monitors detected less than 5% of this undesirable time. Our present study is being extended to determine if this "undesirable time" can be reduced or eliminated by using continuous TcPO₂ monitoring to indicate where the timing and number of diagnostic and therapeutic procedures can be beneficially modified.