

data in normal infants which should prove useful in the evaluation of infants with respiratory distress syndrome.

6. Proper position of the endotracheal tube tip on chest radiographs

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(Introduced by D. W. Roloff, Ann Arbor, Mich.)

In order to decrease complications of improper endotracheal tube positioning we attempted to define the proper position of the tube tip on chest radiographs. We studied inspiratory chest radiographs taken in a neutral position on 142 infants. These were divided into neonatal (30, 31-37, and 38-43 wk) and postnatal (1-4, 5-8, and 9-12 mo) ages. To determine that the clavicles are a useful landmark for proper endotracheal tube tip position, we measured the following distances: vocal cord-carina, vocal cord-interclavicular midpoint (IMP), and IMP-carina. All these measurements increased linearly in the same proportions with gestational and postnatal ages; 92% had the IMP within 1/2 cm of the true tracheal midpoint and 14% had the IMP as their true tracheal midpoint. The difference between the IMP and the true tracheal mid-point (midpoint difference) remained similar for all age groups. The position of the tube tip at the IMP was found to allow for movement of the tube with neck positioning and movement of the carina with respiration. The following method of placement of the endotracheal tube at the IMP was developed. The tube tip could be easily palpated at the suprasternal notch and placement at the IMP then closely approximated. Chest radiographs confirmed the accuracy of placement by palpation. A 2-month clinical study comparing palpation with other described methods was done; 14/14 tube placements by palpation were in good position near the IMP as compared to 3/14 by other methods. No complications of the technique were noted.

COMMENT: Placement of the endotracheal tube at the suprasternal notch by palpation should be particularly valuable when chest radiographs are not readily available. This would prevent placement of the endotracheal tube into a bronchus. The method, however, may be accompanied by a higher incidence of spontaneous extubation since the endotracheal tube is being placed somewhat higher than that recommended by others. This aspect should be explored in a much larger group of patients.

7. Renal solute load and diet in premature infants

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(Introduced by S. J. Fomon, Iowa City, Iowa)

When concentrated formulas are fed to premature infants, renal solute load is of major concern. In this study, urine osmolality and osmolar excretion were measured and related to dietary intake of potential renal solutes.

In each of four premature infants with birth weights of 1,390 to 1,850 gm (appropriate for gestational age), 24-hr urine collections were performed twice between 11 and 29 days of age.

Infants were fed Similac 80 kcal/dl providing 150 kcal/kg/day. Nitrogen, Na, K, Cl, and P were determined in urine and formula; osmolality, urea, ammonia, and creatine-creatinine were measured in urine.

Urinary solute excretion averaged 27.6 (range, 21.4-36.0) mOsm/day, equivalent to 35.9% (range, 29.5-42.5%) of dietary intake of potential renal solutes. Urinary osmolar concentration ranged from 120-152 mOsm/l with a mean of 134.5 mOsm/l. Retention of solutes was relatively uniform and not related to rate of gain in weight, suggesting considerable fluctuations in the composition of weight gain—i.e., in the relative proportions of newly formed fat and fat-free tissue.

It may be concluded: (1) that feeding of 80 kcal/dl standard formulas results in osmotically dilute urines in healthy premature infants; (2) that urinary osmolar excretion is predictable from dietary intake; and (3) that relationships between solute retention, rate of weight gain, and composition of gain need further study.

COMMENT: On the basis of information available in the literature, the conclusion that feeding standard formulas to premature babies results in "osmotically dilute urines" does not come as a surprise. That urinary solute excretion averages 35.9% of dietary intake of potential renal solutes in infants fed with standard formulas is interesting and valid information. Changes in the percentage of solute excretion, however, did not correlate with changes in weight and could, therefore, not be used as a measure of adequate nutrition.

8. Response to fasting in intrauterine growth retardation: A comparison of experimental models

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Intrauterine growth retardation (IUGR) was produced in the rat neonate by ligation of maternal uterine vessels ($n=31$) or by maternal dietary restriction ($n=35$). Infants were delivered by cesarean section at term and fasted for 8 hr. Ligation and restriction animals manifested initial hypoglycemia compared to controls ($n=27$, $p < 0.01$). However, low blood glucose persisted ($p < 0.01$ at 4 hr, $p < 0.05$ at 8 hr), and was accompanied by insulin levels comparable to controls in ligation animals whereas restriction animals recovered from hypoglycemia and had decreased insulin levels ($p < 0.01$ at 8 hr) (Table I).

It is evident that different experimental models of IUGR have distinct metabolic consequences. These data also parallel the clinical finding of hyperinsulinemia in some human infants with IUGR.

COMMENT: This study points out the fact that intrauterine growth retarded infants are unquestionably a heterogeneous group. When metabolic studies are carried out, one can identify a large group of patients who suffer from deficient hepatic gluconeogenesis; however, the finding of another group which is comprised of hyperglycemic, small-for-gestational age newborn infants who have hyperinsulinemia indicates that other mechanisms may be involved. These studies in experimental animals demonstrate that even in carefully controlled studies heterogeneous groups are, in fact, frequently found.