Disturbances in ventilation-perfusion relationships ($\dot{V}A/\dot{Q}$) and functional residual capacity (FRC) are the most important abnormalities of physiology in distressed neonates. These parameters were measured serially from birth to recovery in 14 infants with hyaline membrane disease. $\dot{V}A/\dot{Q}$ relationships were studied by determining alveolar arterial gradients for oxygen, carbon dioxide and nitrogen. FRC was determined by a helium rebreathing method. $AaDo_2$ was measured after 100% oxygen breathing, and where possible during air breathing. Venous admixture and shunts were calculated using standard formulae and assumptions. Three infants had nitrogen washout determinations during the recovery period. Arterial samples were obtained from the temporal or right radial artery. The data allows the following conclusions: (1) In most infants FRC decreased between the first and second day (2) Underperfusion ($\dot{V}A/\dot{Q} > 1$) increased progressively in the first 2 days (3) Venoarterial shunting varied little in the first 2 days (4) Most infants reach a normal FRC by 15 days (5) During recovery the absence of nitrogen gradient, normal nitrogen washout, and the presence of a large venous admixture with a small shunt suggests that diffusion limitation is a major problem.

Alveolar instability with inspired 100% O_2 in the newborn lung. C. R. PARKS, E. R. ALDEN, D. E. WOODRUM, and W. A. HODSON (Intr. by W. G. Guntheroth). *Univ. of Washington, Seattle, Wash.*

Right to left shunt determinations in newborn infants have suggested that alveoli are unstable with inspired oxygen concentrations of 100%. Theoretically alveoli with very low VA/Q ratios should collapse with inspired 100% oxygen, resulting in a decrease in alveolar-arterial nitrogen difference ($A\text{-}ADN_2$) and an increase or no change in alveolar-arterial oxygen difference ($A\text{-}aDO_2$), and an increase or no change in shunt.

Four newborn lambs were ventilated at constant tidal volume initially with 40% oxygen for 1½ hours, then with 100% oxygen for 3 hours and then returned to 40% oxygen for 1½ hours. Arterial and mixed venous blood was sampled at the end of each period and analyzed for PO_2, PN_2, PCO_2. Alveolar PO_2 and PN_2 were calculated.

O_2	$A\text{-}aDO_2$ mm Hg (mean)	$a\text{-}ADN_2$ mm Hg (mean)	% Shunt
40%	121	27	9.1
100%	360		16
40%	152	6	16

Three lambs (Table) had a large number of alveoli with very low VA/Q. Decrease in $a\text{-}ADN_2$, with an increase in $A\text{-}aDO_2$ and shunt, indicates conversion of alveoli with very low VA/Q to alveoli with collapse.

One lamb had a small number of alveoli with low VA/Q. In this animal no changes were anticipated nor found with 100% O_2 inhalation.

It is concluded that in the newborn period, alveoli with very low VA/Q may collapse with inspired 100% O_2.

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