Literature Briefs

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Literature Briefs were submitted by Drs. C. M. Ballinger, D. R. Bucchel, R. B. Clark, M. I. Gold, D. H. Morrow, P. H. Sechzer, and A. D. Sessler. Briefs appearing elsewhere in this issue are part of this column.

Respiration

AIR VISCOSITY Viscosities of moist and dry air were measured at four temperatures to determine variations due to changes in water vapor content. Paired measurements of volumetric rates of air flow and pressure decreases along a tube were made. Coefficients of viscosity were calculated, laminar flow being assured by limiting maximal Reynolds numbers. The relationship between viscosity and water vapor content was approximately linear. The increase in the work load of breathing due to an increase in humidity, and hence viscosity, of air appears to be very small compared with the total work of breathing. (*Roy, P. D., Josenhans, W. T., and Miller, C. F.: Variations in Air Viscosity due to Changes in Water Vapor Pressure for Isothermal Conditions at Temperatures below 40° C., Canad. J. Physiol. Pharmacol. 48: 50 (Jan.) 1970.*) ABSTRACTER'S COMMENT: Josenhans (Respiration 26: 435, 1969) has shown that airway resistance is increased with high relative humidity and many patients experience difficulty in breathing in humid environments.

TRACHEOBRONCHIAL SUCTION Various techniques of tracheobronchial suction were evaluated at the conclusion of surgical operations in 12 anesthetized patients who had no known anatomic tracheobronchial abnormalities. Either a straight catheter or a curved-tip rubber catheter filled with radiopaque solution was passed as far as it would go down the endotracheal tube by one of the following techniques: a) straight catheter, with the patients head straight up in the midline position, head turned to the right maximally (for left-lung suction), and head turned to left maximally (for right-lung suction); b) curved-tip catheter, with the patient's head straight up and tip turned to the right (for right-lung suction), head straight up and tip turned to the left (for left-lung suction), head turned to the right and tip turned to the left (for left-lung suction) and head turned to the left and tip turned to the right (for right-lung suction). After each insertion the position of the catheter was determined by x-ray. It was found that: a) a straight catheter seldom entered the left bronchus regardless of the position of the head (three times in 35 attempts); b) a curved-tip catheter entered the right bronchus more often than the left regardless of head position, though it could be guided to the left bronchus more often (14 times in 47 attempts) than a straight catheter. (*Kirimli, B., King, J. E., and Pfaeffle, H. H.: Evaluation of Tracheobronchial Suction Techniques, J. Thorac. Cardiovasc. Surg. 59: 340 (March) 1970.*)

OXYGEN IN HYPERTHYROIDISM In each of two subjects with hyperthyroidism release of oxygen from blood was increased and concentrations of 2,3-diphosphoglycerate in the erythrocytes elevated. This organic phosphate is the primary regulator of oxygen release from hemoglobin in this and other clinical conditions where imbalances of oxygen supply and demand exist. (*Miller, W. W., and others: Oxygen Relasing Factor in Hyperthyroidism, J.A.M.A. 211: 1824 (March) 1970.*)

HYPOXIC RESPONSE The ventilatory responses to acute hypoxia produced by transient nitrogen inhalation in patients with cyanotic congenital heart disease, patients with noncyanotic heart disease, and normal subjects were compared. In two of six cyanotic patients, the ventilatory responses were reassessed after the cardiac defects were repaired. Ventilatory responses were quantitated by relating maximum increase in venti-

lation to maximum decrease in arterial oxygen saturation for each period of nitrogen inhalation. The ventilatory responses of cyanotic subjects were significantly lower than normal, and there was a direct relationship between degree of chronic hypoxemia and reduction of ventilatory response to acute hypoxia. However, unlike the irreversible diminished ventilatory responses of natives born at high altitudes, the blunting of the hypoxic response caused by cyanotic congenital heart disease was reversed in the two instances where the hypoxemia was corrected by operation. (*Edelman, N. H., and others: The Blunted Ventilatory Response to Hypoxia in Cyanotic Congenital Heart Disease, New Eng. J. Med. 282: 405 (Feb.) 1970.*)

HYPOXEMIA A decrease in arterial blood oxygen tension (Pa_{O_2}) to 20 mm Hg or less has generally been held incompatible with survival, but there are exceptions. It was found that extreme hypoxemia with survival occurred at a rate of more than one of 1,700 hospital patients, and this condition is especially likely in the presence of circulatory collapse. Permanent physiologic impairment could not be identified when these patients were followed up for many months. Neither the degree of hypoxemia nor survival was well correlated with hydrogen ion or carbon dioxide levels. Evidence of severe neurologic impairment did not preclude survival, and the neurologic signs were reversible in most instances. Blood oxygen studies often reveal derangements not revealed by *p*H and carbon dioxide studies, and a low oxygen level should not be considered a sign of hopelessness. (*Gray, F. D., Jr., and Horner, G. J.: Survival Following Extreme Hypoxemia, J.A.M.A. 211: 1815 (March) 1970.*)

OXYGEN UPTAKE AFTER ASPHYXIA Previous studies of resuscitation in asphyxiated newborn infants suggested that oxygen requirement exceeded oxygen uptake but because of the depressed cardiocirculatory state, pulmonary blood flow was inadequate to oxygenate desaturated hemoglobin. The fetuses of 35 ewes were delivered by cesarean section at a gestational age of 140 days and the umbilical circulation maintained. The fetuses were asphyxiated by clamping the umbilical cord and resuscitated with intermittent positive-pressure breathing (IPPB). Oxygen consumption, heart rates, and blood pressures were recorded, and in eight of the animals, blood flows through the left lung were recorded while IPPB was applied to this lung only. The findings supported the hypothesis that oxygen consumption is abnormally low during resuscitation of the newborn from extreme asphyxia because of limited blood flow. Adult ewes were also asphyxiated, and in eight studies a very different pattern of behavior was observed, due to very rapid and complete recovery of the circulation. Observations of pulmonary vascular resistance suggested that complete vasomotor paralysis occurred during extreme asphyxia, so that resistance decreased to a near-minimum level for unexpanded lung. Expansion of the lung produced a large decrease in resistance which appeared to be due to the introduction of gas into the alveolar spaces, lessening the resistance to flow of the capillaries. (*Bolton, D. P. G., and others: The Oxygen Uptake and Pulmonary Blood Flow during Resuscitation from Asphyxia in Foetal and Adult Sheep, J. Physiol. 205: 417 (Nov.) 1969.*)

ERRATA

A misprint appeared in the article, "Surgery of the Aorta and Its Branches," in the August issue (ANESTHESIOLOGY 33: 229, 1970). On page 248, the last line should read ". . . animals were kept hypocarbic [not *hyper*carbic] for two hours."

In the article, "The Search for Better Anesthetic Agents: Clinical Investigation of Ethrane" (ANESTHESIOLOGY 32:555, 1970), the authors in reference 5 are listed incorrectly. S. Shimosato should be the first author and B. E. Etsten the last.