

Literature Briefs

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Literature Briefs were submitted by Drs. L. Bachman, C. M. Ballinger, A. Boutros, T. B. Caldwell, R. B. Clark, M. I. Gold, D. H. Morrow, E. S. Munson, J. W. Pender, H. Roe, P. H. Sechzer, A. D. Sessler, and S. M. Shnider. Briefs appearing elsewhere in this issue are part of this column.

Circulation

ATRIAL FIBRILLATION In man spontaneous atrial fibrillation resulting from myocardial infarction was invariably preceded by one or more premature atrial contractions which led to a brief (2 to 30 sec) period of atrial tachycardia. This sequence was observed in 32 episodes in eight patients. However, not all premature atrial beats led to tachycardia and fibrillation. Twenty-eight spontaneous reversions of atrial fibrillation to sinus rhythm were associated with periods of atrial tachycardia. (Bennett, M. A., and Pentecost, B. L.: *The Pattern of Onset and Spontaneous Cessation of Atrial Fibrillation in Man, Circulation* 41: 981 (June) 1970.)

APNEA AND ARRHYTHMIAS Apnea increases the degree of A-V block and the incidence of A-V junctional escape rhythm or ventricular automaticity in patients with atrial fibrillation. Apnea reduces the incidence of A-V junctional tachycardia and has no effect on the rates of subsidiary pacemakers, but occasionally shortens the coupling interval of premature ventricular contractions. Cheyne-Stokes respirations increase the effects of apnea and often lead to runs of ventricular tachycardia in patients with atrial fibrillation who had only occasional premature ventricular contractions during normal respiration. (Urbach, J. R., and others: *Effects of Inspiration, Expiration, and Apnea upon Pacemaking and Block in Atrial Fibrillation, Circulation* 42: 261 (Aug.) 1970.)

MYOCARDIAL POTASSIUM Potassium was lost from the myocardium of each of 18 patients who developed anginal pain during atrial pacing. The potassium deficits averaged 0.23 ± 0.08 mEq/l. Eight patients with coronary artery disease and four patients with normal coronary arteries who did not develop angina during atrial pacing had significantly smaller potassium losses (0.06 ± 0.06 mEq/l). The potassium losses in the 18 patients with clinical ischemia correlated with increased myocardial lactate production ($r = 0.83$) and with decreased pH of coronary sinus blood ($r = 0.86$). ST depressions averaging 1.8 mm appeared in the ischemic group, but were less than 1.0 mm in the asymptomatic patients. When pacing was discontinued, positive myocardial potassium balances appeared in both groups. (Parker, J. O., and others: *The Effects of Ischemia and Alterations of Heart Rate on Myocardial Potassium Balance in Man, Circulation* 42: 205 (Aug.) 1970.)

ORTHOSTATIC STRESS Patients in congestive heart failure tolerated orthostatic stress better than normal subjects, and subsequent treatment of the congestive heart failure with one to three weeks of bed rest did not decrease their tolerance. (Jeffrey, F. E., and others: *Increased Tolerance of Patients with Circulatory Congestion to Orthostatic Stress, Amer. J. Med. Sci.* 259: 323 (May) 1970.)

REGIONAL CEREBRAL OXYGEN UTILIZATION Regional cerebral oxygen utilization rates in 15 patients with cerebral disease were reported. Blood containing radioactive oxygen-15-tagged hemoglobin was rapidly injected into the internal carotid artery of the patient. A second injection was made under identical circumstances except that the blood was labeled with water- ^{18}O . After each injection, the distribution of radioactive label in the brain was measured and recorded, as a func-

tion of time, by six collimated scintillation probes placed over the subject's head. The recording subsequent to the first injection reflected a) the arrival of the labeled oxygen in the tissues; b) its partial conversion into water of metabolism; c) the washout of labeled water from the brain. The ratio of the amount of labeled water formed to the amount of oxygen perfusing the tissues was a measure of fractional oxygen utilization. The second injection provided a measure of blood flow by the interpretation of the washout of the labeled water from brain tissues. The product, fractional utilization \times blood flow \times arterial oxygen content, gave a value for oxygen utilization rate. The validity of this method was tested by an injection of a nondiffusible indicator, carboxyhemoglobin- ^{14}O . Oxygen uptake measurements by these methods were slightly higher (6 per cent) than the values for the whole brain in normal subjects previously reported. (*Ter-Pogossian, M. M., and others: The Measure in Vivo of Regional Cerebral Oxygen Utilization by Means of Oxyhemoglobin Labeled with Radioactive Oxygen-15, J. Clin. Invest. 49: 381 (Feb.) 1970.*)

FUNCTION OF STORED BLOOD Normal hemoglobin function depends on adequate erythrocytic levels of 2,3-diphosphoglycerate (2,3-DPG), a compound that is poorly maintained during bank storage of blood in acid-citrate-dextrose (ACD). Since 2,3-DPG is better maintained at the higher pH afforded by citrate-phosphate-dextrose (CPD), degrees of hemoglobin function during storage of blood in CPD and in ACD were compared. Hemoglobin function, expressed as the P_{50} or the P_{O_2} at which blood is 50 per cent oxygenated (an inverse but direct measure of oxygen affinity), was considerably better maintained during storage in CPD than in ACD. The hemoglobin function or P_{50} of blood stored in CPD-adenine was not maintained as well as the Hb function of blood stored in CPD without adenine, but the oxyhemoglobin dissociation curves showed only a small difference compared with the difference between ACD and CPD. Blood stored in CPD-adenine with inosine present initially or added at day 25 had higher P_{50} values late in storage, thus providing better hemoglobin function for more of

the storage period. The concentration of 2,3-DPG of erythrocytes might be altered favorably in stored blood to provide the recipient with hemoglobin which functioned more normally. (*Dawson, R. B., Jr., and Ellis, T. J.: Hemoglobin Function of Blood Stored at 4 C in ACD and CPD with Adenine and Inosine, Transfusion 10: 113 (May) 1970.*)

STORED WHOLE BLOOD In extensive tests of the effects of temperature and mechanical agitation of blood with and without plasma, it was found that temperature variation commonly encountered in the clinical blood bank (4 C to 10 C, and short exposure to 22 C prior to transfusion) did not appear to contribute significantly to erythrocytic damage—unless the units were in the oldest stages of storage or had been exposed to warm temperatures for longer than 24 hours. Mechanical stress had minimal adverse effects, but they became more evident when blood was stored as packed cells or when blood had been stored for 21 days or more. However, present blood bank standards provide safeguards to protect stored and shipped blood from excessive temperatures and physical stress. These safeguards must be maintained, especially with longer periods of storage of the blood. Furthermore, despite the apparent resistance of erythrocytes to stress, unreasonable demands can readily produce harmful changes, rendering the blood unusable for transfusion. (*Shields, C. E.: Studies on Stored Whole Blood: IV. Effects of Temperature and Mechanical Agitation on Blood with and without Plasma, Transfusion 10: 155 (July) 1970.*)

MAGNESIUM BLOCKADE Effects of magnesium ion blockade on peripheral circulation were studied in 20 dogs anesthetized with pentobarbital. Following tracheal intubation, the lungs were ventilated mechanically. Superior mesenteric or renal arteries were then exposed and isolated through a midline abdominal incision. In 14 dogs, known concentrations of KCl, adrenergic vasoconstrictors (neosynephrine, norepinephrine and epinephrine) and nonadrenergic vasoconstrictors (angiotensin and pitressin) were infused into either the superior mesenteric or renal arteries in amounts sufficient to cause decreases in