Anesthesiology
V 41, No 4, Oct 1974

Literature Briefs

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Literature Briefs were submitted by Drs. R. D. Bastron, R. Clark, L. J. Drop, B. B. Das, A. Goldblatt, J. Levitt, E. Lowenstein, and J. Reitan. Briefs appearing elsewhere in this issue are part of this column.

Circulation

TRAUMA TO THE HEART Injury to the heart can follow either penetrating or blunt trauma to the chest, and can appear in the form of myocardial laceration, septal defects, coronary-artery injury, ventricular aneurysms, or valvular lesions. The presence of valve injury following nonpenetrating trauma may be obscured by the associated chest-wall and pulmonary injuries. Diagnosis may be delayed for months or years. A ruptured papillary muscle is associated with more severe and earlier signs of valvular incompetence than are ruptured chordae tendineae or valve leaflets. Four cases are presented. In the first, tricuspid insufficiency was diagnosed ten years following an automobile accident and a crushed-chest injury. In the second, tricuspid insufficiency and constrictive pericarditis were diagnosed five months after an automobile accident which resulted in multiple rib fractures. Treatment required replacement of the tricuspid valves with ball-valve prostheses in both cases and pericardial stripping in the second. In the third case, pulmonary infiltrates increased during the ten days following chest injury from an automobile accident. A systolic murmur was present and severe mitral insufficiency was diagnosed by cardiac catheterization. The valve was replaced with a prosthesis. The fourth patient developed a diastolic murmur after several shotgun pellets lodged in his chest. Cardiac catheterization revealed no abnormality, but an aortogram demonstrated mild aortic insufficiency. Surgery was not performed because the patient was asymptomatic. Hemopericardium or a new cardiac murmur is a definite sign of cardiac injury. Any abnormality of cardiac function, including cardiac arrhythmias, hemothorax, a pericardial friction rub, or electrocardiographic abnormalities should alert the physician to the possibility of cardiac injury. *(Bryant, L.R., and others: Cardiac Valve Injury with Major Chest Trauma. Arch Surg 107: 279–283, 1973.)*

HEART FAILURE AND NEONATAL HYPOCALCEMIA The presence of cardiac failure associated with low total calcium ([Ca]) in six newborns, 2 to 30 days after birth, is described. Congestive failure was characterized by peripheral edema, cyanosis, tachypnea, hepatic enlargement, cardiac enlargement (by x-ray) and ECG abnormalities. Three infants showed signs of tetany or convulsions. [Ca] values ranged from 4.6 to 7 mg/100 ml. Five infants responded to treatment with calcium gluconate, digoxin and diuretics. Marked improvement occurred within two to four days in four infants, and in six days in one infant. Simultaneously, ECG abnormalities resolved. One infant, in whom [Ca] was 6.5 mg/100 ml, died despite treatment.

It has been generally assumed that tetany is an early sign of hypocalcemia and that it must be both pronounced and protracted to cause manifest caridac failure. This report calls attention to the fact that tetany may be absent in hypocalcemia and that acute lowering of [Ca] may be instrumental in causing cardiac failure. *(Troughton, O., and Singh, S.P.: Heart Failure and Neonatal Hypocalcemia. Br Med J 4: 76, 1972.)* EDITOR'S COMMENTS: The relationship between hemodynamic failure and calcium homeostasis (both total and ionized) deserves renewed critical evaluation. The data presented do not resolve the conflict as to cause and effect.

CNS Function

CMR_{O_2} AND HEAD TRAUMA Twenty-eight patients with isolated head trauma were divided into three groups based on ultimate outcome: 1) complete recovery, 2) recovery with neurologic deficit, and 3) death from brain damage. All patients had online monitoring of cerebral blood flow (CBF) and

cerebral metabolic rate of oxygen (CMR_{O_2}) using argon clearance rates measured by mass spectography and oxygen saturation from cerebral arterial and venous blood samples. Although both CBF and CMR_{O_2} showed significant differences among the three groups, CMR_{O_2} separated them more clearly as to quality of recovery. In groups 2 and 3, the patients' CMR_{O_2}'s were 51 and 14 per cent of values obtained in group 1. These differences were significant, $P < 0.0001$. CMR_{O_2} is presented as a reliable prognostic indicator in acute head trauma. *(Tabaddor, K., Bhushan, C., Pevsner, P.H., and others: Prognostic Value of Cerebral Blood Flow (CBF) and Cerebral Metabolic Rate of Oxygen (CMR_{O_2}) in Acute Head Trauma. J Trauma 12: 1053–1055, 1973.)* EDITOR'S COMMENT: If substantially large areas of the brain are not perfused, then oxygen consumption must decrease. Although one cannot quarrel with the virtues of this type of measurement, it would be worthwhile to demonstrate that the added instrumentation is a better prognosticator than careful repeated neurologic evaluation.

Renal Function

RENAL CONCENTRATING ABILITY This study was performed to assess urine-concentrating ability as a simple clinical means of evaluating renal function in preoperative patients. Stimuli for urine concentration were either a 12–14-hour period of water deprivation or exogenous vasopressin administration. Urinary osmolality and specific gravity were measured. Concentrating ability was compared with 12-hour creatinine clearance. Results indicate that: 1) specific gravity determinations are not reliable indicators of osmolality; 2) concentrating tests are simpler to perform and less subject to error than are creatinine clearances, and appear to identify the majority of patients with significant impairment of renal function; 3) the combination of a concentration test and a serum creatinine level would identify a wide range of renal-function abnormalities. The authors recommend further evaluation of the concentration test as a simple method for evaluating renal function in preoperative patients. *(Crandwll, W.B., and McDonald, A.: Assessment of Renal Function in Surgical Patients by Urine Osmolality Concentration Tests. Am J Surg 125: 508, 1973.)* ABSTRACTER'S COMMENTS: Concentrating tests are used as a measure of tubular function; creatinine clearances are used to estimate glomerular function. While it is true that concentrating tests are technically easier to perform than creatinine clearances, their interpretation is subject to great error. Exogenous vasopressin is not as potent a stimulus as is dehydration, and 24 hours of water deprivation are required to achieve 90 per cent of "maximum" concentration. Because renal function has a great reserve, it is unlikely that a single test will assess overall renal status, and we must continue to rely on a carefully performed history and physical examination in conjunction with laboratory studies, which might include urinalysis and determinations of serum creatinine and BUN. The ratio of urinary to serum osmolality following a predetermined period of dehydration is a simple method for evaluation of ability to concentrate and probably is not used often enough as a preoperative screening test.

INTRARENAL BLOOD FLOW IN CONGESTIVE HEART FAILURE The mechanism responsible for sodium retention and edema formation in congestive heart failure has not been completely elucidated. Alterations of intrarenal hemodynamics have been implicated as a factor in animals. Studies were performed to determine whether similar alterations might contribute to edema formation in human heart failure. Intrarenal distribution of blood flow was estimated using ^{133}xenon washout. Ten patients with heart failure, seven with edema and three with no edema, were studied. Controls were kidney donors and hypertensive patients on a low-salt diet (the edematous patients were also on low-salt diets). Edematous patients had significantly decreased cortical blood flow compared with normals, hypertensive patients, and heart-failure patients without edema. Moreover, diuresis induced by furosemide was accompanied by increased cortical flow. The authors conclude that preferential cortical vasoconstriction may play a role in edema formation in human heart failure. Of interest is the fact that the authors found an inverse relationship between renal cortical blood flow and central venous pressure, the lowest flow being present at highest CVP despite no