

## Literature Briefs

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Literature briefs were submitted by Drs. J. Bland, L. Brand, L. Cooperman, L. H. Cronan, B. Dalton, M. Gold, A. Goldblatt, J. Harp, E. Lowenstein, L. C. Mark, H. Rackow, G. Rockwell, and E. Salanitro. Briefs appearing elsewhere in this issue are part of this column.

### Circulation

**CAPILLARY PERMEABILITY AND DIFFUSIVITY IN DIABETES** Microangiopathy, which occurs in diabetics and in certain patients with prediabetes, is characterized by thickening of the basement membrane and deposition of PAS-staining material beneath the vascular endothelium, leading to retinopathy, neuropathy, nephropathy and abnormalities of microcirculatory function in general. Capillary diffusion capacity (CDC), an index of microcirculatory function dependent on permeability as well as surface area of the microvascular bed, has been shown to be elevated in diabetes. However, it is not known whether changes in CDC in diabetes are due to alterations in permeability or changes in surface area. The capillary filtration coefficient (CFC) is determined exclusively by the surface area of the microvascular bed. Thus, simultaneous measurement of CDC and CFC will establish which of the two factors is abnormal.

Using calf venous-occlusion plethysmography and the measurement of  $^{133}\text{Xe}$  and  $^{131}\text{I}$  clearances from hyperemic anterior tibial muscle, the authors were able to differentiate between changes in permeability and changes in surface area. The finding of normal CFC and abnormal CDC in diabetic patients with microvascular disease suggests abnormal permeability of small vessels rather than an increase in surface area. (Alpert, J. S., and others: *Capillary Permeability and Blood Flow in Skeletal Muscle of Patients with Diabetes Mellitus and Generic Prediabetes*, *N. Engl. J. Med.* 283: 454-460, 1972.) **ABTRACTER'S COMMENT:** The implications of "leaky" vasculature to water, electrolyte and drug therapy

as well as the evaluation of distribution of anesthetic drugs are of major importance to the anesthetist. Again, the lack of appropriate data which we can apply to our patient material is obvious. The techniques described are sufficiently benign to justify wider application in the operating room setting.

### AORTO-CORONARY BYPASS GRAFTS

Blood flow was measured electromagnetically at operation in 1 aorto-coronary vein grafts in 21 patients, and resistance to flow distal to the graft was calculated. The vasodilatory effect of papaverine (10 mg) injected into the graft was also recorded. Flow through left-sided grafts was  $73 \pm 23$  ml/min and flow through right-sided grafts,  $53 \pm 25$  ml/min; calculated resistances were  $1.2 \pm 0.4$  and  $2.6 \pm 1.6$  units, respectively. Papaverine approximately doubled flow and halved resistance. Four patients, with three grafts to the right and one graft to the left, had resting flows of 30, 9, 14, and 45 ml/min, with resistances of 2.5, 8.0, 6.5, and 1.4 units, respectively. Although responses to papaverine were appropriate, graft occlusion was present in three as demonstrated by coronary angiography performed two weeks to six months postoperatively, and in the fourth patient at autopsy three weeks postoperatively. Resting blood flow greater than 50 ml/min provided a better prognostic indicator of eventual graft patency than the magnitude of vasodilatation following the injection of papaverine. On the other hand, no graft with a flow of 30 ml/min or less remained patent regardless of the magnitude of response to papaverine. (Moran, J. M., Chen, P. Y., and Rheinlander, H. F.: *Coronary Hemodynamics Following Aorto-coronary Bypass Graft*, *Arch. Surg.* 103: 539-544, 1971.)

### CORONARY-ARTERY SURGERY AND SURVIVAL

Patients with coronary-artery disease treated by surgery were classified according to survival and type of surgery (single pedicle, multiple pedicle, vein grafts). The

severity of coronary disease was judged approximately equal in all groups, although the patients classified as good risks for vein grafts had slightly more extensive coronary disease than the patients in the pedicle series. The poor risks for vein grafts had far more extensive coronary disease than the other groups, and would have been considered inoperable during the period when pedicle surgery was performed. The poor-risk vein-graft group was not treated further as part of a survival study because of an operative mortality of 56 per cent (compared with only 1.8 per cent for the good-risk vein-graft group and 4.6 to 8.7 per cent for the pedicle groups). The survival rate in patients with coronary-artery disease of similar severity was lowest in the group treated medically, and improved progressively in the surgically-treated groups in the following order: single pedicle, multiple pedicle, and vein grafts. The best-surviving surgically-treated group, the vein-graft series, has been followed for only two years. (Sewell, W. H.: *Life Table Analysis of the Results of Coronary Surgery*, *Chest* 61: 481, 1972.)

**SURGICAL STRESS** Tachycardia occurred in 18 surgical team members monitored during 33 operations. Etiologic factors included degree of responsibility for the patient (operating surgeon vs. assistant), fatigue, operative difficulty, anesthesia (cardiac arrest), and previous surgical mishap. Interestingly, tachycardia occasioned by operative difficulty was promptly reduced when a staff consultant "scrubbed in," but was temporarily increased when the instructor merely gave advice as an onlooker. (Goldman, L. I., McDonough, M. T., and Rosemond, G. T.: *Stress Affecting Surgical Performance and Learning. I. Correlation of Heart Rate, Electrocardiogram, and Operation Simultaneously Recorded on Video Tapes*, *J. Surg. Res.* 12: 83-86, 1972.)

**HEMODYNAMIC AND RADIOLOGIC PATTERNS IN CHF** Pulmonary hemodynamic and radiologic changes secondary to acute left ventricular failure (CHF) were studied in 30 patients with acute myocardial infarction in a critical care unit. Pulmonary capillary wedge pressures (PCWP) and pulmonary arterial oxygen saturations were ob-

tained serially and were correlated with 65 portable chest x-rays obtained with the patient in the semi-sitting position. In 80 per cent of patients studied, PCWP's above 18 mm Hg were associated with radiologic evidence of moderate-to-severe congestive heart failure. In 10 per cent of patients discrepancies between PCWP's and chest x-rays were associated with: 1) early signs of failure, manifested by high PCWP but followed by radiologic evidence of failure a day later; 2) low PCWP in response to diuretic treatment, but 1.5-21-hour delay in resolution of the radiologic changes; 3) low PCWP with loss of vascular integrity on chest x-ray, accompanied by severe hypoxemia. The last appeared in patients with cardiogenic shock. Ten of 14 patients with pulmonary arterial oxygen saturations less than 60 per cent had moderate or severe failure evident on their chest x-rays; four patients with mild changes were in cardiogenic shock.

The radiologic criteria appeared in a predictable sequence commensurate with congestive heart failure. Early findings included increased upper-zone blood flow, hilar haze followed progressively by increased markings of peripheral blood vessels, and periacinar rosette formation. The presence of cardiomegaly, pleural effusion, Kerley B lines, and increased size of the pulmonary artery proved unreliable as clues to CHF. (McHugh, T. J., and others: *Pulmonary Vascular Congestion in Acute Myocardial Infarction: Hemodynamic and Radiologic Correlations*, *Ann. Intern. Med.* 76: 29-33, 1972.)

**BLOOD GASES AND MYOCARDIAL INFARCTION** Measurements of hemodynamic changes and calculations of right-to-left intrapulmonary shunts were made in a series of patients shortly after their admission to a myocardial infarction research unit. When congestive heart failure (CHF) was not clinically evident, arterial blood gases, calculated right-to-left intrapulmonary shunts, and pulmonary arterial pressures (PAP) were similar to values in patients with angina but no myocardial infarction. When CHF complicated the clinical picture,  $Pa_{O_2}$  was lower, while shunt and PAP were increased. It appears that the arterial hypoxemia associated with