ABSTRACTS

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ENDOCARDITIS, MYOCARDITIS, AND PERICARDITIS


A study of four patients with bacterial endocarditis with allergic reactions to penicillin is presented. A patient with blood cultures positive for a coagulase-negative Staphylococcus Aureus was treated from the outset with 8 to 4 g of cephalothine sodium intravenously per day. A second patient with alpha-hemolytic streptococcus, initially treated with 20 million units of penicillin and 2 g of streptomycin for 10 days, developed a hypersensitivity reaction, and therapy with cephaloridine, 4 g per day intramuscularly was given for another 14 days. In the third case, with positive cultures for an alpha-hemolytic microaerophilic streptococcus, therapy with cephaloridine and streptomycin was instituted at the outset. All three patients were considered to have had bacteriological and clinical cures. A fourth patient with coagulase-positive penicillin-resistant Staphylococcus aureus died on the fourth day of treatment from extensive embolizations. Only one patient developed side effects, with symptoms of gastrointestinal and central-nervous system irritation, which were dose related. The authors conclude that, at present, it appears justifiable to use cephalothine and cephaloridine as the cornerstone for treatment of endocarditis due to gram-positive coci (except enterococci) in patients allergic to penicillin.

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Long-term, intermittent hemodialysis was utilized to treat 27 patients with chronic renal failure. Clinical pericarditis occurred in 11 patients and, in at least eight patients, pericarditis occurred at a time when the uremic state was well controlled. Cardiac tamponade occurred in 15 patients and, of this group, 10 of them survived 4 months or longer. The presence of pericarditis did not appear to alter significantly the outcome for the patient who was controlled by the hemodialysis, however, its occurrence appeared to be associated with an increased incidence of cardiac tamponade. Regional heparinization was recommended in patients who demonstrated clinical evidence of pericarditis since in some cases hemopericardium was apparently provoked by the dialysis. The authors concluded that cardiac tamponade could be managed successfully without a sufficient reason to deny a patient treatment with intermittent hemodialysis.

Karpman


The fifth patient with massive chylopericardium is described. At operation no other abnormalities were found. The epicardium was removed over the anterior and right lateral surface of the heart and the thoracic duct was ligated.
above the diaphragm. The patient is well 14 months after surgery. Three other patients in the literature, treated in a similar manner, are well 9, 11, and 12 years later.

**Kalmanson**


The clinical features of 34 cases of staphylococcal endocarditis were described. There were 16 patients with acute bacterial endocarditis due to coagulase-positive *Staphylococcus aureus*, nine with subacute endocarditis caused by coagulase-negative *Staphylococcus albus*, and nine with postcardiotomy endocarditis. Treatment with the new semisynthetic penicillins gave more favorable results than with the older antibiotics, and the duration of treatment was more important than the daily dosage.

**Traks**

**Hypertension**


This case report deals with a 54-year-old housewife afflicted with hypertension and diabetes mellitus. Aortography revealed bilateral renal artery stenosis. She was found to have normal serum electrolyte levels, normal excretion of hydroxy-corticosteroids, and an increased secretion of aldosterone. Surgical correction of the stenosis was attempted and the patient died of an acute myocardial infarction. Postmortem examination demonstrated two adrenal adenomas which were morphologically indistinguishable from aldosterone-producing tumors. The author suggested that the patient's hypertension would most likely not have been cured by correction of the renal vascular lesions alone. Furthermore, he suggested that patients with renal artery stenosis be explored for adrenal adenomas prior to correction of the arterial lesion since concurrence of primary aldosteronism and renal artery stenosis was probably not rare.

**Karpman**


A follow-up is given for 432 hypertensive patients who underwent surgical treatment for renal arterial occlusive lesions prior to May 1, 1964, with appraisal periods ranging from 1 to 8 years. Eighty percent of the patients were in the fourth to sixth decades of life with men predominating 2 to 1. Artherosclerosis was the predominant etiological factor producing stenosis. The second most common lesion was fibromuscular hyperplasia. The lesions involved the proximal segments of the renal arteries in 71% of the patients and both renal arteries in 33%. Significant cardiomegaly occurred in 52% and azotemia in 15%. Thirty different variations of procedures were used with the bypass graft being used in 50% of the patients and endarterectomy in 17%. The surgical mortality rate was 7% chiefly due to myocardial infarction; the 5-year survival rate was 68%. At the end of 4 years, 26% were normotensive and 68% were improved.

**Kalmanson**


Tyramine hydrochloride was used as a provocative test for pheochromocytoma in 46 hypertensive patients and in 58 normotensive control patients. Positive tests were obtained preoperatively in 10 patients with elevated catecholamines and vanilmandelic acid (VMA) levels with proven pheochromocytomas. A positive tyramine test was discovered in seven patients with labile blood pressure responses; however, in this group the results of the catecholamine and VMA determinations were all within normal limits. The authors concluded that the tyramine test was a useful and safe addition to the screening procedures in the evaluation of hypertensive patients for remediable causes. In addition, they concluded that 24-hour collections of urine for catecholamines or VMA determinations were still required in order to confirm the diagnosis of pheochromocytoma.

**Karpman**

**Pathology**


The left coronary artery of 26 rats was successfully ligated. The animals were sacrificed 5 minutes to 72 hours after this operation. Sections of the heart were immediately frozen and subsequently studied with histochemical and enzyme stains. In general, there was a consistent reduc-
tion in enzymatic activity, varying directly with the duration of ischemia and occurring in the area of distribution of the ligated coronary artery. The stains employed for the detection of pre-necrotic myocardial metabolic changes varied in sensitivity. Those involved in glycogen metabolism (PAS, phosphorylase, branching enzyme, and uridine diphosphate glycogen transferase) detected the earliest changes, followed by beta-hydroxybutyrate and isocitrate dehydrogenase.

THILENIUS


Histological examination of the heart was carried out in five elderly patients dying with amyloidosis, in four of whom the disease was primary in type. Amyloid was abundantly present in all areas of the conduction system in each case. The sinus node was the site of major destruction in four of them, possibly because it is essentially a periarterial structure and amyloid tends to be deposited in arteries. The cardiac mechanism of these four individuals was atrial fibrillation in two, and sinus arrest with slow nodal rhythm in the other two. The fifth patient had more extensive atrioventricular nodal damage and had a prolonged P-R interval. Three patients died of congestive failure; one succumbed to renal failure with pericarditis, which probably affected the sinus node as well. It was theorized that amyloid involvement of the conduction system might increase the sensitivity to digitalis.

ROGERS


Histological lesions of the cardiac conduction system were found in each of three patients dying from thrombotic thrombocytopenic purpura. These consisted of hemorrhage, edema, and necrosis secondary to occlusion and rupture of arterioles. All patients had convulsions; in one of them, a 26-year-old woman with renal failure, careful sectioning of the atrioventricular node showed a 1 mm area of infarction almost completely transecting the bundle of His. She had bradyarrhythmias documented during a seizure. While many of the neurological disturbances in this disease may be due to central nervous system lesions, it is evident from the findings in these cases that cardiac involvement can precipitate or contribute to seizures.

ROGERS


The hearts of 11 patients who died with the clinical diagnosis of myocardial infarction and who had an autopsy marked arteriosclerotic narrowing or thrombosis of the larger coronary arteries but no gross myocardial changes, were obtained for study 6 to 36 hours after death. In none of these hearts did hematoxylin-eosin stains show evidence of myocardial infarction. Enzyme activity, however, was decreased and served as a more easily recognized indicator of early human myocardial damage. The rate of disappearance varied with the enzyme system. Glutaminase I and beta-hydroxybutyrate dehydrogenases were the most valuable indicators. There were distinct differences in enzyme activity between induced myocardial infarction in rats and myocardial infarction in humans, particularly with respect to glutaminase I and isocitrate dehydrogenase.

THILENIUS


Clinical, radiological, and pathological studies on 19 patients with lesions in the extrarenal arteries resembling fibromuscular hyperplasia were described in this paper. Fibromuscular hyperplasia was present in the renal arteries of 11 patients and was observed in the internal carotid arteries in six patients; two of the latter group of patients demonstrated symptoms of cerebral ischemia. Intracranial aneurysms were discovered in nine patients in whom the fibromuscular hyperplasia occurred in the carotid or renal arteries, and intracranial hemorrhage occurred in two other patients in the absence of demonstrable aneurysms. The authors hypothesized that a common etiological factor may be responsible for the frequent association between intracranial aneurysms and fibromuscular hyperplasia.

KARPAN

PHARMACOLOGY


An extraction method with methylene dichloride for measuring plasma levels of digitalis is described, with the use of the specific ability of cardiac glycosides to inhibit the K and Rb uptake.
of red blood cells. The extraction method achieves an inhibitory effect equivalent to a tenfold greater concentration than the direct plasma method previously described (Lowenstein, J. M., Circulation 31: 228, 1965). Disappearance of digitoxin from the plasma after the oral maintenance dosage was stopped was demonstrated in three patients with atrial fibrillation.

FEDER


Levels of digitoxin in plasma, blood, urine, and feces were measured by a double isotope-dilution method that employed digitoxin-3H to monitor procedural losses of digitoxin and acetic anhydride-1-14C to convert the compound to digitoxin triacetate-1-14C. The method was capable of detecting 0.01 μg of the glycoside and had an accuracy of 101 ± 3% (mean ± SEM) in assaying 0.01 to 0.20 μg of the compound in plasma. The plasma of cardiac patients being treated with fixed daily doses contained 1.0 to 5.6 μg/100 ml. Except for small increases between 30 minutes to 1 hour and 4 to 6 hours after ingestion of the daily dose, the concentration in individual patients was constant. It was determined mainly by the dose in relation to the body weight, each microgram per kilogram taken daily resulting in a level of about 1 μg/100 ml. The concentration in erythrocytes was 2% of that in plasma. After stopping treatment, the half-life of digitoxin in plasma was 4.3 days in a patient with normal renal function and 6.4 days in another with slightly impaired renal function. Patients receiving 100 μg daily excreted 8 to 30 μg (mean 16) in the urine and 9 to 19 μg (mean 14) in the feces. The remainder was probably altered chemically in the body prior to its excretion. Since glycuronides of digitoxin susceptible of cleavage by β-glycuronidase could not be identified in the urine, it was concluded that conjugation of digitoxin with glycuronic acid is not an important metabolic process in man.

MARSHALL


Twenty-four patients with coronary artery disease and 10 apparently normal subjects were studied at rest and during supine leg exercise. All patients with coronary artery disease developed pain during exercise and their left ventricular end-diastolic pressures increased from 5 to 17 mm Hg (mean 10) to 24 to 44 mm Hg (mean 34). In the normal subjects, the mean end-diastolic pressure increased from 8 to 13 mm Hg during exercise. The increase in mean pulmonary artery pressure and in right ventricular end-diastolic pressure was also greater in the patients, while the increase in cardiac output was less pronounced. Studies were repeated following the ingestion of nitroglycerin. Eleven of the 14 patients thus tested were able to perform an identical grade of exercise with no chest pain and with hemodynamic changes similar to those in the normal group. While the mode of action of nitroglycerin remains uncertain, the authors suggested that it might act by decreasing myocardial oxygen requirement through a reduction in the volume of the left ventricle.

MARSHALL


The temporal course of the action of various digitalis glycosides in normal subjects was studied by measuring the left ventricular ejection time and correcting for heart rate yielding an ejection time index (ETI). Deslanoside, 1.6 mg, and ouabain, 1.0 mg both given intravenously produced a decrease in the ETI 10 minutes after the drugs were given and reached a minimum at 20 minutes which was maintained for 2 to 4 hours. The effects of digoxin 1.6 mg given intravenously, paralleled the preceding response for the first hour but a secondary decrease in ETI then evolved reaching its peak in 6 hours. Digitoxin, 1.6 intravenously, on the other hand, elicited only a small initial response with a maximal effect occurring between 6 to 24 hours. For the next 5 days, the response to digitoxin dissipated more slowly than that to deslanoside or digoxin, and the ETI remained significantly lower than baseline levels. The dissipation of the physiological effects of the various glycosides are reported as following a logarithmic temporal curve. The response to graded intravenous doses of deslanoside in groups of different individuals showed a significant dose dependent effect of the drug.

In two patients with complete heart block, the ETI distinctly decreased in 1 hour at all observed levels of paced heart rate following deslanoside administration. In patients with cardiac failure, nine of 12 patients had a decrease in the
FEDER

PHYSICAL SIGNS


The early systolic ejection sound was studied in 118 patients with proved aortic stenosis of various types. Evidence is presented that the ejection sound is characteristic of valvular stenosis with preservation of some mobility of the leaflets and arises as an opening snap of the aortic valve. The ejection sound is absent in subvalvular and supravalvular aortic stenosis.

TAVEL

TRAKS


A 17-year-old boy with congenital heart block had a systolic ejection murmur which varied in intensity from beat to beat. The murmur was loudest whenever a P wave preceded the QRS complex by approximately 0.20 second and whenever the left ventricular ejection time (measured indirectly from the carotid pulse tracing) was longest. Mitral regurgitation was excluded by left ventricular cineangiogram. It was concluded that the intensity of the murmur is a function of ventricular stroke volume and represents a flow murmur across the semilunar valves. Variation of such a murmur may be expected to occur in patients in whom atrial contraction contributes significantly to ventricular diastolic filling. In patients with diseased myocardium, this may not be noted.

THILENIUS

PHYSIOLOGY


Phlegmasia cerulea dolens (massive venous thrombosis) was induced in the hind leg of 69 mongrel dogs by ligation of all branches of the iliac and femoral veins above the inguinal ligament. Barium sulfate was then injected into the dorsal paw vein. Untreated animals died within 12 to 24 hours in profound shock with massive swelling of the extremity. This was accompanied by a fall in blood volume and plasma volume, and a rise in hematocrit. Intravenous administration of blood (7% of body weight) and an equal amount of saline during the first 12 hours after ligation resulted in survival for several days, death then being secondary to gangrene and infection. Long-term survival with self-amputation was rarely seen. In untreated animals, arterial pressures and arterial blood flow in the affected limb did not fall until 8 hours after ligation. When systemic blood pressure was maintained by blood transfusion, arterial blood flow remained unchanged for 36 hours. The ensuing decrease in arterial blood flow is explained by the concept of critical closing pressure rather than vasospasm: as long as the transmural pressure is in excess of approximately 20 mm Hg, the artery remains pulsating, but it collapses when either the perfusion pressure falls or the tissue pressure rises to such an extent that the critical closing pressure is reached.


Right ventricular hypertrophy in contrast to that of the left ventricle is accompanied by quite diverse modifications of the electrocardiogram and vectorcardiogram. They range from the characteristic patterns of certain congenital defects to nearly normal tracings observed in some cases of chronic cor pulmonale due to emphysema. Explanations for these different patterns were sought through the study in six cases of pulmonary function, cardiac and pulmonary dynamics, coronary circulation, and myocardial metabolism.

Increased pulmonary pressures, resistances, and therefore right ventricular work play an important role in some cases, but do not seem to be the only mechanisms. Coronary blood flow was abnormally low in the majority of patients in whom it could be examined. Hypoxia in patients with chronic lung disease did not produce any coronary vasodilatation with compensatory increase of blood flow. The theory is offered that myocardial hypoxia by its metabolic effects might account for certain electrocardiographic and vectorcardiographic changes which are unexpected in chronic cor pulmonale (for example, left axis deviations of QRS or rS patterns in precordial leads). Hypoxia may also explain some of the coronary-like modifications seen.

The myocardial respiratory quotient was low (mean 0.71 in 13 cases) which was interpreted as a lipicid type of metabolism and a disorder in
the glucidic metabolism, with a likely decrease of muscle glycogen. Some of the electrocardiographic and vectorcardiographic patterns are due to increased right ventricular work resulting in hypertrophy of the wall, septum, and crista supraventricularis. The tracings are those of the classical type and offer no problems in interpretation.

In many of the authors’ cases, results of cardiac catheterization, coronary circulation, and metabolic studies were normal, but electrocardiographic tracings indicated right ventricular hypertrophy according to classical criteria. In these cases, the vectorcardiogram often was less abnormal than the scalar tracings.

LEWY


The re-entry hypothesis as a mechanism for a formation of extrasystoles was tested on the exposed hearts of 10 dogs. The heart was paced with pacing wires attached to the right atrium and a small, silver coil was used to vary the temperature of a focal area of the left ventricle. When the outer portions of the ventricular wall were cooled, the effective refractory period under the coil lengthened and resulted in a marked increase in the temporal dispersion of recovery between the endocardium and the epicardium. When sufficiently premature stimuli were applied to the atrium, the ventricular response reached the endocardial surfaces normally but encountered refractory muscle under the coil on transit to the epicardial surface. In the junctional region between warm and cool myocardial muscle mass, propagation of the early response was markedly delayed and, near the epicardial surface, it was finally blocked. The authors concluded that cooling of a discrete region of the left ventricle created the necessary conditions for re-entry and that extrasystoles resulting from re-entry were produced. They further concluded that the experimental observations provided support for the view that nonuniformity of excitation can be a factor of major importance in enhancing the propensity of a heart to a formation of extrasystoles and ventricular fibrillation. The data further suggested that the junction between areas of different refractory periods with-

in the ventricle may demonstrate behavior similar to that of a normal A–V node.

KARPMAN

PULMONARY DISEASES


In 43 patients in shock, initially thought to be caused by pulmonary embolism, rapid bedside venous cardiac catheterization was performed to evaluate right heart pressures. The intracardiac electrocardiogram, monitored with an oscilloscope, was utilized for location of the catheter tip. In 19 of the 43 patients, shock was caused by pulmonary embolism. In the remaining 24 patients, it was secondary to septicemia, myocardial failure, pulmonary emphysema, and other causes. In order to benefit from life-saving surgical therapy, patients with massive pulmonary embolism must be distinguished from those with nonlethal embolism. Patients with massive pulmonary embolism had mean right atrial pressures of 12 mm Hg, mean right ventricular pressures of 29 mm Hg, and mean pulmonary arterial pressures of 32 mm Hg. In patients with nonlethal pulmonary embolism and those with shock from other causes, pressures were lower, although there was some overlap. Chronic pulmonary hypertension was, with this method, indistinguishable from massive pulmonary embolism.

THILENIUS


A case of isolated, acoustically silent stenosis of the right mainstem pulmonary artery is described. The mechanism responsible for the silence of the lesion is demonstrated to be the cessation of antegrade flow of blood through the stenotic area and retrograde filling of the poststenotic segment through anastomosis between bronchial collaterals and the involved pulmonary artery.