ABSTRACTS

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PHYSIOLOGY


Purkinje fibers of sheep and dog hearts were placed in sodium-deficient solutions and were then utilized for studying the voltage dependence of the potassium conductance by measuring current-voltage relationships of the membrane. In solutions with a high concentration of potassium, the conductance to small currents increased four to five times and the current-voltage relationship was S-shaped in character. Hyperpolarizing currents increased the membrane conductance whereas depolarizations to about minus 30 mV. decreased the conductance; however, on further depolarization, the conductance increased again. The authors concluded that the value of the potassium conductance was consistent with a constant potassium permeability as defined by the constant field theory as long as the membrane potential was close to the potassium equilibrium potential. In addition, anomalous rectification was present in Purkinje fibers, delayed rectification was present during large depolarizations, and the depolarization which was similar in amplitude to the action potential produced an initial fall in potassium conductance followed by a small slow rise.

Karpman


The effectiveness of cardiac massage was measured in 12 anesthetized dogs. Cardiac output was estimated by changes in plasma conductivity of blood drawn from the femoral artery through an electronic platinum cell. After control outputs were estimated, determinations were made with the chest open. The hearts were electrically fibrillated and in 3 minutes cardiac massage begun at a rate of 60 per minute. Cardiac outputs were obtained during massage of the fibrillating hearts. These were repeated after restoration of normal sinus rhythm by electrical defibrillation. All outputs were completed within a 30-minute period. Control outputs of 182 cc./Kg./min., were reduced to 78 cc. by simply opening the chest. During massage, it averaged 51 cc. and with return of normal rhythm, 71 cc./Kg./min. Mean blood pressure averaged 144 mm. Hg in the control animals; 105 in the open-chest; 70 during massage; and 90 after re-establishment of normal rhythm. Heart rates were 175 per minute in the intact animals; 151 with the chest open; 60 during massage; and 137 after defibrillation. Right jugular vein to left femoral artery circulation time was 6 seconds in the control group; 7.8 in the open-chest; 14 during massage; and 9 seconds with return of normal rhythm. A 50-per cent reduction in cardiac output was induced by opening the chest of the anesthetized dog. A further reduction of 25 per cent was noted during massage of the fibrillating heart. This cardiac output, 51 cc./Kg./min., was approximately 60 per cent of the resting cardiac output of the human subject.

Kaltman

Antipyrine and its iodinated derivative I131 antipyrine have been used for blood flow determinations because of their inertness and rapid diffusibility into body water. The authors utilized I131 antipyrine to measure coronary blood flow simultaneously with the nitrous oxide method in anesthetized dogs. Good agreement between the two technics was demonstrated. Advantages of the I131 antipyrine technic include: speed, less blood letting, patient cooperation and mouth-piece breathing are not required, and simple well-counting or direct recording of the isotope replaced manometric analysis of nitrous oxide. Initial studies in man have shown similar results.

Rakita


Previous studies have shown that the rate at which the ventricular myocardium clears RB86 from arterial plasma closely parallels myocardial blood flow, and that flow to the ventricles can be predicted by this technic with a mean error of about 6 per cent. In the present study RB86 was infused at a continuously decreasing rate over a 10-minute period. Mean arterial RB86 was continuously monitored during the infusion, and the cardiac output was determined after 5 minutes by dye curves. The animals were then sacrificed, and specimens from both atria were analyzed for RB86 content. An average of 10.9 per cent of the total isotope taken up by the heart was present in the atria, and of this 39 per cent was in the left atrium, 45 per cent in the right atrium, and the interatrial septum contained the remainder. The total atrial clearance ranged from 7.1 to 16.5 per cent and constituted a larger portion of the total myocardial uptake in animals with a low output. The actual clearance rates averaged 0.40 ml. blood/Gm./min. When the cardiac output was low the clearance per gram of tissue exceeded that found in the ventricles, suggesting that when the animal is in poor condition atrial flow is better maintained than is ventricular flow.

March


Although oxygen utilization by the heart is not consistently related to external mechanical work, a linear correlation does exist in the isolated heart between oxygen consumption and

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the product of mean systolic arterial pressure and heart rate or the systolic ejection period. In 40 experiments performed on 22 anesthetized dogs under varying hemodynamic and anesthetic conditions, the authors found the same correlation to exist in the intact animal.

Helwig


Experiments performed in mongrel dogs indicated that when either heart rate or systolic intraventricular pressure was increased independently, an ionic alteration occurred and a net potassium loss appeared to be a biochemical result of the altered state of the myocardium. The amount of the potassium loss approximated that seen with a dose of digitalis, suggesting that the observed loss of potassium may be related significantly to the observed hemodynamic phenomena.

Kalmansohn


Venous tone in the forearm is here defined arbitrarily as the rate of venous pressure rise in mm. Hg per ml. of forearm inflow. Venous pressure and forearm flow by plethysmography were monitored simultaneously during the intravenous or arterial infusion of humoral agents. Epinephrine by either route caused conspicuous venoconstriction shortly after an initial arteriolar dilatation. This venoconstriction appeared at about 35 seconds and is thought by the authors to cause the increase in stroke output and pulse pressure noted at this time interval after intravenous epinephrine administration. Norepinephrine and spontaneous pheochromocytoma discharge caused first arteriolar and then venous constriction at 20 and 45 seconds, respectively. Isoproprynorepinephrine caused arterial and venous dilatation. The effect of 5-hydroxytryptamine intra-arterially resembled that of epinephrine, including venoconstriction. Histamine intra-arterially first dilated arteries and then caused venoconstriction. Amyl nitrate dilated arteries and veins, resulting in a sharp decline of forearm venous tone and an increase in flow. This supports a peripheral site of action of nitrates in "nitrite fainting" and in the relief of angina pectoris.

March


In acute pancreatitis, potent vasodilator substances are released into the plasma from globulin precursors. These may produce changes in capillary permeability and vasomotor collapse. Together with loss of plasma into the peritoneal cavity, this may be an important factor in the observed clinical hypotension. Acute pancreatitis was induced in dogs and their blood analyzed for vasoactive substances. A biologic assay measuring the tension developed in a dibenzylyzed ox carotid strip correlated with a more tedious chemical method and was used in this study. The vasoactive material released in pancreatitis has the properties of bradykinin or allied polypeptides. By use of this method, 15 normal human controls were free of these vasoactive substances. Thirty patients with acute pancreatitis all demonstrated material with the biologic activity of bradykinin. One patient, with recurrent pancreatitis, revealed a rise of this polypeptide during several exacerbations. Trasylol, a polypeptide from the submandibular gland, has antitryptic and antikallikrein properties. Studies with induced pancreatitis in experimental animals revealed doubled survival times with this therapy. Plasma levels of vasoactive substances depressed during Trasylol rose when this substance was discontinued. Clinical experiences are still preliminary.

Kaltman


In nine rabbits air was injected rapidly into both lateral cerebral ventricles under local anesthesia; this always caused cardiac arrhythmias and, in eight animals, marked elevation of the ST segment in some leads with reciprocal ST depression in other leads. The ST depression usually appeared only after repeated injections. In these rabbits the concentration of epinephrine in the heart was 220 per cent of that in five control animals subjected to the entire experimental procedure with the exception of air injection, while the concentration in the adrenal glands was only 60 per cent. Cardiac norepinephrine was also increased, but this increase was not significant statistically. In the two animals in which ischemic ST displacement did not appear or appeared later, the myocardial epinephrine was only slightly elevated. The conclusion
is made that the ischemic changes were due to direct effect of myocardial catecholamines rather than to coronary vascular spasm.

Lepeschkin


Whether the heart enlarges by cellular hyperplasia or hypertrophy (or both) has remained unsettled due to the inherent difficulties of light microscopy in the evaluation of mitoses or the size of myofibrils. To circumvent this problem, the authors studied deoxyribonucleic acid (DNA) (located within the cell nucleus) and ribonucleic acid (RNA) (largely cytoplasmic) concentrations in rat hearts that were enlarged as a result of iron- and copper-deficiency anemia. Statistically significant increases in mean heart weight, decreased DNA concentration, increased RNA to DNA ratio and increased total RNA and protein content were found in the hearts of the anemic rats compared to the control animals. The data, therefore, indicate that cardiac enlargement in the experimental anemic rats resulted from an increase in the size of the myocardial cell.

Helwig


Extracellular potassium may be lowered either by dialysis which removes potassium from extracellular compartments or by administration of glucose-insulin solutions which transfer potassium to the intracellular compartment. Both methods are employed clinically in the treatment of hyperpotassemia. The current animal study was designed to evaluate both technics on the electrical activity of the heart. Normal mongrel anesthetized dogs with normal serum potassium were subjected to hemodialysis alone, administration of insulin and glucose alone, and combinations of the two procedures. Serum potassium and electrocardiographic changes were determined. Both methods resulted in similar extracellular potassium changes and electrocardiographic changes, but there was no significant correlation between the electrocardiogram and absolute plasma potassium concentration. Maximal plasma potassium decreases occurred after 2 hours of dialysis of insulin glucose infusion. Administration of insulin-glucose after dialysis caused no further potassium decrease, but the reverse tech-


Eleven dogs were perfused by the technic of Drew and then subjected to varying degrees of hypothermia. Both a heart exchanger and immersion were utilized to minimize temperature gradients. The systemic circulation was maintained by a pump and reservoir system but the pulmonary circulation was short circuited and ventilation arrested. Blood was analyzed for oxygen saturation, Pco2, pH, and lactic acid. In all the experiments progressive desaturation and increasing metabolic acidosis occurred, but the latter was temporarily delayed as long as the oxygen saturation did not drop to zero. Resumption of ventilation and circulation was accompanied by a marked increase in metabolic acidosis. The latter phenomenon is attributed to the observation that reduced hemoglobin is less acid than oxyhemoglobin and hence binds hydrogen ions originating from the hydration of carbon dioxide molecules which are liberated again when the blood is resaturated.

Helwig

Pulmonary Diseases


Changes in the arterial pressure during the first 6 to 8 minutes after exercise in individuals with pulmonary hypertension from various causes are reported. In primary pulmonary hypertension there was a decrease in the arterial pressure at the beginning of work. With patent ductus arteriosus there was a continuous rise of the systemic pressure, reaching a constant level after 2 to 3 minutes of work. With mitral stenosis one patient showed an initial decrease of the systolic and diastolic systemic pressures. The remainder (four patients) showed an increase. The relationship of the observed changes to the blood volume distribution is discussed.

Rakita

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Cattle who have developed brisket disease (congestive heart failure due to severe pulmonary hypertension) at altitudes of 8,000 to 11,000 feet in the mountain ranges of Utah sometimes recover on being returned to Salt Lake City (elevation 4,500 feet). Detailed hemodynamic studies were made following recovery in 14 animals of a group of 42 in which studies had previously been obtained during acute brisket disease. The results were as follows: All clinical features of the disease (including limited exercise tolerance, excessive weight gain, diarrhea, engorged pulsating jugular veins, accentuated pulmonary second sound, precordial pansystolic murmur, gallop rhythm, and brisket edema) disappeared. The mean pulmonary artery pressure decreased from 63 to 32 mm. Hg. The mean pulmonary artery wedge (indirect left atrial) pressure decreased from 23 to 12 mm. Hg. The mean right atrial pressure decreased from 21 to 0 mm. Hg. The cardiac index increased from 4.9 to 6.1 L. The pulmonary vascular resistance decreased from 12.3 to 3.8 units. Evidence from this and previous studies supports the hypothesis that pulmonary hypertension in brisket disease results from exaggerated hypoxic pulmonary vasoconstriction. Determinants of the disease other than hypoxia remain to be elucidated. The elevated pulmonary artery wedge pressure is not invariably a reflection of left ventricular failure.

MARSHALL

RENAI AND ELECTROLYTE EFFECTS ON THE CIRCULATION


Renal angiography in dogs during epinephrine-induced hypertension disclosed marked narrowing of the renal arteries at a point 2 to 4 cm. from the aorta. The proximal arteries and aorta were dilated and hyperpulsatile, while the circulation through the kidneys was reduced as indicated by the delayed and faint nephrographic phase. This arterioconstrictive effect could be overcome by high pressure injection of the medium into the renal artery or counteracted by the intravenous administration of Hydergine, an adrenolytic drug. Similar studies in man were thought desirable.

ROGERS


Daily subcutaneous injections of stilbestrol or progesterone were given to dogs and the effect of the substances on the renal responses to vasopressin and oxytocin were noted. The estrogens were found not to affect the antidiuretic effects of vasopressin and oxytocin, but did modify the effect of the substances on electrolyte excretion. Progesterone was found to have no effect on water or electrolyte excretion nor did it affect the responses to vasopressin and oxytocin. When both drugs were given simultaneously, the effects were similar to those seen when stilbestrol was administered by itself. The authors concluded that estrogen was primarily affecting sodium retention by acting on the tissues more than on the renal parenchyma and that its tendency to change the response to vasopressin and oxytocin may have been related to an increased sensitivity of the renal vessels to the constrictor properties of vasopressin and oxytocin. Renal denervation did not affect the responses noted to oxytocin and vasopressin.

KARPMAN


The development of the radioactive renogram test was described, and a current technic was summarized. Approximately 15 μc. of 131I in 5 mg. of radiohippuran were given intravenously, and the renal uptake was recorded for 25 minutes from twin scintillation counters placed over the kidneys. The initial phase of the renogram was thought to represent vascular capacity of the kidney, but the radioalbumin renogram has since been found to be of lesser magnitude than that of radiohippuran; hence it appears that only the first 15 seconds of the tracing is purely vascular in origin. Renal radioactivity reaches a peak at about 4 minutes following injection, representing principally tubular secretory activity. This peak is low in chronic renal disease including essential hypertension. Then the curve falls for about 20 minutes, the latter portion indicat-
ing excretory function since the decline is delayed by lower urinary obstruction. In five patients with unilateral renal disease and hypertension, the renogram showed lowering of the secretory phase and often of the initial uptake; these results correlated well with other kidney studies but did not supplant any of them. The renogram was regarded as a simple, safe adjunct to the study of renal function, providing qualitative though unique data.

RHEUMATIC FEVER


An attempt was made to confirm a previous diagnosis of rheumatic fever in ambulatory patients referred to the Cardiac Consultation Clinic of the New York City Department of Health. One hundred consecutive cases with a history of rheumatic fever or rheumatic heart disease were analyzed. Detailed histories of the previous disease episode were compared with the modified Jones criteria. Parents, private physicians, and hospital summaries were used to amplify the clinic history. Emphasis was placed upon signs and symptoms rather than etiologic diagnoses of previous observers. When any source of information confirmed the presence of appropriate major or minor manifestations of rheumatic fever according to the Jones criteria, a diagnosis was considered verified. Sixty-two boys and 38 girls between the ages of 6 and 20 years were studied. In 46 of 100 patients, the parents supplied sufficient evidence and in 20 were the only source of information. Physicians' responses in 88 instances satisfied the Jones criteria in 45 patients. In only 14 were physicians the sole source of data. One hundred and thirteen hospital summaries confirmed the diagnosis in only 19 instances. On the basis of this survey, only 65 per cent of children referred to the clinic with a history of rheumatic fever or rheumatic heart disease met the standard criteria for diagnosis of the previous disease episode. The diagnosis could not be verified in 25 per cent of the patients with a history of rheumatic fever and no heart disease. Parents appear to be the most available and reliable source of information. Clinical over-diagnosis was frequent. Detailed history and comparison with accepted criteria still remain an important factor in the evaluation and management of children suspected of having had rheumatic fever.

KALTMAN

ROENTGENOLOGY


Simultaneous tomography was used in the lateral view to demonstrate calcification in the aortic and mitral valves. Calcifications were successfully demonstrated in 29 out of 40 patients in whom this finding was verified by operation. The deposits in the remaining 11 patients were less than 1 to 2 mm. in diameter.

KALMANSONH


Cerebral angiography is the most accurate means of diagnosing intracranial aneurysms. The site, size, and number can be visualized by present technics in almost all instances. Intracerebral or subdural bleeding of moderate size can be shown with relative ease, but localized subarachnoid hematoma cannot be distinguished from intracerebral accumulations. Multiple aneurysms are present in about 14 per cent of patients. Angiography confirms the earlier observations that congenital aneurysms occur at sites of bifurcation or about the circle of Willis and only rarely on the intracranial vertebralbasilar arterial tree. Aneurysms may be of atherosclerotic, dissecting, angiomatosus, infective, or traumatic origin as well as congenital. Some large and unruptured aneurysms mimic neoplasms, compressing cranial nerves, causing hydrocephalus, and rarely, epilepsy.

March


A correlative study is presented which compares among 90 patients, 100 unequivocally positive phlebograms with the clinical findings. In the patients with lower leg thrombosis, 81 per cent of the patients had tenderness over the major veins, 70 per cent had swelling or induration, 44 per cent had a positive Homans' sign, and the sphygmonanometer cuff test was positive in 75 per cent. In femoral vein thrombosis, 91 per cent had vein tenderness, 86 per cent had swelling, the cuff test was positive in 50 per cent, and Homans' sign was present in 60 per cent. In iliofemoral thrombosis, iliac and femoral vein tenderness was present in 93 per cent, swelling was present in 100 per cent, Homans'
sign was present in 48 per cent and the cuff test was positive in 57 per cent. It is important to note that in 15 of the 34 patients with iliofemoral thrombosis there was little or no phlebographic evidence of involvement distal to the proximal portion of the femoral vein, in 16 of them there was cyanosis of the horizontal extremity, and that the venous pressure, when measured, was uniformly elevated. The venous pressure generally correlated well with the extent of involvement. It was concluded that the site of tenderness, the extent of the swelling, and the venous pressure correlated well with the extent of thrombosis, whereas Homans' sign and the cuff test were frequently falsely negative, regardless of the site of thrombosis.

SANCETTA


In 36 patients with mitral stenosis pressures were measured in the right ventricle, the pulmonary artery, and pulmonary capillaries, and the findings compared with those of over-all radiograms, tomograms in the frontal and sagittal planes, as well as angiograms. No close correlation was found between the size of the pulmonary artery branches and the severity of pulmonary hypertension. In the early stages of the disease no vascular changes due to pulmonary hypertension could be demonstrated by means of tomography. Selective angiography is the best method for the demonstration of such changes. Septal lines increase in their frequency with the severity of pulmonary hypertension but without reference to other radiologic changes. They are not an accurate measure of this condition.

LEFESCHKIN


A technic for coronary angiography is described. Correlation of the clinical symptomatology and the electrocardiograms revealed that in a group of five patients with angina pectoris, a history of previous cardiac infarction, and electrocardiographic abnormalities diagnostic of myocardial infarction all showed obstruction in the coronary arteries. A second group of four patients with angina pectoris, previous myocardial infarction, and pathologic ST-segment or T-wave changes at some period showed obstruction of the coronary arteries in three and no obstruction in one. A retrospective view of the history in this latter patient suggested that pulmonary infarction would have been a more likely diagnosis. In a final group of 10 patients with typical angina pectoris and no previous history of myocardial infarction, but with ST-segment or T-wave changes in the electrocardiogram during rest or during an exercise tolerance test, the presence and absence of obstruction occurred with equal frequency. Four of these five patients without obstruction had clinical diagnoses compatible with the pain of angina and pathologic ST-segment or T-wave changes in spite of the absence of coronary artery obstruction. Of 23 patients with typical coronary pain eight had no visible coronary artery obstruction by angiography. The clinical diagnoses in these eight patients included hypertension, myocarditis, aortic stenosis, chronic bronchitis, and pericarditis. Correlation of the electrocardiographic and angiographic findings in 40 patients revealed that in two of nine patients with normal electrocardiograms obstruction was demonstrable by angiography. In addition, in two of five with pathologic ST-segment or T-wave changes on exertion only, in eight of 20 with pathologic ST-segment or T-wave changes at rest, and in five of six with pathologic Q waves, coronary artery obstruction was demonstrable by angiography. In a series of 140 coronary angiographies the only complication reported was hypotension with an associated ventricular tachycardia in one patient.

Rakita


There has been disagreement in the literature regarding the existence of a quantitative correlation between the physiologic and roentgenographic parameters in the patient with an atrioseptal defect and a left-to-right shunt. Seventy-seven patients with secundum type defects proved by cardiac catheterization were studied. Thirty control subjects were utilized. The routine 6-foot anteroposterior chest films were gradual as to pulmonary vascularity in six zones, upper, middle and lower on the left and right by three examiners. With this technie, a definite correlation between the radiographic appearance of the pulmonary vessels and the pulmonary-to-systemic flow ratio was found. The findings can be explained by Burton's critical closing pressure con-
cept which makes it likely that in the normal subject many of the apical pulmonary arteries are collapsed and with a left-to-right shunt these will be the first to open and hence be visible radio graphically. Hence, localized upper zone plethora is of value in the diagnosis of small atrioseptal defects and plethora throughout the lung fields would indicate a large shunt.

**Helwig**


In 60 persons the coronary vessels were injected at autopsy with a radiopaque substance and the roentgenologic findings compared with the anatomic findings. The roentgenologic patterns found in coronary sclerosis are reviewed. Diffuse sclerosis is difficult to recognize, but a serrated outline and band-like filling defects are among its most important signs, while tortuosity and ectasia are less specific. Localized sclerotic plaques can be seen as localized filling defects if more than one direction is used. Radiological diagnosis of coronary sclerosis was correct in 85.5 per cent of the cases. Intercoronary anastomoses could be demonstrated in every heart.

**Lepeschkin**


Cerebral angiography is an important tool in the diagnosis and evaluation of stroke patients. There are two main angiographic technics to study the neck and cerebral circulations. Direct methods consist of injecting the contrast substance in the carotid or vertebral arteries; the artery can be punctured by the percutaneous technic or exposed surgically. Indirect methods consist of catheterizing percutaneously or through an incision a peripheral artery (subclavian, brachial, or temporal) and reaching the origins of the cerebrovascular tree, by injecting the contrast substance in a retrograde fashion. Direct technics have been associated with a fair number of complications: extravasation of dye, hematoma of the neck, and transfusion of the artery leading to acute occlusion. The retrograde right brachial injection fills the innominate, the carotid, and the vertebral arteries. In a low percentage of patients the contrast material crosses the aortic arch and the left carotid artery can be visualized. If the left carotid artery is compressed during the right brachial artery injection, all the intracranial and half the cervical structures are opacified. This technic carries very low morbidity and has been used in the study of more than 500 patients. It provided enough information to make further investigation uneccessary.

**Lopez**


Morphology remains the foundation by which radiologic diagnosis is most firmly based. However, mechanical and chemical methods of altering the physiology of the cardiovascular system may greatly increase the value of the roentgen examination. Rapid injection of opaque dyes into the cardiac chambers may temporarily reverse the flow and allow visualization of an interventricular septal defect. Dye may be forced into the aorta from a peripheral artery. Balloon occlusion of arteries and major veins allows selective opacification of specific vascular segments such as the coronary or mesenteric arteries. Elevation of the intrabronchial pressure by the Valsalva maneuver or under anesthesia allows layering of the contrast media at the level of the coronary arteries. Chemical methods may be employed to produce hypotension which may prove helpful in renal arteriography. Acetylene may be utilized to produce temporary cardiac arrest to facilitate coronary arteriography. Thus, a variety of mechanical and chemical methods are available to add the dimension of function to morphology in roentgenographic examinations.

**Helwig**


Methods for obtaining selective angiocardiograms and aortograms in critically ill newborn babies are described. Ten infants from 1 to 10 days of age were studied. Three deaths occurring within 24 hours of the procedure were thought to be due to the underlying disease. A contrast media-filled plastic tube was introduced into the umbilical vein. In the older infants, with atrophied cords, a skin incision was necessary to isolate the vein. The catheter usually could be passed through the ductus venosus into the inferior vena cava and right atrium. Advancing
through the foramen ovale, injection of contrast media into the left atrium was performed for left-heart visualization. The catheter then could be withdrawn for injection into the right heart for studies of the right heart. For aortography one of the unibilical arteries was isolated and a catheter passed through it into the iliac artery. It then was advanced into the abdominal aorta and, subsequently, the ascending aorta for injection of contrast media. These methods allow for studies of critically ill newborns without cut-down and dissection or anesthesia. The size of the vessels employed makes possible the introduction of relatively large-caliber catheters for injection of contrast media or for intracardiac pressure measurements and blood sampling. If the ductus venosus cannot be traversed, injection of contrast media into the unibilical vein may be adequate for cardiac visualization. However, flow through the foramen ovale and simultaneous opacification of both left and right atria limits interpretation of these films. Selective angiocardography, when possible, is a more precise diagnostic technic.

KALTMAN


The authors review the clinical and angiocardiographic data of 14 selected patients with various systemic arteriovenous fistulas encountered at the New York Hospital over a 12-year period. Although satisfactory films were obtained in many of these patients by venous angiocardiography, the authors agree that selective arteriography will provide more definite information. Eight of the 14 patients had congenital fistulas; the remainder were traumatic (including introgenic) in origin.

HELVIG


Flow in the extramural coronary arteries can be studied by means of coronary arteriography only in the naturally beating heart and by use of injection into the left ventricle or aortic bulb. Acetylcholine standstill creates abnormal conditions, while injection into a single coronary artery causes abnormally high perfusion pressures. Under natural conditions flow into the extramural portions of the coronary arteries takes place in systole as well as in diastole. In systole flow from the extramural to the intramural vessels ceases, due to compression of the latter, and is resumed in diastole. In the isometric phase of systole the extramural branches may become blurred due to movement and angulation of the vessels, while in the ejection phase the coronary arteries become tortuous; this is a normal finding and not the result of coronary sclerosis. Tortuosity during diastole, however, is a sign of coronary sclerosis, especially when filling defects near the coronary wall are present. Anomalies in the course of the coronary vessels are of importance in transventricular surgery. A single coronary artery was found in six of 188 patients subjected to coronary angiography. Important anastomoses between the two coronary arteries are often found in unilateral ventricular hypertrophy, and their location is also important in transventricular surgery. The definition of the vessels can be improved considerably if coronary dilators (such as persantin) are injected prior to coronary arteriography.

LEPESCHKIN

Surgery and Cardiovascular Disease


Cerebral blood flow determinations (nitrous oxide extraction) were performed in 62 resting subjects with known episodes of cerebrovascular insufficiency due to extracranial arterial or basilar artery obstruction, at a time when no neurologic deficit was demonstrable. An attempt was made to correlate the parameters usually measured in such studies with the severity of the clinical manifestations. Arteriograms were also obtained in most instances. There was a significant reduction in cerebral blood flow and cerebral oxygen uptake, with a significant increase in cerebral vascular resistance, in the following categories of patients: those with occlusive or stenotic lesions of the great vessels arising from the aortic arch, or with bilateral stenotic lesions of the common or internal carotid arteries at the bifurcation, associated with similar lesions involving the vertebral-basilar systems. These patients were all severely incapacitated by the frequency and severity of their attacks, and their lesions usually involved a large proximal vessel or vessels arising from the arch. In contradistinction, the above parameters were usually within normal limits in patients with lesions limited
to the carotid bifurcations, patients with intracranial carotid or basilar involvement only, symptoms of insufficiency with negative arteriograms, and those who were asymptomatic except for the presence of loud carotid bruits. In those patients having successful endarterectomies, postoperative flow studies demonstrated a return to normal values.

SANCETTA


Reports by other authors had indicated that the use of low-molecular-weight dextran (average 41,000) in open-heart surgery was not associated with increased postoperative bleeding. The present study of 29 patients undergoing open repair of a septal defect confirmed these reports. However, in the 10 patients in whom more than 20 ml per Kg. of dextran was used in the pump oxygenator, a significant increase in average operative blood loss was found. This was attributed in part to a dilution effect, and no change in simple tests of blood coagulation was observed. It was believed that this subject deserved further investigation and, meanwhile, dextran in doses of 20 ml per Kg. or more should not be used.

ROGERS


An irreparably regurgitant mitral valve was replaced by a ball-valve prosthesis in five adult patients between September 1961 and December 1962 at the University of Alberta Hospital. The first patient died 10 weeks postoperatively of emboli from a left atrial thrombus, anticoagulants not having been administered. The fifth patient died similarly 4 weeks postoperatively, inadequate coumarin therapy having been given. The remaining three patients receivedacenocoumarin (Sintron) beginning 4 days after surgery, and all had a satisfactory course during the subsequent 2 to 8 months. It was concluded that the Starr-Edwards valve was useful in the treatment of destructive mitral valve disease and that chronic anticoagulation was an imperative adjunct.

ROGERS


Fifty anesthetics were administered for the insertion, exploration, or removal of a cardiac pacemaker in treatment of Stokes-Adams attacks. Premedication included atropine, 0.6 mg., as an antiallogogue; hydrocortisone hemisuccinate, 100 mg., before and after the operation if corticosteroids had been received; morphine, 10 to 15 mg., or a similar drug if needed to control nervousness. When the heart was already adequately paced (by an intravenous electrode catheter in all except four patients), an anesthetic sequence of thiopentone, 100 to 150 mg., endotracheal intubation, nitrous oxide and oxygen, halothane was found to be simple and safe. When pacing was unreliable, great care was necessary during thiopentone induction and nitrous oxide-oxygen alone was thought best. Suxamethonium, 50 mg., was given for muscle relaxation. Electrocardiographic monitoring was essential throughout the procedures since ventricular asystole or arrhythmia was a constant possible hazard. Five patients died within 10 days of operation, four of them from ventricular dysrhythmia.

ROGERS


Three patients with proven cor triatriatum are presented in detail. The age of onset and the severity of symptoms were found to be related to the degree of obstruction to left atrial emptying. Two of the three patients died in congestive heart failure, but the third patient was a 16-month-old boy who was successfully operated upon 3 years prior to the present report. The authors concluded that if the wedge pressure was high, irrespective of whether the diagnosis was mitral stenosis or cor triatriatum, surgical exploration should be carried out as soon as possible with the surgeon prepared to deal with an obstructing band under direct vision with cardiopulmonary bypass. They warned that a diagnosis of primary pulmonary hypertension should never be made without a normal wedge pressure or unequivocally normal left atrial pressure and angiogram.

KARPAN


Gastro-duodenal erosions or ulcerations were diagnosed in 129 (3 per cent) of 4,670 patients operated upon at the Surgical Clinic in Dusseldorf, Germany. The highest incidence was noted after...
correction of an aortic coarctation (ulcer rate of 7 per cent), after operations utilizing extracorporeal circulation for cardiopulmonary bypass (6 per cent) and after operations under general hypothermia (4.5 per cent). Among the 129 patients who developed these ulcerations following cardiovascular surgery, 52.7 per cent were below the age of 15 years. Continuous measurements of the gastric juices were obtained during a variety of cardiovascular operations and clearly demonstrated an increased acid and peptic activity, which seemed to vary in extent and frequency, depending upon the type of surgical procedure. The author concluded that a decrease in the viscosity of the gastric juices accompanied by an increase in acid and pepsin production may be the etiological factors behind the development of these gastrointestinal ulcerations following cardiovascular surgery.

Karpman


The use of electrically induced ventricular fibrillation in 47 patients having open-heart surgery was described. Fibrillation produced a quiet operative field and, as its chief merit, prevented air embolism. It was readily induced by a small 110-volt unit that delivered an 0.5- to 6-volt alternating current to the right or left ventricle. Spontaneous defibrillation tended to occur when the current was discontinued. At the termination of the operative procedure, after 13 to 123 minutes of fibrillatory arrest, the heart in each instance resumed beating, although countershock was required in 29 patients. In no instance was there clinical or electrocardiographic evidence of harmful effects having resulted from the fibrillation. This type of arrest was used principally in the repair of atrial or ventricular septal defects and of mitral valve disease, and 43 of the 47 patients survived. The authors concluded that fibrillatory arrest was a valuable adjunct in many types of open-heart operations and went on to employ it in a further 42 patients.

Rogers


Two children and one adult showed a fistula between a greatly dilated coronary artery and the right ventricular cavity; in one case the artery involved was the right coronary, in the second it was the left coronary, while in the third it was a single coronary artery that showed anastomosis to the pulmonary infundibulum. The systolic-diastolic murmur present in all cases resembled that found in persistent ductus arteriosus, a perforated sinus Valsalvæ aneurysm or an interventricular plus interatrial communication, but the correct diagnosis could be made by means of coronary angiography through direct puncture of the left ventricle. The most serious operative complication is myocardial ischemia due to ligation of the artery above its terminal branches; this danger is present especially if the artery has a long intramyocardial course. Thus, the first patient died suddenly 24 hours after the operation, and autopsy showed an area of myocardial ischemia, while the second patient developed the electrocardiographic signs of posterior myocardial infarction after the operation. The best way to avoid such complications would be to ligate the fistula on the endocardial side, using open-heart surgery.

Lepeschkin


One of the usual responses of patients undergoing major surgical procedures is the retention of water and sodium by the kidney in the immediate postoperative period. Water and electrolyte excretion data were obtained in 44 patients surviving open-heart surgery with total cardiopulmonary perfusion bypass. In 38 patients the usual water and electrolyte pattern was observed; in the remaining six there was an early and profuse postoperative diuresis. In four the urine was hypertonic, and in two it was isotonic or hypotonic to plasma.

Sancetta


Nine patients underwent surgery for treatment of aortic regurgitation. In seven, this was a primary lesion. Destruction of leaflets due to calcific aortic lesions necessitated replacement of a cusp or valve to avoid regurgitation in the other two. Two deaths occurred. One was attributed to inability to resuscitate the heart after 2 hours of hypothermia in an 18-year-old boy. The other was caused by failure of the suture line in a 49-year-old man with Marfan's syndrome who had extensive resection of an aortic aneurysm and attempt at bicuspization of the valve. Various types of valve reconstruction were used in this series of patients. Artificial prostheses were avoided as much as possible and
limited when necessary. Single or multiple cusp elongation or excision of a cusp with plastic replacement was achieved in five patients. Autogenous pericardium was used in lieu of plastic material in one patient. Simple plication of the free edge of fused coronary cusps, bicuspidization, and total valve excision with homograft replacement were other methods of correction employed. The need for an efficient perfusion to maintain arterial oxygen saturation is stressed as a prerequisite to this type of open-heart surgery. Further protection of the myocardium by selective hypothermia and adequate coronary perfusion is desirable.

KALTMAN


Six patients with ostium primum atrioseptal defect and one with left ventricular-right atrial canal were successfully treated by open-heart surgery at the University of Saskatchewan. Their ages ranged from 5 to 46 years, and all except the youngest were symptomatic. The most constant physical sign was a loud pansystolic murmur at the third and fourth interspaces near the left sternal edge. All patients except the one with pulmonary hypertension had electrocardiographic left axis deviation with a right ventricular hypertrophy pattern in the chest leads. Evidence of the left-to-right atrial shunt was regularly observed in chest roentgenograms and at cardiac catheterization. Surgery was carried out by a right anterior chest-right atrial approach. The cleft in the mitral leaflet was sutured together and the atrioseptal defect patched with dacron. At least two patients had residual cardiac difficulty; one had complete heart block which was to be treated with an artificial pacemaker, and one had cardiomyopathy of unknown cause.

ROGERS


The risk of increased bleeding in patients on phenylindandione therapy during surgery was evaluated. An increased sensitivity to the anticoagulant was noted during the immediate postoperative period. At this time patients on the average required only about two thirds of the preoperative dose. This was more apparent in patients after cholecystectomy than after gastric resection. Preoperative requirements were re-established by the fifth to eighth postoperative day. There was no significant difference in the blood loss following cholecystectomy in the anticoagulated patients, in the immediate postoperative period, and during the first 48 hours after surgery. The same was true in patients after gastric resection except for a possible slight increased tendency to postoperative ooze. No mortality occurred. It is concluded that patients may be safely operated on during anticoagulant therapy.

Rakita


In this investigation, 15 dogs were studied by means of right and left heart catheterization under local anesthesia, before and after administration of varying levels of halothane anesthesia. Data obtained included intracardiac and great vessel pressures and blood flows. The ventricular function curves, tension-time index per beat, left ventricular stroke power, and mean rate of ejection were calculated. Halothane depressed myocardial contractility in direct proportion to the inspired concentration of the gas, but the authors concluded that the mechanical efficiency of the heart was not altered.

Helwig


Eight hundred forty-five pregnancies complicated by rheumatic heart disease and 64 pregnancies complicated by congenital heart disease were reviewed. Twenty patients underwent valvotomy during pregnancy or during the puerperium, 19 patients had moderate to severe pulmonary congestion preoperatively, and six of these had pulmonary edema. Fifteen patients have remained in good condition without progression of their disease over an average follow-up period of 4.2 years. The authors believe that surgical intervention during pregnancy should be performed if there is evidence of pulmonary edema or recurrent profuse hemoptyses. In the patients with congenital heart disease, there was no maternal mortality and a fetal mortality of 6.2 per cent. Heart failure occurred in only one patient who had pulmonic stenosis. Only rarely did it appear necessary to advise surgery during pregnancy—the authors did not advise it in this series of patients.

Kalmansohn

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Twenty-three patients who had undergone valvotomy for valvular pulmonic stenosis with intact ventricular septum were assessed to determine the incidence of postoperative pulmonic regurgitation. They ranged in age from 2 to 50 years, and the preoperative right ventricular pressures ranged between 50 and 187 mm. Hg. No patient had a diastolic murmur before surgery. In 22 patients the valvotomy was performed under direct vision, during hypothermia or cardiopulmonary bypass. The remaining patient was done by closed transventricular valvotomy. Resection of hypertrophic infundibulum was not performed in any one. All had “striking symptomatic improvement” at the time of re-evaluation, from 6 to 42 months post surgery. The right ventricular systolic pressure was below 50 mm. Hg in all but three, and none was above that figure. In 12 patients pulmonic regurgitation was evidenced by the appearance of a diastolic murmur along the left sternal border. In the remaining 11 patients there was an immediate appearance of large quantities of dye in the right ventricle after pulmonary artery injection. This finding was deemed diagnostic of an incompetent pulmonic valve. Six of these individuals had pulmonic diastolic murmurs as well. The end-diastolic pressures in the right ventricle and pulmonary artery were identical in 11 patients, and in another 11 the pulmonary artery to right ventricular pressure gradient was less than 3 mm. Hg. Reduction in the cardiac silhouette was not striking, and in seven patients the heart size increased. Three of the latter had residual shunts at the atrial level. In contrast, a decrease in the R wave in V1 and normalization of the frontal plane axis occurred in every patient except one with a residual shunt. The conclusion is that pulmonic regurgitation is an inevitable sequel to pulmonary valvotomy, but that it is well tolerated in the absence of a complicating lesion.

MARCH


The pattern of biochemical change seen in simple heart surgery using extracorporeal circulation was demonstrated. Before perfusion, there was a respiratory alkalosis caused by induced hyperventilation. During perfusion, there was lowered pCO2 resulting from good mechanical ventilation. After perfusion there was a mild metabolic alkalosis. In the recovery phase, there was a respiratory acidosis. The sodium concentration showed no significant change. The serum potassium fell with induction of anesthesia and still further after extracorporeal circulation. The phosphorus tended to rise during the operation, while the calcium remained stable. The fall in hematocrit and plasma proteins on perfusion was thought to be due to dilution. The main changes in the electrolytes were thought to be due to alteration in respiratory function.

KALMANSOHN


Four of 10 patients with muscular subaortic stenosis were treated surgically during cardiopulmonary bypass. All had well-marked symptoms, and these were considered to be the principal indicator for operation. Through an aortotomy, a 2-cm. deep incision was made across the hypertrophied septal tissue, and the cut edges were bluntly separated. Left bundle-branch block developed in the case in which this incision was centrally located; nevertheless, good clinical improvement ensued. The incision was made into the anterior extremity of the septal mass in the remaining three patients, two of whom also had good results during months of follow-up. Leftward deviation of the QRS axis without bundle-branch block was observed in all three, due presumably to section of the anterior branch of the left bundle of His. Postoperative hemodynamic and clinical data indicated elimination of left ventricular outflow obstruction and improvement in left ventricular filling. Slight right ventricular outflow and inflow obstruction in all patients persisted, since the associated infundibular hypertrophy on the right side was not directly treated.

Rogers

UNCOMMON FORMS OF HEART DISEASE


Diagnostic features in 40 patients with proved left atrial myxoma, previously unreported, were reviewed and added to those of five patients personally studied. There were 31 women and 14 men averaging 45 years of age with a range of 18 to 69 years. The diameter of the tumors var-
ied from 0.5 to 8 inches, and 32 were pedunculated. All consisted of mucoid material arising from the atrial septum in the region of the fossa ovalis. Clinically, left atrial myxoma stimulates mitral stenosis. In the absence of dyspnea, pulmonary hypertension, or mitral murmurs, the diagnosis is improbable. Syncope or dizziness, resulting from obstruction of the mitral orifice, was present in 25 per cent of the patients. Atrial fibrillation occurred in only six patients. Systemic embolism was noted in 21 of the 45 cases, pulmonary embolism in 13. Coronary embolus was found in two patients with development of myocardial infarction and subsequent heart failure. Fever, weight loss, rapid erythrocyte sedimentation rate, and anemia were common. Clubbing of fingers was seen infrequently, but was an important constitutional finding adding to the difficulty of differentiating tumor from bacterial endocarditis. None of the patients had splenomegaly. Serum proteins revealed an abnormally high gamma globulin in all five cases observed by the author. An additional five of 16 patients tested had similar findings in the remainder of the series. Whether this was a direct effect of the myxoma, a result of emboli, or a reflection of low cardiac output on liver function is not known. The most important factor in diagnosis is awareness of the condition and its clinical manifestations. Selective angiocardiography may be helpful in establishing the diagnosis, but apparent filling defects in the atrium must be carefully scrutinized. When thrombus in situ cannot be excluded, operation under cardiopulmonary bypass may be necessary.

KALTMAN


Two patients are presented in whom radiation is suggested as the cause of myocardial fibrosis. In one patient, death occurred as a result of fibrosis involving the conduction system 23 years after radiation. In another patient, rupture of the apex of the heart occurred 14 months after radiotherapy. Postmortem examination in both of these patients revealed extensive myocardial fibrosis without evidence of significant coronary artery disease.

KALTMANSON

VALVULAR HEART DISEASE


In an effort to correlate cardiac function with symptoms in mitral stenosis, hemodynamic data obtained in 168 patients during 1953 through 1958 were analyzed statistically. Effort intolerance was related to the level of pulmonary artery mean pressure and to the wedge pressure. Symptoms were not related to the cardiac index at rest nor very well to its increase with exercise. Both cardiac output and its increment on exercise were lower in the patients who had atrial fibrillation and in those who had higher pulmonary artery pressures. Myocardial disease could not be incriminated as a cause for the reduction in cardiac output. The "protective" effect of increased pulmonary arteriolar resistance in lessening pulmonary symptoms was associated with an adverse influence on the patient as a whole resulting from the reduced cardiac output.

ROGERS


By use of radioactive P32 in the form of sodium phosphate in dogs, dilution curves were recorded in the pulmonary artery and in the aorta. The ratio between the descending slopes of the curves is represented as a linear function of the ratio between regurgitant mitral flow and cardiac output. It is indicated that the technic does not pretend to resolve the problem of quantitative determination of mitral insufficiency in man. It is suggested that the technic probably permits the diagnosis of valvular insufficiency where the regurgitant flow exceeds 30 per cent of the systemic flow.

RAKITA


A retrospective study was undertaken in 43 patients with congenital aortic stenosis to determine if routine clinical evaluation could provide criteria for selecting patients for left-heart catheterization. The authors accept that a systolic peak gradient greater than 45 to 50 mm. Hg across the aortic valve is an adequate criterion for referring patients to surgery. Since about one half of the patients with mild degrees of obstruction were unnecessarily catheterized, a more accurate clinical evaluation is desirable. The nature, intensity, or abnormal location of the classic systolic ejection murmur was not inden-

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LioTTA


The postoperative status of 94 patients with mitral stenosis was evaluated in the period from April 25, 1951, to September 19, 1960. The total operative mortality, that is death within 30 days of operation, was 9.1 per cent. Twenty-three and four-tenths per cent of the patients died, but one dying from heart disease. Seventy-five per cent of those living and followed for at least 5 years showed evidence of satisfactory improvement. Eighteen and one-tenth per cent of those patients who were thought to have adequate commissurotomies had clinical evidence of restenosis; 17 per cent of the patients had evidence of mitral regurgitation postoperatively, 27 per cent of whom had evidence of this condition preoperatively. The mortality of the group with mitral regurgitation was 43.7 per cent as compared with 23.4 per cent for the entire series. Emboli occurred in 18 of 88 patients postoperatively and contributed directly to death in 33 per cent of these patients. Unfavorable prognostic findings in preoperative evaluation included calcified valves, cardiac enlargement, atrial fibrillation, systemic hypertension, mitral regurgitation, and persistent heart failure.

KALMANSOHN


The single-breath-of-oxygen test (Comroe and Fowler) was used to estimate the distribution of alveolar ventilation in 20 patients with mitral stenosis, in 20 age- and sex-matched normal subjects, and in 12 patients with chronic bronchitis. The nitrogen concentration difference of the expired air between 750 ml. and 1,250 ml. averaged in the normal subjects 2.25 per cent at rest and 2.24 per cent 1 minute after exercise. The differences were 3.21 and 4.53 per cent, respectively, in the mitral group, while they were 4.52 and 4.45 per cent in the bronchitis patients. The significantly more uneven alveolar ventilation in the mitral patients was attributed to transudation of fluid into the lung as a result of pulmonary capillary hypertension and was not related to the bronchitis present in some of them. The level of the pulmonary wedge pressure did not, however, parallel the nitrogen concentration difference at rest or during exercise.

ROgers


Phonocardiographic and hemodynamic data obtained at cardiac catheterization were analyzed in 130 patients with mitral stenosis. In 40 patients repeat data were obtained after commissurotomy. The Q-1 interval showed a significant correlation with the pulmonary capillary pressure. Q-1 was generally prolonged with increasing pulmonary capillary pressures. However, it is not possible to predict exactly the level of the pulmonary capillary pressure from the measurement of this interval. The second sound to opening snap (2-OS) interval was similarly but inversely correlated with the pulmonary capillary pressure. The “mitral index” provided the best correlation. There was a good correlation in the Q-1 interval and the area of the mitral orifice. The first sound was increasingly delayed with diminution in size of the mitral area. There was poorer correlation between the 2-OS interval and the mitral area. Only very short intervals (0.05 seconds) were associated with severe mitral stenosis. However, there was a good relationship between the mitral index and the mitral area. Modification in these phonocardiographic parameters occurred in patients following commissurotomy with the reversal of the indices toward normal.

Rakita

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VASCULAR DISEASE


This study represents a survey of serum lipid concentration and the vascular complications in 139 diabetic patients classified into three temporal groups: those seen between 1931-1939; those between 1940-1950; and those seen from 1951 through 1961. The average ages of the three groups were 52, 49, and 55 years. The average duration of diabetes was 6.0, 9.2, and 9.7 years, respectively. The vascular system was classified into two groups: small vessel disease (arteries, veins, and capillaries) and large vessel disease (arteries of large and medium size). Small vessel disease is almost specific for diabetes, occurring in such forms as diabetic retinitis and the Kimmelstiel-Wilson syndrome. Large vessel disease usually exhibits typical atherosclerotic lesions which, although more frequent in diabetic patients, do not differ from such lesions found in nondiabetic patients. Atherosclerotic lesions were exemplified by coronary artery disease, peripheral vascular disease, and some forms of cerebral vascular disease. Mean triglyceride concentration increased from 5.7 mEq./L in the 1930 to 1939 period to 8.3 in the 1951 to 1961 period. The increase was observed both in patients receiving and those not receiving insulin. A similar increase in atherosclerotic lesions of large vessels was observed, from 10 per cent in 1930 to 1939 to 56 per cent in 1951 to 1961. Small vessel disease increased from 13 per cent in 1930 to 1939 to 23 per cent in 1951 to 1961. Cholesterol remained unrelated to these changes. The authors suggest that these findings need to be related to a change in the diabetic diet from a diet liberal in fat but low in carbohydrates in 1930, to a diet of lower fat and higher carbohydrate intake in 1960, and also point out the inverse relationship between dietary fat and serum triglyceride concentration. Therefore, important reduction of dietary fat may be contraindicated for many diabetic subjects because of the risk of inducing hypertriglyceridermia and increasing the chance of vascular atherosclerotic complications.

Liotta


Among 2,250 admissions to an infectious-disease hospital during a recent 18-month period, were 10 elderly patients who presented a syndrome of polymyalgia rheumatica. All had muscular pain, joint stiffness without swelling, low-grade fever, rapid sedimentation rate, and increased values for plasma fibrinogen and alpha-2 globulin. Although the temporal arteries were sometimes physically unremarkable, biopsy in seven of nine patients showed giant-cell arteritis. In one patient, a woman of 64, the syndrome included bilateral occlusive disease of the axillary and subclavian arteries. Corticosteroid therapy produced dramatic improvement in all patients, including restoration of the radial pulses in the woman with Takayasu’s syndrome. It was concluded that giant-cell arteritis is a fairly common disease of older individuals, that it may produce various manifestations according to location of the arteries involved and that corticosteroid therapy regularly is effective in relieving the symptoms for periods of at least a year.

Rogers


The vascular factor in diptheritic shock was investigated by indirect observations of the vasoconstrictive responses of blood vessels of rabbit skin and mesentery to intravenous doses of l-norepinephrine both before and after diptheritic toxemia. There occurred a significant diminution of the intensity of constrictor response of the smaller arteries and veins, of the arterioles of the splanchnic bed, and of the smaller arteries and veins of the skin when exogenous l-norepinephrine was administered. The author suggested that the vasoconstrictor failure may be due to adrenal cortical insufficiency resulting from lesions in the zona fasciculata of the adrenal gland.

Karpman


One hundred and ninety-six patients were followed 1 to 15 years after excision of lumbar sympathetic ganglia 2 through 4 in treatment of symptomatic arterial occlusive leg disease. The predominant difficulty was intermittent claudication in 90 patients, cold painful feet in 40, leg or toe ulcers in 40, and 26 had gangrenous toes. The results of treatment were judged as excellent in 79 cases, good in 46, fair or poor in 26 each, and supracondylar amputation was required in 18 individuals. The concomitant direct surgical relief of arterial obstruction was advocated in

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the femoral or larger vessels. Contraindications to sympathectomy included marked atrophy of the limb, rapid onset and progression of symptoms, and constant intractable pain. Lumbar sympathectomy was viewed as the most widely applicable and effective surgical measure for the management of peripheral arteriosclerosis obliterans. (Four discussants agreed that the operation was valuable, but there was disagreement about the technic and its effect on intermittent claudication.)

**Rogers**


Carotid bypasses were constructed in anesthetized cats so that the flow to the sinus regions could be interrupted either with or without simultaneously interfering with the carotid flow to the brain. Cerebral ischemia normally increased the responses of selective stimulation of the carotid body chemoreceptor and baroreceptor. However, in the absence of reduced cerebral blood flow, the responses were either considerably reduced or were only minimal at best.

**Karpman**


Two patients were described having arteriosclerotic obstruction of the right subclavian artery just proximal to the origin of the vertebral artery. In both subjects, contrast medium injected into the left subclavian artery flowed up the left vertebral then down the whole right vertebral artery without irrigating the basilar system. In the second patient complete retrograde filling of the right vertebral artery followed an injection of contrast agent into the right carotid artery, although the carotid siphon was narrowed. Neither patient had signs or symptoms clearly due to cerebral ischemia, but both had other evidence of advanced arteriosclerosis including intermittent claudication. Subclavian endarterectomy therefore did not affect the neurologic status in either case, while in both it equalized the blood pressure in the arms. It was concluded that while reversal of vertebral arterial blood flow due to subclavian stenosis may reduce the cerebral circulation, these alterations do not necessarily result in a neurologic disturbance.

**Rogers**


A review of lipoprotein transport across the vascular endothelium is reported. Information concerning the exchange across the capillary wall and exchange and deposition in the arterial wall is discussed. It is indicated that the experimental evidence suggests that the lipoproteins normally pass through the vascular endothelium to an extent dependent upon the size and concentration of the lipoprotein and upon the structure of the endothelial barrier. In the presence of injury, the transference of lipoproteins is greater. The deposition of liquid in the arterial intima is probably associated with the uptake of metabolism of the individual lipoprotein by macrophages.

**Rakita**


This report is concerned with the vascular digital response in man to a perfusion of angiotensin II and a comparison with the injection of norepinephrine in the same conditions. Digital vascular responses were measured by means of the digital rheoplethysmograph. Ten normoten- sive subjects and seven subjects with arterial hypertension were studied, ranging in age from 22 to 74 years. After intravenous infusion of angiotensin II the arterial blood pressure rose (beginning after an average of 40 seconds), the mean length of the pulse cycle increased 12 per cent, the inflow volume and rate of blood into the digit decreased and the systemic venous pressure increased from 52 to 105 mm. of water (following always the arteriopressor response). After intravenous infusion of norepinephrine, blood pressure increased, and the mean length of the pulse cycle increased 23 per cent. Significant decrease in total digital blood volume and a rise in systemic venous pressure from 70 to 150 mm. of water (preceding every time the rise in arterial blood pressure) were observed. Angiotensin II appears to act primarily upon the precapillary (resistance) vessels, whereas norepinephrine acts upon the precapillary and postcapillary (capacitance) vessels, as well as upon the arteriovenous anastomosis (arterial and venous sides of the digital vascular system). Intra-arterial injections of angiotensin II and norepinephrine in the same arm in which digital blood flow was being studied were qualitatively similar to the intravenous responses, although of a greater magnitude. However, no change in
systemic venous pressure was observed with the intra-arterial injection. In general, the magnitude of the digital vascular and arteriopressor responses to angiotensin II was greater for the normotensive than for the hypertensive subjects (responses to norepinephrine were essentially of the same magnitude in both groups). This supports the concept that angiotensin II plays some part in arterial hypertension, since the hypertensive subjects may already have been exposed to circulating endogenous angiotensin and would therefore have been less responsive to exogenous angiotensin than the normotensive subjects. The weaker venopressor properties of angiotensin II may make a more satisfactory agent for the treatment of cardiogenic shock than norepinephrine. In cardiogenic shock venous pressure is already high; by constricting the veins further, norepinephrine mobilizes large volumes of blood toward a failing heart and pulmonary edema ensues.

LIOTTA


A new method, pilojection, has been devised for the treatment of aneurysms of the intracranial arteries. Using a pencil-like pneumatic gun developed at the Naval Research Laboratory, tiny hog hairs are injected into the aneurysm sac by a pressure of 40 to 50 lbs./in.² The velocity imparted to the hair causes it to penetrate the arterial wall without laceration. The advantage of this method is that it does not necessitate total exposure of the aneurysm with its attendant hazards. It is known that hair induces thrombosis, because its shingle-like exterior acts as an inducer for clot formation and possibly also because of the negative ionic charge on the hairshaft surface. Four patients received pilojection treatment for leaking anterior cerebral aneurysms. In three, postoperative carotid angiograms revealed significant reduction in aneurysmal size when compared to preoperative films. One patient died of cerebellar hemorrhage. At autopsy, the pilojected anterior cerebral aneurysm was completely thrombosed. The other three patients have recovered from the initial subarachnoid hemorrhage and operation and were nearly asymptomatic.

HELWIG


Previous reports by the authors described the value of regional sympathectomy in 19 patients with bilateral cold injury to the hands or feet. The present paper reports follow-up observations on 10 of the original group and early results in six additional patients. Sympathectomy achieved earlier cessation of pain, less edema, earlier autoamputation and more rapid healing. The sympathectomized limb was less painful, warmer, and drier and cold perception was consistently better than in the control (non-sympathectomized) limb. The authors conclude that the protective effect of regional sympathectomy is due partly to release of the excessive sympathetic activity and partly to the reversal of the decrease in cold perception in the unsympathectomized frostbitten limb.

HELWIG


The volume of blood flow in the lower segment of the inferior vena cava was measured in 15 patients by means of a continuous local indicator-dilution technic via a double-lumen catheter. Cardiac output was estimated by dye-dilution curves recorded from an ear cuvette. Cava flow fell promptly when the subject was tilted feet down, and a roughly parallel decline in cardiac output lagged behind. Partial recovery of caval flow and cardiac output during tilt was observed in 5 to 8 minutes in all except one bilobar sympathectomized patient whose flows fell for at least 32 minutes. Both the degree of flow decreased and the extent of recovery depended on the angle of tilt. Head-down tilting increased caval and cardiac flows for several minutes, then a tendency to recovery occurred; however, this was incomplete at 26 minutes in 1 subject.

ROGERS


It is essential to classify patients into the three following clinical states. Stage 1, or incipient stroke, "intermittent insufficiency" refers to attacks of focal ischemia with mainly a functional substratum that may last 15 to 30 minutes. Between attacks the patients are normal. Stage 2, or progressing stroke, refers to an increasing neurologic deficit. The period of evolution rarely
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The author reviews certain aspects of intravascular pressure, vascular tone, and the sympathetic system bearing on the return of vascular resistance after sympathectomy. The failure of vasodilatation and increased blood flow to persist indefinitely after sympathectomy in the degree noted soon after operation is due to multiple causes, early and late. The possible early causes are listed and discussed. Release of sympathetic control leads to increased lateral hydrostatic pressure and according to Laplace's law may cause a readjustment in contractile elements, with radial reduction and an approach of tangential tension to normal. In time, this may possibly lead to secondary muscular hypertrophy. There is no clear evidence indicating an increased neurohumoral activity by the interstitial cells of Cajal. The cause of the "fifth day" phenomenon is not known. There is no evidence that vasodilatory fibers to the extremities exist and are interrupted by sympathectomy; nor does evidence exist that the totally denervated vessel becomes "hypersensitive" to endogenously released neurohumoral substances. Additional mechanisms thought to be operative are incomplete denervation with sensitization (based on the Law of Denervation), "sprouting," residual and intact extra-ganglionic sympathetic neurons (although their functional significance is questionable), and, finally, the presence of "cross-over fibers." These additional factors should be subject to control by the performance of a sympathectomy that is as nearly complete as possible. The factors leading to late return of arterial insufficiency beyond 3 to 6 months after sympathectomy are ascribable to progression of the basic vascular disease or to the regeneration of sympathetic nerves. The return of abnormal vasomotion can be prevented in most instances when denervation is nearly complete. Except for the progression of the vascular disease, the remaining mechanisms enumerated are inadequate to compensate for the severely decreased preganglionic activity brought about by sympathectomy. Emphasis is placed on the fact that a certain measure of return of vascular "tone" after sympathectomy is universal and on the basis of current knowledge may best be attributed to the intrinsic tension response of smooth muscle cells.

SANCETTA
ABSTRACTS
STANFORD WESSLER

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