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PATHOLOGY


Rabbits were fed a diet containing 1 per cent cholesterol. After a period of 4 months, the rabbits were placed on the stock diet without cholesterol. Two of the 10 rabbits in the experimental group that survived for 2 years were then sacrificed and their aortas examined with an electron microscope. The endothelial cells formed a continuous layer and showed features that distinguished them from normal endothelium. The principal cell of the subendothelial tissue was a modified smooth-muscle cell whose role in the pathogenesis of arterial disease is poorly understood.

Kalmansohn


Cardiac, cerebral, and vascular lesions identical to those occurring in cases of fatal human trichinosis were induced by experimental infections in rabbits. Varying conditions were imposed upon the experimentally infected animals including suppressions of antibody formation by whole-body gamma irradiation. The temporal relationship of these lesions to the appearance of circulating trichinella larvae and circulating antilarval antibodies was then investigated under a variety of experimental conditions. It appeared that circulating antibodies played no significant role in the pathogenesis of cardiac and cerebral lesions of trichinosis. It was recognized that antilarval antibodies with specific cell or tissue affinities may have existed and not been detected in body fluids although they may have been present at the sites of developing lesions. The authors concluded that the cardiac and cerebral lesions of trichinosis were most likely related to the toxic effects of larvae, their metabolites, or toxic products that had been produced in the course of a host reaction rather than to the formation of antilarval antibodies and the subsequent antigen-antibody reaction in the tissues.

Karpman


A histochemical investigation was made of naturally occurring, early atherosclerotic lesions in man and the turkey and experimentally induced plaques in the rat and the rabbit. Human lesions were obtained from subjects in the age group 13 to 24 years; turkey lesions were obtained from a healthy male bird of a flock in which some birds had died of aortic rupture due to atherosclerosis. In all instances, the lesion was predominantly fibrous and only in the turkey
did it contain much lipid. The presence of extracellular material that stained for acid mucopolysaccharide and protein suggested that the lesions were active sites of collagen production and were caused by the same basic mechanism.

Kalmansohn


Fresh aortas obtained post mortem were used in this study. A small needle was inserted into the outer third of the media, and water was injected under increasing pressure until a bleb exceeding 1 cm, in diameter developed. The mean pressure required reached a maximum of 586 mm Hg in the third decade of life and decreased gradually to about 450 mm Hg in the seventh to tenth decades. The pressures did not correlate with race, sex, site, or proximity to atheromatous plaques; they were slightly greater in the aortas from patients with hypertension, and considerably greater in four cases of syphilitic aortitis. In one patient with spontaneously occurring dissection of the aorta the resistance was impaired but in a second it was normal. It is postulated that a solitary focus of medial degeneration is an adequate stimulus for dissection and subsequent rupture of the vasa vasorum into the weakened area, resulting in a rapidly expanding bleb. The pressure required for subsequent enlargement of the bleb will vary inversely with its diameter, thus tending to extend the dissection. This would explain the frequent finding of a histologically normal wall distant from the site of the lesion in cases with extensive intramural dissection.

MARSHALL

PHARMACOLOGY


The positive inotropic effect, the ability to induce cellular potassium loss, and the "toxic effects" of two rapidly acting cardiac glycosides, convallatoxin and acetylstrophanthidin, were compared in the dog heart-lung preparation. The maximum inotropic effect with both cardiac glycosides was reached after 10 minutes. On the average, the inotropic effect of acetylstrophanthidin was more marked than that of convallatoxin. The rate of potassium loss from the tissues of the heart-lung preparation was rather constant for the first 20 minutes after injection of the glycosides but became more marked when toxic arrhythmias appeared. Although part of the total potassium loss came from myocardial cells, some potassium was probably also lost from the lungs, making quantitative estimates of potassium changes in the myocardium unreliable. When the increase in potassium in the plasma and the inotropic effect induced by both drugs were compared, is was shown that the positive inotropic effect of acetylstrophanthidin was positively correlated with an increase in plasma potassium. Convallatoxin, however, showed a decreased inotropic effect with increased plasma potassium. Thus, the two glycosides acted in opposite ways in regard to the ratio between electrolyte and inotropic effect. When pH was lowered by inducing respiratory acidosis another difference was noted between the two glycosides. Hypereapnia depressed the inotropic effects of convallatoxin but seemed to be without action on the inotropic effect of acetylstrophanthidin.


The manifestations of digitalis intoxication in 13 healthy premature and one normal full-term newborn infants are presented and discussed. Conduction disturbances other than prolongation of the P-R interval and ectopic beats or rhythms were accepted as electrocardiographic manifestations of intoxication provided that these were absent from control tracings, appeared during digitalization, and reseeded after digitalis was discontinued. The patients were observed for evidence of gastrointestinal disturbances, changes in feeding behavior, and alterations in activity level. The arrhythmias consisted chiefly of sinoatrial node depression with associated ectopic supraventricular beats and rhythms and atrophic-ventricular conduction disturbances. Anorexia, nausea, and vomiting, which are common symptoms of digitalis toxicity in adults, were seldom conspicuous in infants and young children. The electrocardiogram was therefore found to be the only reliable guide to digitalis intoxication in young infants. Frequent electrocardiograms during digitalization were advocated by the authors, since premature and newborn infants appeared to be more susceptible to digitalis intoxication than did the older infants. They noted that errors could be avoided if the tracings were taken for at least 1 minute and were free from artifacts. The premonitory signs of toxicity were
found to be a slowing of the heart rate and a prolongation of the P-R interval during digitalization.

Karpman


In 13 unanesthetized dogs with surgically induced complete heart block, the intravenous administration of quinidine sulfate, 5 to 20 mg. per Kg., promptly was followed by a rise in average atrial rate from 145 to 177 beats per minute and in ventricular rate from 47 to 54, although in one animal the ventricular rate fell to 7. Similar quinidine-induced acceleration was observed after vagolysis with N-methyl atropine, suggesting that the cardioacceleration was not a result of the antivagal action of quinidine. After reduction in adrenergic activity from treatment with reserpine, hexamethonium, or surgical sympathectomy and adrenalectomy, the ventricular rate was approximately halved while the atrial rate fluctuated little. Quinidine administration after hexamethonium, reserpine, or adrenalectomy alone produced minor changes in heart rates. But after hexamethonium plus reserpine or hexamethonium plus adrenalectomy, marked ventricular and some atrial slowing occurred, and at times ventricular premature beats developed. It was suspected that the quinidine cardioacceleration was mediated by the sympathetic nervous system and that depletion of myocardial catecholamines might account in part for the inhibition of this effect by reserpine.

Rogers


This is an evaluation of a new monamine oxidase inhibitor (β-phenylisopropyl hydrazine hydrochloride, "Catron") in the treatment of angina pectoris and peripheral vascular disease. Of 12 patients with severe angina pectoris, seven were said to have complete and two almost complete relief of pain; five were able to stop using nitrites. Pain began to subside between the third and sixth day of treatment with a daily dose of 12 mg. There was no objective sign of improvement in the electrocardiogram, however, either at rest or after exercise. Satisfactory improvement was claimed in three of four patients with intermittent claudication. Side effects included nervousness (two patients), insomnia (five), and eezematoid rash (one); orthostatic hypotension was not observed. It is recommended that patients with angina should first receive treatment with well-established agents, such as nitrites for relief of pain, and that Catron should be used only if the results are unsatisfactory.

Marshall


Hypotension was induced in lightly anesthetized dogs by the injection of a suspension of lycoptodium spores into a coronary artery, inducing either right or left heart failure. The responses were studied to intracoronary, intravenous, and intra-aortic injections of levarterenol (norepinephrine), possessing inotropic and peripheral vasoconstrictor properties, and methoxamine (Vasoxyl), known to cause only peripheral vasoconstriction. Left or right coronary embolization produced decreased left ventricular and systemic arterial pressures and decreased myocardial contractility. Left atrial pressure increased slightly following left coronary embolization, and either did not change or decreased following right coronary embolization. The intravenous or intracoronary injection of levarterenol subsequent to embolization caused increased myocardial contractility and systemic arterial pressure, and decreased left atrial and pulmonary arterial pressures, elevated by the prior embolization. The intracoronary injection of methoxamine either did not change or increased the previously elevated left atrial pressure. When an excessive intravenous dose of levarterenol was given, there was an initial improvement as with smaller doses. Subsequently, there were increases in both the atrial and pulmonary arterial pressures, varying directly with the level of systemic arterial pressure. This situation of "over treatment" was similar to the responses obtained with all intravenous doses of methoxamine. When an intracoronary injection of levarterenol was given during the circulatory changes elicited by methoxamine, there occurred a decrease in left atrial and pulmonary arterial pressures, and an increase in systemic arterial pressure. Injection of either drug into the descending aorta, obviating the direct myocardial action of levarterenol, caused identical effects: increased systemic, pulmonary, and atrial pressures. The application of the experimental data to clinical situations is discussed.

Ross

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PHYSICAL SIGNS

Splitting of the first heart sound is due to asynchronous closure of the atrioventricular valves; the mitral valve normally closes first. Physiologic splitting "spaltung" does not exceed 0.030 to 0.035 second; its significance is very different from that of "true" splitting ("doppelung"). Paradoxical, or reversed, splitting of the first sound has received little attention, in contrast with what is known about reversed splitting of the second sound. It is dependent upon inversion of the sequence of closure of the mitral and tricuspid valves. The authors point out, from their phonocardiographic studies, that it may be due to either electrical or mechanical causes. The former is represented by late activation of the left ventricle in relation to that of the right, as in complete left bundle-branch block, right ventricular extrasystoles, and Wolff-Parkinson-White syndrome (B type). The latter is encountered in mitral stenosis, in which delayed closure of the mitral valve is related to prolongation of the mechanical latency phase of the left ventricle.

MARSHALL

PHYSIOLOGY

In matched experiments in dogs, the effects of left ventricular outflow-tract obstruction were compared with those of aortic constriction, which produced a similar slight degree of ventricular systolic pressure elevation. Left ventricular output and mean systemic arterial pressure decreased little or none, and coronary sinus outflow increased slightly in both types of obstruction. Coronary arteriovenous oxygen difference increased slightly in outflow-tract stenosis but decreased slightly in aortic constriction. It was thought that the rise in coronary blood flow in outflow-tract stenosis was due to vasodilatation alone, whereas the rise in flow during aortic constriction was due to the increase in coronary perfusion pressure.

ROGERS


The intravenous administration of 2 meg. of isoproterenol to five patients with hypertrophic subaortic stenosis resulted in a decrease in size of the left ventricular outflow tract as evidenced by a rise in left ventricular systolic and end-diastolic pressures, a fall in brachial arterial pressure and a reduction (in four patients) of cardiac output. In contrast, 2 mg. of methoxamine abolished the left ventricular-brachial arterial systolic gradient in each of four patients, presumably at least partly due to causing peripheral vasoconstriction. Cineradiographic studies showed the left ventricular end-systolic size increased after the administration of methoxamine but decreased after isoproterenol. The inconstant or functional nature of the left ventricular outflow obstruction in some patients with hypertrophic subaortic stenosis was thus demonstrated, and the possible danger of giving drugs with a positive inotropic action—such as isoproterenol or digitalis—was shown.

ROGERS


The experimental preparation used was an isolated dog's heart perfused with blood from a donor dog. Coronary flow was maintained at 5 ml. per Kg. per mm. The unarrested hearts of 10 dogs were used as controls. Five hearts were kept beating at an ambient temperature of 37 C., and five at 27 C. Three biopsies were taken from each group of animals and analyzed for adenosine monophosphate (AMP), adenosine diphosphate (ADP), and adenosine triphosphate (ATP). The experimental group consisted of 20 dog hearts divided into two groups. In the first group cardiac arrest was produced by anoxia in five dogs at 37 C. and in another five dogs at 27 C. In the second group potassium citrate was used to induce cardiac arrest in five dogs at 37 C. and in the remaining five at 27 C. Biopsies were taken during the control, arrested, and recovery phases, and analyzed for AMP, ADP, and ATP. There was a constant and significant loss of all these adenosine compounds from the myocardium during perfusion at 37 C., both with and without cardiac arrest. At 27 C. this loss of adenosine compounds was abolished while the heart was beating. During cardiac arrest at 27 C. ATP was reduced, whereas ADP and AMP were increased. Under normothermic conditions restoration of the initial level of ATP, ADP, and AMP was delayed for at least 1/2 hr. after the heart resumed beating.

LUCHE

Dilution curves from cardiac cavities were obtained by registration of precordial radioactivity, after transeustaneous injection of a radioactive indicator into the right subclavian vein, in 22 patients with atrial septal defect, three patients with ventricular septal defect, five patients with persistent ductus and one with coronary-right atrial fistula. Left-to-right shunts appear on the radioangiogram as a third peak following the second peak after an interval at least as long as that between the first and second peaks. The third peak was seen in 35 of the 37 cases with left-to-right shunts, but never in persons without such a shunt. The amplitude of the peak allows estimation of the magnitude of the shunt; this was 16 to 33 per cent of the pulmonary flow in all patients with the ostium secundum type of atrial septal defect, which justified surgical intervention. These values were greater in the cases of ostium primum defects but moderate in the case of intraventricular septal defects. The highest values were seen in persistent ductus. The radiocardiographic method is important, not only in determining indications for surgery, but also in evaluating a residual shunt after surgery.

Lepeschkin


Arterial pressure and volume pulse studies of the brachial artery were performed in 16 healthy young men and 10 elderly men and the results compared. In young men the volume pulses exceeded in relative size the pressure pulses of equal amplitude, and the typical pressure-volume loop was a dextrorotated figure. These findings were interpreted as indicating a viscous response (or storage of energy) of the arterial wall during late systole and diastole. In the aged men the mean level of the volume pulse was found to be significantly lower and the mean ratio of areas of volume pulses to pressure pulses of equal amplitude was 91:100. The typical pressure-volume loop, therefore, was a levorotated figure, interpreted as a release of energy from the arterial wall during diastole. The findings suggested that in the older men there was an elevated periarterial tissue pressure and that this apparent stiffening of the wall may be altered by blocking neurogenic mechanisms.

Sagall


Left ventricular function in intact dogs was studied under various conditions by means of simultaneous recordings of aortic flow (from a pulsed ultrasonic (flowmeter), left ventricular diameter (from two transducer disks of a sonocardiometer placed on opposite sides of the ventricle) and of left ventricular pressure (from a catheter placed through the atrium). By feeding these primary variables into an analog computer, secondary variables were derived, including stroke volume, cardiac output, effective power, stroke work, average power, volume acceleration, rate of change of pressure, duration of systole, and heart rate. The use of ambiguous terms, such as contractility or vigor of contraction, was deplored.

Rogers


In 18 patients with atrial fibrillation the heart size was determined by means of x-rays before and 3 or 4 weeks after return of sinus rhythm as a result of treatment with digitalis and quinidine. A reduction of heart size exceeding 5 per cent was found in five, whereas one exceeding 10 per cent was found in only two patients. All but one showed signs of heart failure at rest or after exercise prior to treatment. It is concluded that absence of atrial contraction does not by itself lead to cardiac enlargement as long as there is no myocardial failure, and that therefore patients with this type of arrhythmia do not need other criteria for the evaluation of cardiac size than those with normal sinus rhythm.

Lepeschkin


Determinations of aortic diameter and lateral intravascular pressure were obtained in 10 anesthetized patients undergoing open-heart surgery. The average change in aortic area during systole, estimated with an electrical strain-gage caliper, was 11 per cent of the diastolic value. The circumferential extensibility, the ratio of the change in radius of the aorta to the product of diastolic radius and pulse pressure generally decreased with increases in mean aortic pressure, occurring either spontaneously or after injection of l-norepinephrine. The lateral intravascular pressure and aortic radius generally varied directly. Age, height, or
weight apparently did not correlate with either diastolic radius of the aorta or circumferential extensibility. Since an 11-per cent change in cross sectional area of the aorta was calculated to occur during cardiac systole, the assumption that the aorta behaves as a rigid tube, a basis for the mathematical treatment of pulsatile flow, must be re-examined.

Ross


Positive intrapulmonary air pressure increased the resistance to the perfusion of blood through a lobe of dog lung. Vascular resistance decreased slightly as the lobe was inflated by an induced negative pleural pressure. When insufflation pressure and extrapleural pressure were balanced and the lung was not inflated, the resistance was greater than that found when the lung was permitted to expand, provided that intrapulmonary air pressure exceeded pulmonary venous pressure. When pulmonary venous pressure exceeded air pressure, vascular resistance was not significantly affected by lung inflation. These results suggested that much of the pulmonary vascular resistance is contributed by collapsible vessels, presumably capillaries. The tendency for these vessels to collapse, and hence for vascular resistance to increase depends on the difference in pressure between the pulmonary veins and the air passages. This pressure difference may be important in determining the degree of pulmonary vascular resistance.

Marshall


Simultaneous recordings of left ventricular and aortic pressure, maximum left ventricular circumference, and of the force required to keep together the two edges of a slit part way through the ventricular wall were obtained from five dogs under various experimental conditions. The principal finding was that the net mural force developed perpendicular to a given plane through the ventricle was almost identical to the product of the intracavitary pressure and the area of the cavity at this plane. This relationship held true regardless of the thinness of the wall or the shape of the ventricle. Thus, slight dilatations of the ventricle could substantially increase the force required to generate a given pressure.

Rogers


The chemical composition of normal bovine myocardium obtained less than 20 minutes after death was studied. No differences were found between left and right atria, or between left and right ventricles. However, the protein content of the atria differed from that of the ventricles, the former having more stroma and the latter more myofilaments. Atrial and ventricular contents of water, sarcoplasm, nonprotein material, and nitrogen were similar. The effect of overactivity and of inactivity on the content of guinea pig myocardium was also observed. It was found that exercise tended to produce myocardial hypertrophy without altering the protein composition of the ventricles.

Marshall


The cardiac output and blood volume were determined using radioiodinated human serum albumin and an external counting device; these determinations were made in 30 patients with hookworm anemia and a hemoglobin under 7 Gm. per 100 ml. and in four healthy subjects. The blood volume was slightly reduced in 62 per cent of the patients and was better related to the surface area. It increased after correction of the anemia. The cardiac output was increased, but decreased after the correction of the anemia. There was no tachycardia or appreciable change in blood pressure. Significant mitral regurgitation was not demonstrated.

Kalmanson


An indicator-dilution technie for precise localization of uncommon intracardiac and intravascular shunts, as well as for diagnosis of clinically insignificant vascular regurgitation, is described. Cold normal saline solution injected at about 0 C. is used as an indicator, a thermistor being employed intracardially or intravascularly as the receptor. The method also lends itself well for reasonably accurate determination of cardiac output and various circulation times. The special value of this technic lies in the possibility of detecting even minute shunts in either direction, which would escape diagnosis by pressure determinations and blood-gas analysis. Other advantages offered by the thermal dilution method over...
other indicator-dilution technics are small technical expenses, low buying and running costs, and avoidance of excessive exposure to radiation, toxic effects, skin discoloration, and blood loss.

Samartzis


Open-tip platinum electrodes were introduced 2 to 6 mm. into the anterior left ventricular wall of mongrel dogs, epicardial electrocardiograms were recorded, and the oxygen tension changes in the ischemic and peripheral areas were polarographically recorded after total and partial occlusion of branches of the anterior descending coronary artery. Total occlusion reduced recorded oxygen tension to zero levels; however, during 80 to 90 minutes of observation, recorded tensions slowly increased for about 30 minutes and gradually returned to zero by about 1 1/2 hours, suggesting a transient opening of collateral channels. The epicardiogram did not show changes in the S-T segment until oxygen tensions had fallen by 50 per cent. Potassium concentration of coronary sinus blood did not change in the first critical 30 to 60 seconds. The acid-soluble glycogen fraction in the ischemic area remained constant, the non-acid-soluble fraction decreased. Ischemic myocardial catecholamine content began to decrease 2 weeks after occlusion. Myocardial sodium chloride and water gradually increased for 24 hours; myocardial potassium decreased. Early light microscopic changes were not seen until 3 to 60 hours after occlusion. By electron microscopy, early changes were noted 1/2 to 3 hours after occlusion.

Sancetta


Sounds and pressures were recorded from the constricted main pulmonary artery in anesthetized, open-chest dogs. The murmur increased in intensity until 30 to 40 per cent pulmonary artery constriction, beyond which further constriction did not materially change the murmur, despite a marked decrease in pulmonary artery pressure and flow. A correlation was noted between the intensity of the murmur and the velocity of flow through the constricted area. There was no constant relationship between the peak of the "diamond-shaped" murmur, produced by the constriction, and the degree of stenosis. There was an increase in cardiac output during pulmonary artery constriction up to 40 to 50 per cent, beyond which there occurred a diminution in output below that of control values.

Ross


Chronic portal hypertension was produced in dogs by high ligation of the inferior vena cava. This resulted in decrease in metabolic rate, lung ventilation, cardiac output and arterial blood pressure; the respiration rate and heart rate increased. The dogs were then given a diet with a sodium chloride content of 0.3 to 0.5 Gm. per Kg. body weight. After 1 or 2 weeks of this diet, at which time the animals had peripheral edema and ascites, oxygen consumption equalled or exceeded twice the control value; the cardiac output was also about twice the control value; lung ventilation was doubled; the arterial blood pressure was slightly increased; heart rate was almost doubled. The authors postulated that in the period of high-salt intake the hyperkinetic features could be explained by hypervolemia. This, however, would not account for the increased metabolic rate, for which they had no ready explanation.

Marshall


Seventy consecutive patients with clinical evidence of intracardiac shunts underwent right heart catheterization. Dye curves were drawn with use of Coomassie blue injected into one or more chambers of the right heart or the great vessel via a catheter. A left-to-right shunt of at least 40 per cent of the total pulmonary blood flow was required before the curve became diagnostic. In two of the 10 patients with right-to-left shunt, the curve was technically unreadable; three other patients had their shunts incorrectly placed. All patients with bidirectional shunts gave satisfactory curves and an accurate localization of the shunt.

Kalmansohn


Cardiac catheterization by the hydrogen-platinum electrode system in 100 patients demonstrated
the value and usefulness of this simple technic in the detection of small left-to-right shunts, particularly when oxygen saturations were equivocal. With this method a cardiac catheter with a platinum electrode is placed in the main pulmonary artery. The patient then inhales a single breath of hydrogen gas. This immediately delivers a high concentration of hydrogenated blood to the left side of the heart. In the presence of a left-to-right shunt, even a small one, the hydrogenated blood from the left side of the heart is readily detected by the platinum electrode in the right side of the heart. In eight patients this simple, low-cost, easily used hydrogen technic established the presence of small left-to-right shunts at either atrial, ventricular, or pulmonary arterial levels when serial blood oxygen contents were equivocal.

SAGALL


The injection of a suspension of lycepodium spores into a coronary artery in anesthetized, closed-chest dogs caused a transient diminution, followed by a prolonged increase, in coronary blood flow. There was a corresponding increase in the oxygen content of the coronary venous blood. Autonomic blocking agents, bilateral thoracic sympathectomy, bilateral vagotomy, bilateral lumbar sympathectomy and splanchic division, bilateral adrenalectomy, or spinal cord transection, did not alter the response to embolization. Selective angiograms of the coronary arteries following embolization failed to demonstrate evidence of vasoconstriction, despite the use of autonomic agents, coronary vasodilators, pitressin, or selective occlusion. The initial decrease in coronary blood flow was considered to be caused by the mechanical obstruction secondary to the emboli. The subsequent increase in coronary flow and oxygenation was thought to be caused primarily by vasodilatation, based upon an intrinsic or extrinsic local mechanism.

ROSS

PULMONARY DISEASES


Detailed study of 1,000 patients with pulmonary hypertension showed that a "cardiac hump" appears in children with acquired as well as congenital heart disease, but only in the presence of pulmonary hypertension. In ventricular septal defect this hump is usually localized to the level of the insertion of the second and third ribs, whereas in atrial septal defect it is situated usually at the level of the fifth rib more to the left. It is attributed to hypertrophy and decreased elasticity of the right ventricular wall. Bilateral hypertrophy usually caused symmetrical arching of the anterior chest wall. Kyphoscoliotic deformation limited to the spinal columns was present in 5 per cent of patients with congenital cardiac disease. Simultaneous X-ray kymography of the proximal and peripheral parts of the pulmonary artery showed that the normal pulse-wave velocity was 130 to 170 cm. per second. In the presence of pulmonary arterial hypertension it increased to 500 or even 1,000 cm. per second, and the slope of the ascending branch of the pulse curve becomes more vertical. Decrease in pulse-wave velocity after oxygen or aminophyllin suggested a functional origin of these changes. The characteristic patterns of the pulmonary kymographic curves make possible a direct estimation of the degree of pulmonary hypertension from these. Pulmonary arterial hypertension was present in 30 per cent of patients with mitral stenosis, especially in women during pregnancy and the menses, and in 41 per cent of those with thrombosis of the left atrium. Pulmonary hypertension with a mean pressure exceeding 80 mm. was seen in 6 per cent of the patients with patent ductus arteriosus, 17 per cent of those with atrial septal defects, 9 per cent of those with ventricular septal defects, and 73 per cent of those with the Eisenmenger complex. The recognition of marked pulmonary hypertension is of great clinical value, as in such cases the effect of operation decreases while the risk increases.

LEPESCHKIN

RENAI AND ELECTROLYTE EFFECTS ON THE CIRCULATION


Synthetic valine-5 angiotensin II aspartic B-amide was infused for periods of 1 to 6 hours in normotensive and benign essential hypertensive subjects in pressor and subpressor dosages. With both modes of administration, normal subjects responded with increased urinary sodium excretion, and the hypertensive individuals with increased sodium excretion. Natriuresis occurred
in a patient with Cushing’s disease and one with primary aldosteronism; sodium retention in patients with Addison’s disease, after adrenalectomy and with coarctation of the aorta. Creatinine clearance universally decreased (much more in the nonhypertensive) but did not parallel urinary sodium changes. Also with both modes of administration in normotensive and hypertensive subjects aldosteronuria occurred. Angiotensin infusion exerted a greater and opposite effect on the tubular sodium reabsorptive mechanism than on glomerular filtration rate, suggesting a direct effect on the tubular transport mechanism probably mediated by the increased aldosterone. The results highlight a distinct difference in hemodynamic and tubular responses of the two groups of patients, but do not explain them.

**SANCETTA**

**RHEUMATIC FEVER**


According to the author there is some evidence against the streptococcal origin of acute rheumatism. Firstly, Aseho’s granuloma has never been found in instances of streptococcal infection; secondly, the recovery from an acute general streptococcal infection is usually definitive; thirdly, the streptococcus has never been isolated from involved organs such as joints, heart or aorta. On the contrary, the following observations, made by the author, point to the Vincent’s Spirochaeta as the etiologic agent of acute rheumatic fever: the frequent finding of the Spirochaeta in the left atrial fragments excised during mitral valvulotomy, and the remarkable remission of symptoms, during the acute and chronic phase of the disease, after a few intramuscular injections of bismuth. The pathogenic role of the streptococcus would be that of making virulent Vincent’s Spirochaeta.

**GHINTINI**


The occurrence of penicillin-resistant staphylococci was studied in throat cultures of children attending rheumatic fever clinics and maintained on a prophylactic regimen of orally administered penicillin and in control groups of rheumatic and nonrheumatic subjects. Forty-eight per cent of the children on the penicillin regimen were found to harbor penicillin-resistant staphylococci, 37 per cent of which strains were of the bacteriophage group III. In the control groups, 8 per cent were positive for penicillin-resistant staphylococci and 5 to 6 per cent were in the bacteriophage group III. No correlation existed between the occurrence of penicillin resistance and the duration of the prophylactic doses. It was thought that the high rate of penicillin-resistant staphylococci was due to maintenance of strains that were harbored on discharge from the wards.

**KALMANSOHN**


The heart of an 11-year-old boy who died of rheumatic pericarditis and severe congestive heart failure following streptococcal infection showed widespread deposits of gamma globulin, indicating an active pathologic process involving the myocardium. The demonstration experimentally that the cell walls of strains of the group A streptococci contained an antigen, which was immunologically cross-reactive with a constituent of human heart tissue, yielded evidence supporting the hypothesis that in rheumatic fever an autoimmune reaction to a constituent of myocardial and smooth muscle may be induced by exposure to a cross-reactive antigen of group A streptococci.

**SAGALL**


During an 8-year period from 1948 to 1956, 539 pregnancies were observed in 385 women with rheumatic heart disease. Therapeutic abortion was never performed. Seven deaths relating to the pregnancy (at or within 1 year of confinement) occurred only among the 64 unbooked cases; none in the 475 booked cases. The authors conclude that adequate medical care can virtually eliminate maternal mortality in rheumatic heart disease without recourse to therapeutic abortion. A follow-up of the 378 survivors was undertaken in 1961. Forty-eight patients had died at an average age of 38.3 years and an average parity of 5; among the 308 survivors, the average age was 40.7 years and the average parity was 4.7. The authors conclude that if a mother with rheumatic heart disease survives the immediate hazards, life expectancy is not materially altered by pregnancy.

**SANCETTA**

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ABSTRACTS

ROENTGENOLOGY


Since the smaller vascular channels of the lung cannot be adequately visualized when the injection of contrast material is made directly into the pulmonary artery, the authors injected the material directly into the pulmonary artery wedge position employing no. 10 catheters. Thirty, 60, and 76 per cent Urograin and Thoracast were employed. The type of contrast material did not influence the quality of visualization. The best results, permitting accurate visualization of vessels down to 0.1 mm. diameter, and veins with a caliber not exceeding that of the lobular veins, were obtained at injection rates of 8 to 30 ml./min., equivalent to a wedge-tip pressure increase of 10 to 25 mm. Hg. The capillary bed appeared as a faint, diffuse haze. Injection rates below 8 ml./min. were inadequate; above 30 ml./min. they usually led to persistence of the clumped contrast material most likely caused by extravasation of the material.

SANCETTA


A method is described for satisfactory coronary arteriography in the dog. Sodium diatrizoate (0.3 ml. per Kg. of a 50-per cent solution) was injected mechanically through a radiopaque polyethylene catheter introduced percutaneously from the femoral artery. The tip was placed into the left aortic sinus and the single side hole was directed toward the right. By means of a special electronic variable delay circuit, a single roentgen film was triggered in diastole from the R wave of the electrocardiogram. One animal developed fatal ventricular fibrillation after injection of the test dose. Six other animals died within 2 weeks of the procedure of causes that may have since been eliminated.

KALMANSOHN


The occurrence of complications is examined in 500 consecutive selective angiographies and 500 consecutive aortographies performed by a modified Seldinger technique. Studies in both series were performed under general anesthesia with use of a variety of contrast media. Two deaths occurred in the angiocardiographic series, one prior to injection of contrast medium. Cardiac irregularity in the form of supraventricular tachycardia occurred in five patients; atrial ventricular block was observed three times. Nausea and vomiting occurred in 10 patients and minor neurologic symptoms of short duration were observed in three patients. In 51 of the 500 cases combined cardiac catheterization and angiocardiography was followed by an elevation of temperature. In 357 cases no complications and no complaints whatever were recorded. Two deaths occurred in the aortographic series in close relation to the examination. Local reactions to the arterial puncture occurred in 50 patients. In six patients the catheter had been introduced some distance outside the lumen of the artery. Temperature was slightly elevated for 1 day in 12 patients. Surprisingly, subintimal injection of contrast medium was demonstrated in 31 cases, particularly in patients with arteroslerotic disease. Significant increases in blood urea or serum creatine occurred in only seven patients. On the basis of this analysis it was concluded that the risk in selective angiocardiography compares with the injection of the contrast medium into a peripheral vein and should be used as the technic of choice.

KURLAND


Electrocardiographic changes were studied in 40 dogs during coronary arteriography. In nine animals the left anterior descending coronary artery had been ligated and a muscle flap from the diaphragm sewn up to the ischemic myocardium. In 10 dogs a magnesium-aluminum needle had been introduced into the anterior descending artery. Bradycardia and ST-T changes were very common. In five days transient (1.0 to 2.5 second) asystole occurred in all animals receiving Rheopak or Urokon. Arrhythmias occurred in less than 50 per cent of the dogs and were short-lived. Ventricular fibrillation did not occur. In doses producing comparable opacification, Rheopak and Urokon caused more pronounced electrocardiographic changes than Hypaque and Urograin. The authors concluded that coronary arteriography is a safe method.

MARSHALL

Cineangiocardiography was used to study the behavior of normal and diseased aortic valves. For injections into the ascending aorta the tip of the catheter was placed slightly above the coronary ostia in order to avoid artifacts from the impinging of the jet of contrast directly against a valve cusp. For left ventricular injections the catheter was introduced either by retrograde passage through the aortic valve or by using the Braunwald and Morrow technic of transseptal catheterization. Films must be taken in rapid sequence in two planes. The method permits the detection of lesions of the aortic valve as well as assessment of their nature and severity. Simultaneous cine studies, phonocardiography, electrocardiography, and manometry enable changes in the corresponding parameters of cardiac function to be correlated.

MARSHALL


The authors describe their technic of coronary angiography. Cardiac output and hence aortic blood flow is reduced by the Valsalva maneuver in conscious cooperative patients, or by raising intrabranchial pressure in patients under general anesthesia. Reduction in aortic flow allows “layering” of the contrast medium, permitting the contrast medium to be directed into the coronary arteries, even those considerably narrowed by atheromatous. No serious complications were noted. Two patients had asystole lasting 10 and 20 seconds respectively; slight, transient electrocardiographic changes were sometimes present for a few beats. In the left coronary artery the most common site of narrowing was at the primary bifurcation; the most common site in the right coronary artery was a rather long area 4 to 5 cm. distal to the aorta. Short, local narrowing of severe degree localized to one coronary artery or its branch was found in 25 per cent of the cases studied. Slow filling or delayed emptying of coronary vessels indicated reduced flow. In 13 cases localized accumulation of contrast material was observed in the left ventricular wall. This was thought to represent neo-vascularization of an infarcted area of muscle.

LUCHI


The author used a modification of the Gullmo method for lower leg phlebography. The method employs compression bags on the lower extremity and an initial injection is made with sufficient compression to collapse the superficial veins. The pressure is suddenly released and additional films are taken to determine the competency of the perforator veins. An additional examination is then made for patency of the deep veins. The entire procedure takes about 10 minutes and was thought to demonstrate to best advantage the competency of the perforator and deep venous system.

KALMANSOHN


Pheochromocytoma localization is important not only in diagnosis but also in planning the proper operative approach. A wide variety of technics is discussed and evaluated. Plain films of the abdomen may reveal the presence of a pheochromocytoma because of calcification of the tumor (rare), or in thin patients a tumor outline may be seen. Displacement of the kidney or the ureter may be observed by intravenous or retrograde pyelography. Laminography precisely timed to intravenous injections of contrast material or injection of perirenal air may occasionally be helpful. Retroperitoneal pneumography utilizing carbon dioxide rather than air or oxygen is very useful. Both perirenal and presacral insufflation is discussed, the authors preferring the former technic. Aortography may reveal the tumor either during the arterial or delayed “capillary blush” phase. Combined aortography and pneumography may occasionally be helpful. Inferior vena cavography may be of value in selected cases and is occasionally positive when all other tests are unrevealing. Perirenal injection of opaque media offers no advantage over perirenal gas injection. In the authors hands perirenal carbon dioxide insufflation and percutaneous retrograde femoral aortography have been the procedures of choice for demonstrating pheochromocytomas.

LUCHI


In 16 of 20 patients undergoing carotid catheterization and revealing isolated, mild valvular pulmonic stenosis (peak resting right ventricular systolic pressure less than 50 mm. Hg) selective angiocardiography was done by injection of the contrast material in the right ventricle. The valve area so calculated showed a mean reduction of 70 per cent; areas hydrodynamically calculated simultaneously were uniformly greater. As con-

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trasted with patients having more severe grades of pulmonic stenosis, the pulmonary infundibulum and annulus were never found to be obstructive factors. The principal value of contrast angiography in pure pulmonic stenosis lies in this very demonstration.

SANCETTA

SURGERY AND CARDIOVASCULAR DISEASE


Six patients who underwent coronary thrombo-endarterectomy had extensive atheroma in all three main coronary arteries. One died 3 months after surgery with previously undetected severe ostial narrowing (this was the only patient who did not have coronary arteriography), three died on the table as the result of surgical tears in the coronary arteries, and one died suddenly 2 months after surgery without autopsy. One survived and showed improvement. There are yet no criteria for the selection of patients. Accurate contrast studies are an absolute prerequisite, but cannot provide information relevant to contrasting prognosis with other modes of treatment. Contrast studies cannot give information relevant to the thickness of involvement of the arterial wall—if the process extends into the adventitia a tear in the vessel is inevitable.

SANCETTA


Impaired exercise tolerance was found in 13 patients with pulmonic stenosis and in 17 patients subjected to valvotomy. In patients with pulmonic stenosis, relative shortening of diastole and increased right ventricular filling resistance appeared to be the factors limiting cardiac output during exercise. After operation, the factor of increased filling resistance alone sufficed for an abnormal response to effort. Myocardial fibrosis seemed to be the cause of the increased right ventricular resistance seen after resolution of the hypertrophy. Early and adequate surgical relief of pulmonary hypertension was urged.

KALMANSOHN

UNCOMMON FORMS OF HEART DISEASE


A family group with cardiomyopathy is described. No patient with Friedrich's ataxia was known to occur in any member of these groups. Nine members had a cardiomyopathy and six probably had myocardial disease. Five patients were symptom free, but despite a lack of symptoms, sudden death occurred in two patients, indicating that the presence or absence of symptoms did not appear to be of prognostic significance. A conduction defect was present in only one patient; two patients showed evidence of biventricular hypertrophy, two of left ventricular hypertrophy; in the remainder there were abnormalities of the P, T, and Q waves. Systolic murmurs, variable in location and intensity were audible in six patients. Pathologic findings revealed areas of dense fibrosis and hypertrophy involving all four chambers. The metabolic defect in two patients consisted in the finding of a non-metachromatic neutral polysaccharide in the muscle fibers.

KALMANSOHN


The cardiac and pulmonary manifestations of myotonic muscular dystrophy are discussed in 11 patients. None had hypertension. Eight patients had electrocardiographic abnormalities, three left-sided heart failure, and three showed cardiomegaly. Only one patient had a murmur considered to be clinically significant. There was no constant relation between the degree of cardiac abnormality and the severity of the skeletal muscular disease. Four patients developed pneumonia, two during the terminal illness. No characteristic abnormality was noted at postmortem examination. Alveolar hypoventilation was present in one patient. Postmortem findings in the heart in one patient were distinctive and provided an explanation for the heart failure. They resembled the changes in the skeletal muscle in myotonic dystrophy, i.e., enlargement of scattered muscle fibers with centrally placed muscle nuclei, isolated fibers with nuclear proliferation and staining of cytoplasm.

KALMANSOHN


In contrast to previous clinical investigations the present study reported a significant association between rheumatoid arthritis and heart disease. In 254 patients hospitalized with rheumatoid arthritis the incidence of heart disease was 34.8 per cent, whereas in a control series of an equal number of randomly selected patients.
matched for sex and age the incidence of heart disease was only 14.6 per cent. Of the 88 rheumatoid patients in whom organic heart disease was found 20 had hypertensive heart disease, 18 had definite coronary artery disease, 18 had suggestive coronary artery disease, one had cor pulmonale, two had probable amyloid infiltration of the heart, and 29 had indeterminant heart disease on the basis of unusual cardiac findings, such as pathologic murmurs indicating valvular defects, unexplained heart-chamber enlargement, defects in myocardial conduction, arrhythmias, and pericardial disease. The control group showed a similar incidence of hypertensive heart disease and cor pulmonale, but a much lower incidence of coronary artery disease, amyloid disease, and the heart disease classified as indeterminant. The patients with arthritis showed an increased incidence of congestive heart failure, angina pectoris, enlargement of the left ventricle, enlargement of the right ventricle, atrial enlargement, aortic systolic murmurs, aortic diastolic murmurs, and mitral diastolic murmurs. In the discussion of the significance of the findings the authors suggested that heart disease in rheumatoid arthritis often was the result of a specific rheumatoid process that could damage any part of the heart, including the coronary vessels. This would explain the increased association of coronary artery disease and rheumatoid arthritis. The clinical and autopsy findings also indicated that acute and subacute pericarditis, although unrecognized clinically, often occurs in active rheumatoid arthritis. The clinical manifestations of rheumatoid heart disease otherwise were often nonspecific, frequently mimicked or masked other conditions, particularly rheumatic and coronary artery heart disease. It was postulated that the increased susceptibility to heart disease in these patients might be an important factor in the shortened life expectancy previously described for rheumatoid patients.

SAGALL


Among 12 siblings, 5 patients are reported with primary systemic amyloidosis. Dyspnea was the presenting symptom in all patients appearing in the age range of 37 to 46 years. Paresthesias of the hands were noted in three patients. The disease was rapidly progressive with a duration from the first symptom until death of 2 to 3 years in three patients. The objective signs were those of full-blown heart failure in fairly young individuals. Three patients had a marked splitting of their second sound, and the blood pressure tended to be on the low side. Roentgenographic examination revealed moderate enlargement of the heart in all patients. The electrocardiograms were characterized by right bundle-branch block, left axis deviation, and low or negative T waves in Lead I; two patients had the pattern of left ventricular hypertrophy and strain. Hemodynamic studies in all five patients showed elevation of pressures in the right ventricle and pulmonary artery wedge position with a dip-plateau configuration in the right ventricle. Serum protein studies were not helpful.

KALMANSOHN


Five patients, ages 10 to 20 years, were presented showing right ventricular outflow obstruction, resembling that of congenital infundibular pulmonary stenosis, as a result of a bulging hypertrophied interventricular septum from chronic left ventricular myocardiopathy. The diagnosis of “infundibular pulmonary stenosis” was established by right heart catheterization, the systolic pressure gradient between pulmonary artery and right ventricle exceeding 70 mm. Hg in three patients, and the angiocardiogram showing typical obstruction of the outflow tract in two of them. The catheter, however, took a medial course, suggesting that the left cardiac border was formed by the left ventricle. Cardiac enlargement to the left and a systolic murmur of “pulmonary stenosis” were present. The electrocardiogram showed marked left axis deviation in four patients and right bundle-branch block in one patient. Surgery on three patients revealed normal pulmonary valve and infundibulum, with enormous hypertrophy of the left ventricular wall and septum.

SAMARTZIS


Two patients are described with a myxoma of the left atrium successfully diagnosed and removed. The first patient had no previous history of rheumatic fever, an abrupt onset of symptoms episodic in intensity and duration, inconsistent auscultatory findings, a prominent pulmonary artery segment with only slight left atrial enlargement, and a discrepancy in the pulmonary venous engorgement in the two lungs ascribed to selective pulmonary vein obstruction. The
second patient had no history of rheumatic fever, abrupt onset of symptoms, nondiagnostic auscultatory findings, and the demonstration of the tumor mass by angioeardiography.

Kalmansohn

VALVULAR HEART DISEASE


Inquiries were made about the families of 125 patients with pulmonic stenosis to find genetic or environmental factors that might help explain its etiology. Many had associated malformations of the heart and 13 per cent had noncardiac malformations. A malformation of the heart was present in 2.2 per cent of the siblings, nearly always pulmonic stenosis. There was no great difference in the sex incidence. More boys with pulmonic stenosis were born in the July to September quarter. This factor was less apparent in girls although still present.

Kalmansohn


The authors believe that it is still difficult to gauge the long-term benefits of mitral valvotomy. Ideally, the prognosis for patients surgically treated should be compared with that of patients studied before surgical treatment was available. They present data on 40 unselected cases of pure mitral stenosis, who were followed either until death or for a period of 20 to 23 years; 24 were women and 16 men. When first seen, they were aged 12 to 65 (mean 35) years, but the majority were between 21 and 50 years of age. The follow-up study confirmed that mitral stenosis has a serious prognosis, 70 to 80 per cent of patients dying in less than 20 years from the time of initial prognosis. However, with present-day medications (antibiotics, steroids, and diuretics) the prognosis would be better. Increased heart size, atrial fibrillation, and severe functional disability indicated a poor prognosis. Patients with no cardiac enlargement, with sinus rhythm, and with minimal symptoms had a relatively good prognosis and valvotomy was not indicated in these individuals.

Marshall


Thirty-two of 231 survivors of 270 operations for mitral valvotomy have required reoperation, none within the first 5 years. All primary operations had been performed by the transatrial route with use of a finger split or a Broek knife. At that time, valve calcification was absent in 17 cases, slight in nine, moderate in two, and severe in four. Retrospectively, 27 of the 32 primary operations appeared to the authors to have been inadequate. For reoperation a Tubb's dilator was used via the ventricle, and the split was uniformly satisfactory. The valve orifice at the second operation was always less than had been noted on completion of the initial valvotomy. The role of subclinical rheumatism in the development of restenosis was uncertain. The result of left atrial biopsy was of no prognostic value. It seems clear that restenosis is most likely to develop when the initial "split" is poor. In these cases, the re-fusion that seems certain to occur at the outer parts of the commissures assumes clinical importance, whereas a comparable degree of re-fusion of a widely split valve will not decrease the area of the orifice by the same proportion and hence will not become clinically manifest.

Marshall


The authors describe the roentgenologic findings in eight patients with localized hypertrophy of the interventricular septum causing subvalvular aortic and pulmonic stenosis. Left ventricular enlargement was present in all the patients and left atrial enlargement in all but one patient. Four patients showed enlargement of the right atria and ventricles. Cardioangiography with injection into the left ventricle showed considerable thickening of the ventricular wall with irregular indentations into the lumen. The thickening caused the lumen of the left ventricle to appear to be divided into two parts. The interventricular septum was thickened and bulged into the lumen on both sides. Mitral insufficiency was also present in two patients.

Kalmansohn
ABSTRACTS
STANFORD WESSLER

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