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RENAL AND ELECTROLYTE EFFECTS ON THE CIRCULATION


Renin was initially purified from pig kidneys by the fractional method of Haas et al. as far as step 6; it was further purified by electrophoresis in starch gel, kaolin adsorption and immunologic precipitation of impurities by specific antisera. The antisera prepared in rabbits against homogenate of pig kidney cortex or in hens against step-6 renin, produced precipitins against pig kidney protein impurities. The antisera were used for immunologic analysis by gel diffusion. The purest renin sample was obtained by electrophoresis; immunologically pure preparations were obtained by removal of the precipitogens by the antisera; however, these preparations were less pure chemically due to contamination by the rabbit or hen serum proteins. The contamination was reduced by the kaolin adsorption method. The gel diffusion method provides a simple and economical method of testing the purity of renin preparations.

Kalmansohn

RHEUMATIC FEVER


Two hundred and ninety-eight adolescents and adults with previous rheumatic fever, but who had been free of rheumatic fever for at least 5 years, were observed in regard to the incidence and complications of streptococcal infections in the absence of antistreptococcal prophylaxis. In this group appropriate antibiotic therapy was instituted only when clinically apparent, symptomatic streptococcal infection developed. Routinely two monthly throat cultures and serum streptococcal antibody determinations were employed to detect asymptomatic infections. In the adolescents (ages 11 to 22 years) the rate of streptococcal infection was 23.2 per cent per patient year and in the adults (ages 23 to 70 years) 12.8 per cent. Recurrences of rheumatic fever occurred in seven patients in the adolescent group—a rheumatic fever recurrence rate of 1.8 per cent per patient year and 9 per cent subclinical streptococcal infection. No rheumatic fever recurrences were found in the adult patients in this study. When these figures were contrasted with those of concomitant studies in children receiving prophylaxis (recurrence rates of 2.4 per cent per patient year and 17.5 per cent per subclinical infection), it is evident that there is a downward trend with age in the incidence of streptococcal infections and in the frequency with which these infections reactivate rheumatic fever. However, the authors emphasized that these preliminary data should not be construed as a sound basis for modifying current recommendations concerning the duration for which antistreptococcal prophylaxis should be maintained in the rheumatic subject.

Sagall

The author's current approach to acute rheumatic fever and its complications and its indications for special investigations and surgical attack in chronic rheumatic heart disease are described in detail. The clinical course of the various valvular lesions is discussed in detail and illustrative cases are outlined. It is emphasized that the expectation of life in rheumatic valvular disease has increased over the past 30 years because of improvement in prophylaxis and in drug therapy. In addition, emphasis is placed on the concept that congestive heart failure in subjects with rheumatic heart disease is a combination of myocardial, valvular, and pulmonary defects and associated illnesses. The ability of the surgeon is still inadequate to cope with combined valvular lesions of the aortic and mitral valves. For these reasons the author's indications for valvular surgery at this time are based upon clinical disability, explained by hypertension attributable to distal valvular dysfunction.

Sheps


Antistreptolysin-O (ASLO) titer of blood drawn from 333 children attending the first three grades of public schools in Miami, Florida, were determined in conjunction with studies of beta-hemolytic streptococci isolated from the throats of the same subjects. ASLO levels were lowest in the bloods of those children from whose throats no streptococci or only group B organisms were isolated; next higher with groups F and G; still higher with group C, and highest with group A organisms. Serial ASLO titers showed a rise in children from whose throats group A beta-hemolytic streptococci were isolated. A similar but lesser rise was demonstrated in children with group C throat cultures. Children without beta-hemolytic streptococci cultures showed a negligible rise. High-colony counts on original isolation plates were more likely to be associated with a two-tube or greater ASLO-titer elevation than were low-colony counts.

Maxwell

ROENTGENOLOGY


To prevent pneumothorax caused by other technics the authors describe their method of percutaneous subclavian angiography. A needle is directed through the skin in the supraclavicular region toward, and finally into, the subclavian artery and, when this is accomplished, 10 ml. of a 50 per cent solution of diatrizoate (Hypaque) is rapidly injected and several films are obtained. This series of films with a right-sided injection will show the condition of the innominate, carotid, subclavian, and vertebral arteries in the neck, and will show the condition of the latter two vessels with injection on the left. Lateral exposures are used to demonstrate the carotid bifurcation as well as the vertebral, basilar, and intracranial system of arteries.

Krause


Thirty-six patients with myocardial infarction were studied with electrokymograms at periods of from several weeks to several years after the onset of symptoms. Completely paradoxical ventricular movements during systole indicative of ventricular aneurysm were observed in seven patients. A partially paradoxical systolic movement was observed in 19 patients. Uncertain ventricular changes were noted in eight patients, but no changes were noted in two patients. Eighty per cent of the patients showed evidence of obstructed flow from the left atrium. The completely paradoxical ventricular curves during systole were thought to be due to a severely damaged muscular wall. The less marked paradoxical movement during the initial ejection phase was the most commonly observed abnormality but was not considered pathognomonic of myocardial infarction. The changes in the atrial curves were thought to be due to an intra-atrial conduction disturbance with dilatation and hypertyphosis or atrial infarction.

Kalmansohn


When an obstructive lesion affects the arteries supplying the brain proximal to the circle of Willis, the clinical diagnosis becomes more difficult as the area of brain involved is more diffuse. The more proximal the arterial obstruction, the milder and more vague are the symptoms. Recently, effective medical and surgical treatment has made the diagnosis and localization of these lesions important. Most of the radiologic
information is obtained by arteriography. The left vertebral system is best visualized by catheterizing the subclavian artery through the brachial artery. Injection is made against the blood stream increasing the concentration of contrast material and avoiding trauma to the vertebral artery itself. On the right side, injection after catheterization of the brachial artery with the tip of the catheter in the subclavian artery (or in the innominate artery if simultaneous carotid arteriogram is desired) will produce good pictures. The carotid system can be visualized by percutaneous arteriography. However, trauma to the vessels is a hazard, and the proximal portions of the artery may not be visualized. Catheterization of the innominate artery via the right brachial artery and of the left common carotid by way of either femoral artery is preferable. This is so because there is less trauma to the vessels supplying the brain, and less concentration of contrast material in the brain. Also, evaluation of the part played by each vessel is possible, the examination is more comfortable for the patient, and better radiation protection is possible for the staff. Cases are presented where no accurate estimate of the situation was possible without arteriography of the components feeding into the circle of Willis. This could be readily and safely demonstrated by the methods described and the information determined the type of treatment needed.

KITCHELL


The authors have employed left ventricular angiocardiography for the evaluation of the stenotic component in mitral valvular disease. In this particular report, they employed a method with the patient in the supine position in which a needle was introduced through the apex beat and directed toward the right second costochondral junction under local anesthesia. They demonstrated a characteristic dome formation in patients with mitral stenosis. This particular formation is due to the fused mitral valves forming a dome during diastole. This dome bulges into the left ventricle, making a sharply outlined filling defect in this chamber. It can be seen in both the frontal and lateral projections. Mitral stenosis was found at operation in all 20 patients in whom a dome had been found preoperatively in the left ventricular angiocardiogram. The stenosis was severe in all but one patient in whom it was very mild, admitting 1½ fingers. No dome formation was found in patients in whom there was no mitral stenosis. Occasionally a false dome formation was observed in the lateral projection. In these patients, the atrial wall simulated a dome caused by fused mitral valves but this could not be observed in the anteroposterior projection. Furthermore, this false dome in the lateral projection persisted during systole, which, of course, did not occur with a true mitral stenosis. Usually this dome defect appeared rounded but owing to the relation between an eccentric orifice and the projection used the defect appeared more slit-like and the border of the anterior leaflet was sometimes seen below that of the posterior leaflet. The absence of a dome in the anterior projection in patients with an enlarged left ventricle cannot exclude the presence of mitral stenosis,since excessive contrast media in the left ventricle will mask the dome.

LEVINSON


From examination of numerous selective pulmonary angiograms it was concluded that the lobular artery is an end artery and shows no anastomoses, while the lobular veins show numerous anastomoses with neighboring lobular veins. Anastomoses between pulmonary and bronchial arteries could not be demonstrated in normal lobuli but might appear in parenchymal sclerosis. Arteriovenous anastomoses could not be found under any circumstances. The control mechanism for the circulating blood volume seemed to be situated primarily in the capillary portion of the pulmonary circulation, but in pathologic cases it became displaced toward the arterial limb because of reduction of the capillary bed. Parenchymal atrophy caused an increase in the lobular volume, rarefaction of the vascular net, and stenosis of the arterial limb. Parenchymal sclerosis led to decrease of lobular volume, stenosis of the capillary and postcapillary limbs, and formation of arterio-arterial anastomoses. Localized lobar destruction of parenchyma at first decreased the number of blood vessels and then caused the formation of blind ends of the lobular arteries, while the venous limb could no longer be demonstrated.

LEPESCHKIN

Thoracic aortographies were performed in 73 living dogs. When correctly performed, there was satisfactory filling of the coronary arteries in all examinations. In 37 of 223 aortographies, films were obtained which identified the coronary venous circulation. The contrast filling of the veins was thought to be related to the degree of filling of the coronary arteries, as evidenced by the fact that the phlebographic stage was constantly reached when a high concentration of contrast medium had been obtained in the coronary arteries. However, good demonstration of the coronary arteries was not always accompanied by the appearance of the venous elements. After the intravenous administration of ephedrine-type substances, contrast filling of the coronary veins was more frequent and more dense.

Kalmansohn


Percutaneous, spring-guided catheterization of the left ventricle, the aorta, and systemic arteries is a reasonably safe, simple, and effective procedure for obtaining detailed anatomic and physiologic information. It is easily carried out on unanesthetized outpatients. A detailed description of this method is given. The percutaneous retrograde femoral-aortic approach is useful not only in diagnostic visualization but also as a means for obtaining hemodynamic data and a route for selective drug administration.

Kitchell


In a series of paraffin heart models the tomographic method described by Gebhardt was shown to be the most accurate one. It was therefore applied in 25 cardiac patients and 25 normal healthy persons to evaluate the degree of exactness of the Rohrer-Kahlstorf technic, modifications of which are the most commonly used roentgenologic methods for determination of the heart volume. Deviation of values obtained by this technic from actual heart volume was found to be slightly higher than in the Gebhardt method and in the majority of subjects the Rohrer-Kahlstorf method of measurement furnished values that were somewhat lower.

Sheps


A safe and simple technic for performing aortography by means of the venous route is presented. It avoids the complications of translumbar aortography secondary to direct puncture of the aorta. In 204 aortograms made on 184 patients, there was no death or serious complication, and diagnostic information was obtained in over 90 per cent of the cases. After inserting a polyethylene catheter under local anesthesia into the median ante cubital vein and properly positioning it, circulation time is accurately determined by injection of I\(^{131}\)-labelled renografin. The timing of the circulation to the aorta is accurately determined by means of a collimated scintillation counter connected through a rate meter to an Esterline Angus recorder. Using this information, a solution of diatrizoate is injected into the catheter as rapidly as possible (by means of an Elema-Schonander hand injector). Following a pause, equal to the arm vein to aorta circulation time as determined previously, roentgenograms are obtained in one or two planes (the authors in most cases used the Schonander biplane apparatus taking roentgenograms at 1 per second for approximately 8 seconds). Although delineation of the smaller vessels is not as detailed here as in direct aortography, the major arteries are well visualized and changes in caliber of flow can be clearly seen.

Kitchell


Since the advent of arterial grafting for occlusive arterial disease femoral arteriography has acquired increased importance. Determination of the site and extent of segmental occlusion, the state of the distal arterial tree, and the degree of collateral circulation can be best obtained by serialigraphic studies. The authors report 102 consecutive femoral arteriograms on 91 patients. They described full-length multitape visualization by an automatic long-segment serialograph. This machine contains six 14 by 36-inch cassettes that can be serially exposed at predetermined intervals as selected on an interval-timer control box. Occlusive disease in the femoral popliteal system is classified into nine arteriographic patterns. Importance of the
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"run-off" in the selection of patients for arterial grafting is emphasized and a classification of collaterals into three groups according to occlusion patterns of the femoral-popliteal segment is given. Prognostic considerations based on arteriographic patterns and degree of collaterals are arrived at by correlating them with clinical findings. In most instances a good correlation existed between the clinical and the angiographic findings, attesting to the reliability of serial arteriography.

Kitchell

Holesh, S.: Dissecting Aneurysm of the Aorta.

Until recently, dissecting aneurysm of the aorta was regarded as fatal and the occasional recovery found in the autopsy room was considered a medical curiosity. An increasing number of acute dissections is being treated surgically, and immediate diagnosis improves the poor prognosis. Operation should be performed within 48 hours and copies nature's method of healing by establishing re-entry of the dissected passage distally into the aorta. Reconstruction operation with graft can be performed but depends on the extent and location of the lesion. The radiologic findings are determined by the stage in which the examination is made. Shortly after the acute phase the superior mediastinum is widened and the heart is considerably enlarged. The mediastinal widening is probably due to dilatation of the aorta and extravasation of blood into the mediastinum. The cardiac enlargement may be due to rupture into the pericardium or acute cardiac dilatation. The patient's poor condition precludes tilting maneuvers so that it is difficult to tell whether increased cardiac size is the result of dilatation or hemopericardium. Left hemothorax often obscures the heart border. Where recovery takes place, the aortic knuckle becomes more clearly defined roentgenologically and may return to normal size, usually however at a higher level than before. Often the aorta remains widened and a double aortic knuckle is visible. The normal width of the aortic wall is 2 to 3 mm. and dissection is suggestive if the thickness of the wall approaches 1 cm. If it is 1 cm. or more, there is little doubt about the diagnosis. With a slow leak before acute dissection occurs, the obvious diagnostic sign is marked difference in caliber of the aorta before and after rupture. In chronic cases the radiologic appearances depend on the location and extent of the previous dissection. When previous pictures are available showing calcification in the knuckle, such calcification is an easy baseline from which to measure thickness of the artery wall. Often the dissection stops just above the hiatus and a posteroanterior film showing a sudden alteration in caliber at this point may be diagnostic. Angiocardiography is of great value in doubtful cases. The total number of angiograms and aortograms performed in cases of dissection is small but these will increase, since it has been established that diagnosis may be lifesaving with present surgical technics.

Kitchell


Many different methods have been employed for demonstrating intra-cardiac calcifications including roentgenography, roentgenkymography, and planography. Each of these has limitations. Over a 2-year period, 803 cinefluorographic examinations of the heart were performed at Veterans Administration Hospital in Minneapolis. The technic of the examination consisting of six film sequences of the heart and great vessels is described. On the basis of these studies, the authors consider cinefluorography the method of choice for detecting and recording calcifications within the heart.

Kitchell


The availability of technics for cine roentgenographic and high-speed serialographic technics of roentgenologic examination, in the Department of Radiology of the University of Missouri, permitted the clarification of some of the problems relating to these two modalities. Three broad aspects of the problem (dosimetry, relative diagnostic effectiveness, and evaluation of the relative roentgen opacities of various concentrations of contrast media) were studied. There was little difference in the radiation dose to the skin with either method, although more skin was irradiated with serial angiocardiography. Simple protection measures will guard attendant personnel. In lesions where the dynamics of flow were important, cineangiocardiography possessed advantages. Tests indicated that the radiopacities of 50 per cent and 85 per cent Hypaque were quite similar and the advantages of additional opacity were offset to a great extent by the disadvantage of the inherent increased viscosity and toxicity.

Kitchell

In about 75 per cent of patients with congenital heart disease, the type of malformation can be accurately determined and operability predicated by correlation of the history, physical examination, electrocardiographic findings, and conventional roentgenographic and fluoroscopic findings. Special methods such as cardiac catheterizations and angiocardiography must be utilized in the remaining 25 per cent. Congenital anomalies can be broken down into four groups (based on the changes in the lesser circulation) and further subdivisions of these groups (based on certain other differentiating features) can be made and prove to be a great practical value in diagnosis. Although in most instances the x-ray findings alone are not unequivocally diagnostic of a specific cardiac anomaly, by use of the suggested approach and by correlation with the clinical findings in a given patient an accurate diagnosis can often be established. In many instances specialized procedures, including cardiac catheterization, angiocardiography, and thoracic aortography, must be used for precise diagnosis.

Kitchell


Angiocardiography and thoracic aortography have been carried out at the Mayo Clinic on 200 patients having a variety of mediastinal lesions. These procedures were often the only accurate means of distinguishing vascular from nonvascular lesions without exploration. The results of the studies may determine the exact nature, extent, and probable resectability of lesions of the mediastinum. In contrast, fluoroscopy and other diagnostic technics were inaccurate in distinguishing vascular from certain nonvascular lesions. Twelve case histories are given to illustrate the value of information obtained by angiography. These showed the possibility of avoiding unnecessary and possibly hazardous mediastinal exploration in some patients; and in other cases indicated the necessity of surgical exploration. No fatalities and no serious reactions were encountered in the entire group of patients with either angiocardiography or thoracic aortography.

Kitchell


In well over 600 angiocardiograms at Indiana University Medical Center over the past 12 years, the aortic configuration was found to be the key to the recognition and differentiation of many primary types of congenital and acquired cardiac lesions. By use of selective cinecardioangiography in the past 3 years, the importance of aortic size in differential diagnosis has been even more impressive. In an evaluation of the usefulness of the size, shape, and specific aortic contours for diagnosis of congenital heart disease, a review of the plain films of 610 cases of 12 commonly encountered lesions was carried out. The conclusions drawn were as follows: 1. The aorta is enlarged in patent ductus arteriosus, tetralogy of Fallot, tricuspid atresia without transposition, truncus arteriosus type IV, aortic stenosis, and coarctation. 2. The aorta is decreased in size in atrial septal defects, ventricular septal defects, anomalous pulmonary venous return, truncus arteriosus type I, II, and III, pulmonary stenosis, tricuspid atresia with transposition, transposition of the great vessels, and fibroelastosis. 3. In coarctation, patent ductus arteriosus, and aortic stenosis, the aortic configuration may be sufficiently characteristic to permit roentgen identification. 4. The aortic size and profile may differentiate patent ductus arteriosus from other left-to-right shunts. 5. The large aorta of tetralogy of Fallot distinguishes this condition from pulmonary stenosis with right-to-left intratral shunt. 6. The large aorta is a useful sign in differentiating tricuspid atresia from tricuspid atresia with associated transposition of the great vessels. 7. Specific aortic contour is as reliable a diagnostic sign of coarctation of the aorta as is rib notching. This is of value because one sign may be present when the other is absent.

Kitchell


The posteroanterior films of 172 patients, who had undergone cardiac catheterization, were examined for the appearance of the pulmonary venous vasculature. All had valvular heart disease and the findings were not entirely in agreement with those of previous investigators. It was noted that pulmonary vein size was related to pressures within the left atrium, and an accurate estimate of the left atrial pressure could be obtained from plain posteroanterior films of the chest. The upper lobe veins were a more reliable index to elevated pressure than the lower lobe veins. However, both should be considered as well as the presence of Kerley's B lines, fluid, and distinctness of the veins. No appreciable
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difference in appearance among valvular lesions producing an elevated pressure was observed.

Kitchell


In 13 hypertensive and four normotensive persons 50 to 75 mg. of Penthionium caused decrease of venous pressure, increased circulation time, decrease of heart output (method of Broemser and Ranke) and decrease of heart size (determined by means of simultaneous roentgen tomography in 3 to 7 planes). The amplitude of contraction, determined by synchronous kymographic of seven points, also decreased. In four of six patients with pathologic kymographic curves these became normal; this is attributed to decrease of an abnormally elevated residual ventricular blood volume.

Lepeschkin


In the examination of 5,307 unselected chest microfilms of Negroes living in Ruanda (Central Africa), 4.45 per cent revealed pathologic anomalies of the heart and great vessels and 2.82 per cent were suggestive of abnormalities. A comparable investigation in the white Belgian population, living in Europe, revealed 13.53 per cent pathologic anomalies and 1.22 per cent suggestive abnormalities. Arteriosclerosis, chronic pulmonary heart disease, aneurysm of the aorta, and calcifications of the pericardium were more common in the white population. The Negroes showed often a globular-shaped heart. The frequency of chronic rheumatic heart disease and of congenital heart disease was the same in Belgium and in Ruanda.

Brachfeld


Seven patients with metallic bodies in the cardiovascular system were studied angiographically. Two of these patients had successful removal of bullets; one from the right ventricle, and the other from the right atrial appendage. Four patients were asymptomatic and were not subjected to surgery. The remaining patient, who had suffered a right hemiplegia and interventricular block after injury, had recurrent cerebrovascular seizures and, due to this, it was thought that the removal of a 38-caliber bullet from the posterior wall of the left ventricle would be too hazardous. This method of study will often indicate whether or not metallic fragments should be removed from the cardiovascular system. In other cases reassuring the patient of the unimportance of the fragments (which may not be causing trouble) will relieve the symptoms of a cardiac neurosis.

Kitchell


The mesenteric arteries are subject to the same atheromatous, thrombotic, and embolic phenomena associated with the coronary and cerebral vessels. It has been said that mesenteric artery abnormalities exhibit roentgenographically a specific pattern. Although this belief is far from conclusive, there are certain roentgenographic manifestations encountered in mesenteric vascular occlusion that have not been adequately stressed. The present paper demonstrates and discusses some of these patterns observed in the past 10 years at the Massachusetts General Hospital. The clinical history is essential for interpretation of the roentgenographic findings, and in the presence of the following findings mesenteric vascular occlusion should be suspected: 1. Acute abdominal pain, vomiting, and shock in a patient presenting etiologic factors such as generalized atherosclerosis, atrial fibrillation, myocardial infarction, liver disease, blood dyscrasia, and antecedent aortic or abdominal surgery. Roentgenograms may show nonspecific ileus, signs of fixation of bowel loops with edema of intestinal walls and increase in intraperitoneal fluid. With contrast studies performed early, marked swelling of the mucosal folds with thickened bowel wall and occasionally an intraluminal pseudotumor formation may be noted. 2. In subacute and chronic cases abdominal pains may be anginal in nature and roentgenograms may be negative. Here contrast substances may outline narrowing of the bowel lumen simulating regional ileitis or ulcerative colitis, with or without evidence of malabsorption syndrome. Aortography may or may not demonstrate diminution of the mesenteric vascular flow. In our present state of knowledge, visualization of apparently patent mesenteric arteries does not exclude the diagnosis. If the mesenteric artery is well visualized, consideration should be given to the possibility of mesenteric venous thrombosis. The diagnosis
of mesenteric vascular disease is important because bowel and vascular surgery may offer the possibility of altering a grave prognosis.

**Kitchell**

**SURGERY AND CARDIOVASCULAR DISEASE**


The author describes a heat exchanger for deep hypothermia and enumerates the advantages of deep hypothermia with extracorporeal circulation without an oxygenator. These include: (1) less blood trauma and less hemolysis, (2) better oxygenation in the patient’s lungs, (3) better protection for the myocardium than during other types of circulatory arrest, (4) easier operation, and (5) better blood volume control. In addition, cardiac arrest or complete circulatory arrest may be made at low temperature for longer intervals than with other methods. After 17 clinical cases, conclusions are that the ordinary pump-oxygenator (with the spinning disk oxygenator) is preferred at normal temperature in most cases, but combined with deep hypothermia in aortic valve disease. Deep hypothermia is considered contraindicated in children because of the risk of brain damage, caused possibly by the aggregated thromboocytes and white blood corpuscles, which disappear from the circulation at a low temperature, returning to the circulation during rewarming, and occluding certain areas of the brain. In children, the myocardium is protected by local hypothermia. The heart may be surrounded with plastic bags of ice, after aceylecholone arrest, or isolated coronary perfusion with cold blood may be used.

**Maxwell**


Of 29 patients with aortic or pulmonary stenosis operated upon by closed heart methods, only two developed conduction disturbances. Of 28 patients with ostium secundum-type atrial septal defects operated upon by the open heart method, none developed them, while of 30 patients with ostium primum atrial, atrioventricular, or ventricular septal defects operated upon by this method, A-V block appeared in six and right bundle-branch block in 11. Of six patients with valivular pulmonary stenosis one developed patients with A-V block died. Histology study proved in all nine patients with infundibular stenosis, A-V block appearing once. All cases of A-V block appeared during insertion of a prothesis into a large septal defect; five of the seven patients with A-V block died. Histologic study showed that in these cases the common bundle or its bifurcation was compressed by sutures. Right bundle-branch block did not seem to influence the prognosis. When it appeared, the initial portion of QRS was not modified; the wide $R^*$ wave in $V_1$ always showed high voltage, even if no right ventricular hypertrophy pattern was present before appearance of the block. The duration of the QRS complex showed a continuous scatter between 0.08 and 0.17 second. Left bundle-branch block appeared only once, after operation for aortic stenosis.

**Lepeschkin**


An acute occlusion rate of 10 per cent and a 2-year occlusion rate of approximately 50 per cent were encountered in 125 patients having femoropopliteal bypass grafts of crimpl Nylon or Teflon tubes. Direct inspection of the unsuccessful grafts and arteriographic study of patent ones in 22 patients indicated that the chief factor leading to thrombotic occlusion was the loss of elasticity and flexibility of the graft. Arteriograms during knee flexion frequently showed kinking and buckling of a graft that was reasonably straight while the leg was extended. Experiments were cited to show that loss of flexibility was a result of fibrosis of the graft, the degree of which reached a maximum within 6 months. Two infrequent causes of graft failure were local infection and progressive arteriosclerotic obstruction proximally or distally. The author presently prefers endarterectomy for relief of short-segment femoropopliteal obstruction and reserves grafting for long-segment obstructions.

**Rogers**
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