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THE DIRECT APPROACH TO CARDIOVASCULAR DISEASES

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THE importance of the group of cardiovascular diseases is shown by vital statistics of this country. The total number of deaths in 1941 was about 1.4 million. Heart disease was the cause of death in 0.4 million, which is more than one out of every four. The coronary artery problem is almost as important as the cancer problem, 107,000 deaths for coronary artery disease compared to 166,000 for cancer.

While this group of cardiovascular diseases is in first place as a cause of death it has not received equivalent funds for research. There are some interesting figures on this subject. In 1940, the amount spent per death for heart disease was 17 cents, for cancer $2.18, for infantile paralysis $525, and for other causes $4. It would appear that the amount of money available for research depends to a great extent upon public appeal. We are familiar with the "March of Dimes" and the Sister Kenny campaign. The fight against cancer and tuberculosis is always in progress. Little or no public appeal has been made to collect funds for research on the heart and blood vessels. It is highly desirable that special cardiovascular institutes be established for the study of these diseases.

Our present knowledge of these diseases concerns anatomy, physiology, pathology, and internal medicine. Until fairly recently only a small part was surgical. It is of interest to note that in the diagnosis and treatment of diseases of heart and blood vessels the internist uses methods that might be classified as indirect. These methods of study include the use of the stethoscope, the electrocardiogram, the x-ray, the fluoroscope, and such physiologic measurements as arterial and venous pressures, circulation time, temperature, etc. None of these methods involve direct vision of the part. The internist who treats heart disease seldom, if ever, sees the human heart beat. Practically no one ever thinks of this point. No one, including the internist himself, believes that here is a point worthy of comment. That is the way it has always been; that is the

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way it is. And yet we know that direct vision contributes something in the way of precise knowledge and understanding that cannot be obtained in any other way. We know that when a machine breaks down, a mechanic is necessary to look it over. If a car does not run, someone has to lift up the hood and look. We are now entering the era of direct examination and manipulation in the cardiovascular field. In 1905 craniotomy and laminectomy were new operations. I believe a similar development will be possible with the heart and blood vessels. It may be even a greater development because disorders of the heart and blood vessels involve mechanics and physics to a greater degree than is the case with the brain and spinal cord. It will be interesting to observe this development during the next twenty-five years.

I should like to refer briefly to the accomplishments that have been made in the direct approach to the heart and blood vessels. Many members of this association are familiar with these developments and I cannot here do more than make brief reference to them. The program of this meeting includes several contributions on the direct approach to cardiovascular diseases. These are milestones in surgical progress. These presentations are made by the individuals who made the original contributions and I dare say that this program is unique in this respect.

Let us refer briefly to the accomplishments made by the direct approach to heart and blood vessels. We begin with trauma. Methods have been described for the suture of auricular and ventricular wounds. The methods for the suture of auricular and ventricular wounds are not identical. Several excellent series of cases have been reported. Methods of procedure have been determined and are well recognized by certain surgeons, but there are many instances in which proper treatment is not given. Here is opportunity for teaching. Foreign bodies have been removed. Removal of foreign bodies from the heart is a subject that can bear further study and experimental investigation. This subject will be presented on our program. Reference should be made to the group of nonpenetrating wounds of the heart. This type of injury, I believe, is more common than the penetrating wound and better clinical recognition is in order. In the repair of vascular injuries, considerable progress has been made during the war. Small lacerations of major arteries have been repaired by suture. Excision of injured artery and end-to-end anastomosis have been done. The use of the vitallium cannula seems to enlarge the possibilities in blood vessel anastomosis. Demonstration and teaching of these methods are necessary so that surgeons generally will be able to perform these operations. No doubt, there were many instances in World War II where such opportunities were overlooked. There will be instances where they will be overlooked in civilian surgery. These methods should be taught in the experimental laboratory. The late repair of vascular injury in World War II was carried out in the vascular centers of this country. The results obtained in these centers almost reached perfection, in that there was almost no loss of life or limb in the performance of these operations.

We turn now to a group of disorders which concerns inflammation and the results of inflammation, namely fluid, adhesions, and scar tissue around the

heart. This group includes purulent pericarditis, pericardial effusions, adhesive pericarditis, constrictive pericarditis, and other conditions. The term extrinsic lesions has been suggested for these conditions and the group of extrinsic lesions has been analyzed into its components which are compression, torsion, rotation, and not traction of the heart. In other words, a heart is exposed in the experimental laboratory and then an attempt is made to interfere with the function of the heart by external manipulation. The possible ways in which the heart can be disturbed by such manipulation are compression, rotation, and angulation of the heart. Let us refer briefly to one of these, namely compression. Compression may be acute or chronic as is the case with the brain. The pathology may include a variety of lesions with the heart as with the brain. There is much to recommend the adoption of this point of view. It simplifies diagnosis and it makes clear the requirements to cure the patient. For example, an almost identical clinical picture can be produced by a compression scar on the heart, by tuberculous or other type of exudate in the pericardial cavity, and by a neoplasm in the pericardium, but the treatment of these lesions is entirely different. Recognition of clinical picture is the first requirement, and determination of type of lesion is the second requirement in order to determine correct treatment. I recommend to you recognition of extrinsic lesions as a group and analysis of the various types as indicated.

We come now to patent ductus arteriosus and coarctation of the aorta. These subjects are presented on the program by those who made the original contributions. I can only compliment these surgeons for their vision and courage in doing these operations. It is not an important point to say that ligation of the patent ductus arteriosus and excision of a narrowed aorta were considered by surgeons for many years. The important event is to do the operation. This involves freeing yourself from the inertia of your associates and going ahead in experimental laboratory and with patients. I desire to refer also to the courageous step taken in ligation of the patent ductus arteriosus in the presence of infection in the blood stream. After these accomplishments are made by the surgeon there remains the problem of application of the operation in the treatment of these conditions and this is a matter of medical education. I might add that the student frequently is more apt than his teacher in learning and accepting these new developments.

Likewise the work on tetralogy of Fallot is presented on this program by those who originated the work. I think this is one of the nicest contributions made to surgery in my lifetime. It was conceived as an original idea, it was worked out in the experimental laboratory, and it was applied to patients. While it does not cure the cardiac abnormality it provides definite benefit to a condition that was hopeless. What has been accomplished in this field suggests that the direct approach of the surgeon might be extended to other cardiovascular conditions that appear hopeless.

Reference should be made to the recent developments in the treatment of portal vein obstruction. Anastomosis has been made between the splenic vein and the renal vein. The Eck fistula, of historical and experimental interest, is

being applied to patients with cirrhosis of the liver. No doubt with refinements in operative skill and technique these operations will be done with greater frequency.

Resuscitation is also presented on this program. While methods of resuscitation might be improved in the future, we do possess effective methods for starting the heart from standstill and also for defibrillation of the ventricles. We possess excellent respirators for getting oxygen into the lungs. I believe courses of instruction should be provided on resuscitation so that surgeons would have in mind an order of procedure such as they have for the performance of surgical operations, instead of the disorderly procedure that usually prevails at this moment of crisis. Certification by the American Board of Surgery and the Surgical Specialties should require knowledge on resuscitation.

I cannot refer to all the advances that have been made in the direct approach to cardiovascular diseases. The prevention of pulmonary emboli by ligation of veins and by the administration of anticoagulants is a very important contribution. I can only mention sympathectomy for hypertension, for arterial spasm, for causalgia, for anginal pain, and for other conditions.

I should like to discuss briefly the coronary artery problem and show some slides of specimens that have been produced. Most of us are familiar with the trigger mechanism in the heart. A trigger is produced by reduction of arterial blood flow to any part of the heart muscle. A delicate balance may come into existence in which a small amount of oxygenated blood may prevent or promote discharge of the trigger. Discharge of the trigger produces ventricular fibrillation which is fatal. The arterial blood supply to the myocardium can be altered in several ways. One method consists of production of extracoronary anastomoses, that is, vascular communications between the coronary arteries and the arteries of tissues grafted upon the heart. Another method consists in production of a more equal distribution of arterial blood by way of the coronary arteries. Coronary arteries are essentially end arteries. Occlusion of a coronary artery or of one of its branches may produce an unequal distribution of blood to the myocardium. Communications between the peripheral branches of the two coronary arteries would produce a common arterial bed which in turn would be a protection to the heart if occlusion should develop. Such communications can be produced by surgical methods. The most effective method that I have found is by gentle abrasion of epicardium and the application of a small amount of powdered asbestos onto the abraded surface. It has been demonstrated beyond any reasonable doubt that communications produced by this method are beneficial in the presence of arterial occlusion. Another method of producing a common arterial bed in the heart is that which occurs after nonfatal occlusion of an artery. The occlusion must not destroy cardiac function because time is required for these communications to develop. I believe it is possible for the extracoronary communications and the intercoronary communications produced by inflammation to provide this time factor for these protective channels to develop. A heart with intercoronary channels is a protected heart. The specimens shown are, indeed, significant. Another method for changing or improving the coronary arterial circulation is by production of venous stasis. Experimental

ligation of coronary veins does produce some measure of benefit when a coronary artery is ligated. There is also some experimental evidence to show that removal of nerves at the base of the aorta and in the region of the left coronary artery is beneficial after a major coronary artery is occluded. I have not made measurements in this subject.

It does seem to me that we have arrived at the time when some application of these data should be made to patients with coronary artery disease. I, and others working in this field, have been conservative in application to patients. It is hoped that a conservative and critical attitude will prevail in the future as further clinical application is carried out. It is hoped also that experimental studies on the coronary problem will be carried out in the research laboratories of our medical institutions. I repeat that the coronary problem is almost as important as the cancer problem and future progress in the coronary problem will be along lines of direct surgical approach.

Before concluding this address I should like to make a few remarks about possible developments of the future. Among these I would place transplantation of arteries. I have in mind excision of a segment of aorta or a segment of another important artery and replacing it by a graft taken from a less important artery. I also have in mind exclusion of the heart from the blood stream so that the heart can be opened and intracardiac operation carried out. Some progress in this field has been made. The possibilities in the way of intracardiac operations are repair of valves, removal of intracardiac tumors, removal of ball-valve thrombi, repair of defects in the auricular septum and in the ventricular septum, removal or destruction of vegetations, removal of foreign bodies, etc. These and other advances that scarcely enter one's mind, I believe, will be possible by the direct approach not only to the outside of the heart and blood vessels but to the inside of these structures as well.