A New Era of Surgery for Ischemic Heart Disease

Before World War II, the attempts to revascularize the ischemic myocardium utilized various forms of omentopexy. The initial efforts of Beck and O'Shaugnessy encouraged other surgeons to devise methods intended to augment a deficient coronary arterial blood supply. Hearts, both animal and human, were operated upon with incredible variation in technics. Some were abraded, then wrapped with tissues taken from other parts of the body—omentum and pericardial fat, intercostal muscle bundles, small bowel and large bowel, lung, even spleen were utilized as agents for revascularization. Other operations sponsored an inorganic approach wherein the ischemic myocardium was anointed with caustic agents such as phenol or trichloroacetic acid. Another technic dusted the circulation’s helpless pump with talc or powdered asbestos. These procedures, each traumatic in its own way, were alleged to bring new blood to the ischemic myocardium or to redistribute the diminishing supply. The less direct operations ignored revascularization and attempted to eliminate angina pectoris by neurosurgical means—something akin to the philosophy that burglary is less troublesome if the alarm is silenced. The era of pioneer surgery for the treatment of coronary arterial disease ended with general disillusionment, and the attitude was that medical treatment, despite its obvious inadequacies, was preferable to whatever the surgeon had to offer.

In 1959, a new era of surgery for myocardial revascularization began, not with a new surgical modality, but with the introduction of an invaluable adjunct to diagnosis. Sones’ technic of selective coronary arteriography for the first time permitted accurate demonstration of coronary arterial disease, and defined the precise needs of the individual patient. The Cleveland Clinic experience that now exceeds 12,000 successful arteriographic studies of coronary arteries in man attests to the safety and to the value of this procedure.

Improved diagnosis leads invariably to improvement in therapy. Clinical experience with coronary arteriography demonstrated that patients with ischemic heart disease have myocardial perfusion deficits that can be localized with accuracy. The finding of an established myocardial perfusion deficit in itself suggests that effective treatment will require augmentation of blood supply to the area of demand. It is of interest that coronary arteriography, which brought precise diagnosis to ischemic heart disease, helped to establish the surgical treatment of this entity. Utilizing his technics in combination with mammary arteriography, Sones, in 1962, proved in living patients the validity of Vineberg’s thesis that revascularization may be provided by internal mammary artery implantation. On the basis of this evidence, more than 2,000 patients have since been operated upon in the Cleveland Clinic Hospital with mammary artery implant procedures. The encouraging results of Vineberg’s original contribution, as established by both subjective and objective studies, has led to broader application of this approach and other approaches to surgical revascularization. It is now certain that many patients who suffer from ischemic heart disease may benefit from surgical treatment that utilizes some form of implant procedure or direct operation upon the obstructed coronary artery. In addition, there are those patients who will benefit from plastic reconstruction of the left ventricle whose function has been impaired by myocardial infarction.
As might be expected, the resurgence of enthusiasm for the surgical treatment of ischemic heart disease has renewed interest in previously discarded procedures and has extended the search for newer ones. Omental grafts, dorsal sympathectomy, the "arterialized" vein graft, even acupuncture are receiving clinical application. Those who both advocate and defend the clinical use of these procedures cite favorable observations made in the experimental laboratory. No one questions that experimental surgery is a basic precursor to clinical surgery, or that any new operative treatment for ischemic heart disease warrants thorough laboratory assessment. But the mere fact that experimental work has been performed is not in itself justification for clinical application. The monumental work of Beck and his co-workers in the laboratories of Western Reserve University, which encompassed many years, has not produced a means of augmenting blood flow to ischemic myocardium. Vineberg's extensive experimental study with free omental graft has encouraged him to advocate its clinical use; however, there is little objective evidence to support his thesis that omental grafts provide true revascularization in man. After 1962, the Cleveland Clinic team utilized free omental graft in more than 120 operations; progress examination by arteriographic means has failed to establish in a single instance that the omentum has contributed additional blood to ischemic heart muscle. An appreciable number of these patients initially treated by epicardectomy-free omental graft, have been reoperated upon—at no time has a single instance of either healthy omentum or vascular communications been demonstrated. These disappointing observations have led the Cleveland Clinic team to abandon epicardectomy-free omental graft as a part of revascularization procedures.

Those who have advocated the use of an "arterialized" vein graft for myocardial revascularization have reported repeatedly on the benefits provided by this technic. As is so frequently the case, emphasis has been placed upon the survival of the patient and the frequency of subjective improvement. Ample time has elapsed for those who favor myocardial implantation by vein graft to support their claims by angiographic proof of success. To my knowledge there is no reported instance where arteriography has shown conclusively that an implanted vein graft has provided unquestionable collateral support to the impaired coronary arterial circulation.

The surgery of coronary arterial disease begins and ends with arteriography! The patient who is suitable for undergoing a revascularization procedure is selected on the basis of his individual needs; these cannot be established without arteriography. The evaluation of the postoperative result requires more than a surviving patient and a favorable subjective response. If revascularization is claimed, then it must be shown without question that the surgical mission has been accomplished. When an internal mammary artery opacified a year or more after implantation has within its myocardial tunnel clearly defined arteriolar pathways to the coronary arterial circulation, then there is proof that revascularization has occurred. When a main coronary artery that was entirely occluded is reconstituted with an effective patch graft or an interposed saphenous vein graft, postoperative arteriography will demonstrate the degree of revascularization that occurs. It is argued frequently that certain procedures do not lend themselves well to arteriographic evaluation and, under these circumstances, the author claims successful revascularization on the basis of favorable experimental evidence and the surviving patient's declaration that he is symptomatically improved. This is not enough! Wherever blood flows, radiopaque dye will go. If a free omental graft can be successfully opacified by a postmortem Schlesinger-mass study, then there must be a means of demonstrating its capacity for collateralization within the living patient.

Although a new era of surgery for ischemic heart disease has been established, there are many physicians who have not forgotten the disillusionments of the pioneer days. Doubt for any surgical treatment of coronary arterial disease will be dispelled only when the objective evidence of successful revascularization is irrefutable. Therefore, those surgeons who operate upon coronary artery patients, sans arteriography, and utilize procedures of dubious clinical merit, only delay the time when general acceptance of revascularization surgery will be realized. Since sufferers from coronary arterial disease are numbered in the tens of thousands, clinical diagnosis and surgical therapy must be available to virtually every medical community if the logistic problems of this disease are to be solved. This means that many more diagnostic laboratories must be built and staffed than are currently available. It also means that any surgical procedure intended for the relief of ischemic heart disease must have its efficacy established beyond question, and then be standardized to the simplest form in order that it may benefit the greatest number at the lowest cost.

Donald B. Effler, M.D.*

*From the Department of Thoracic and Cardiovascular Surgery, The Cleveland Clinic Foundation, Cleveland, Ohio.