Editorial

Coronary Artery Disease
Physiological Aspects and Surgical Therapy

RECENT issues of Modern Concepts of Cardiovascular Disease have featured two presentations on coronary artery disease.\(^1\)\(^2\) The first, by Elliott and Gorlin, is a provocative, correlative study of the clinical, electrocardiographic, metabolic (lactate production), and cineangiographic findings in 100 patients exhibiting significant coronary disease.\(^1\) Several facts of clinical importance deserve emphasis:

1. When pain occurs nocturnally, postprandially, or spontaneously at rest without inciting cause, when it radiates to two or more sites (neck, arms, back, and so forth), and when it has been present for more than 3 years, significant stenosis (\(> 50\%\)) of two, frequently three, major coronary vessels can be predicted with confidence.

2. Master's stress tests in the 26 patients whose resting electrocardiograms were normal disclosed negative electrocardiographic results in 10 patients (10% of the entire group), five of whom developed anginal pain; the remaining five patients (5%) exhibited neither pain nor electrocardiographic alterations. This finding, as well as the traditional variability of the anginal syndrome itself, may be related to the integrity of subendocardial collateral blood flow and to the various dynamic factors which modify it.\(^3\)

Of considerable interest is the emergence of a fascinating new syndrome, not yet completely defined nor explained, consisting of a classic history of angina pectoris in the presence of normal selective cine coronary angiograms, normal metabolic studies, and negative Master's tests. One may inquire whether classic angina may exist in the presence of only small vessel disease not disclosed by present angiographic techniques, or whether it possesses a different (that is, transient coronary artery spasm) or even varied genesis in individual patients. These techniques, while unquestionably useful for the delineation of the larger coronary arteries, fail to display the smaller vessels. The demonstration of varying degrees of arterial stenosis may not mean necessarily that coronary flow itself is diminished or that perfusion to a specific area of cardiac muscle is critically deficient. Nevertheless, studies using selective coronary vein sampling for evaluating lactate production have tended to correlate well with ischemic areas corresponding to obstructed coronary arteries.

The development of coronary arteriography and improvements in surgical technique have given impetus to and permitted a more direct surgical approach to the therapy of
ischemic heart disease, a field admirably summarized by Sabiston.2 Endarterectomy is suggested after medical management has failed for those patients who exhibit proximal arterial lesions of short length but good distal arteries and are under 50 years of age. The demonstration that implants of the internal mammary artery into the anterior wall of the left ventricular myocardium remain patent (63 to 85% of patients4,5), anastomose with coronary vessels, and apparently increase blood supply to ischemic muscle has led to a resurgence of interest in Vineberg's and other revascularization procedures. The mortality is acceptable and amelioration of pain has been achieved in the majority. Limited experience utilizing an autogenous saphenous vein graft from artery to myocardium has been reported. In our clinic, results have been disappointing due to failure of vein graft patency. Data on the volume of blood flow through endarterectomized vessels or through implants obviously are of critical importance but are not yet available. Indirect estimates of flow utilizing Kr curves and lactate changes, before and after revascularization, suggest increased blood flow through such implants.5 The normal, resting, beating heart utilizes 0.08 to 0.1 ml of oxygen per gram of left ventricular muscle per minute; this requires a coronary flow of 105 to 135 ml/min for an average normal subject. The question remains unresolved whether such surgical procedures actually provide a sufficient increase in the delivery of oxygen flow to the myocardium to justify surgery. It is evident that one must know which coronary artery is involved and precisely what area of heart muscle is ischemic before surgery is attempted. The cardinal indication for consideration of an implantation procedure is uncontrolled angina. An impending or healing myocardial infarction is an obvious contraindication. Disease of all three coronary vessels and rise in end-diastolic pressure above 14 mm Hg predicate a high operative mortality (82%).

A priori, long-standing, and conventional ideas regarding coronary artery disease are undergoing constant modification as new data become available. New advances in the treatment of coronary disease certainly are applied best against a rational background of understanding the patient and the precise nature of his problem. At present surgery seems indicated for only a small percentage of patients suffering from ischemic heart disease. Caution is needed in the application of new drugs (for example beta adrenergic receptor blockers). Knowledge of the pharmacological background of the drug and careful patient selection is mandatory, for while such drugs may be effective in the relief of anginal pain, they can precipitate heart failure, shock, and death.

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References
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