Discussion

**Question.** What are the criteria for simultaneous coronary artery bypass and carotid endarterectomy?

**Dr. Wright.** The difficult case is the individual who has left main coronary artery disease, substantial angina, and has 99% stenosis of the carotid artery on one or both sides with a positive carotid noninvasive study and a positive carotid angiogram. That patient will undergo simultaneous coronary artery bypass and carotid endarterectomy. This occurs in about 2% of our cardiac operations overall. In the worst-case situation, when the patient became hemodynamically unstable, carotid endarterectomy was postponed and done electively at a later date.

**Professor Nicolaides.** The only situation in which we would operate on the carotid and the coronary arteries under the same anesthesia is that of the patient who has left main stem disease or unstable angina and whom the anesthesiologist believes it is unsafe to anesthesize to perform the carotid endarterectomy and not correct the cardiac problem. In that situation the carotid and coronary arteries are done simultaneously, with the carotid endarterectomy taking a slight temporal precedence. For the patient who has repeated transient ischemic attacks, with stable angina, the carotid endarterectomy is performed first with the coronary operation done a week or two later. In the patient without symptoms who has very tight carotid stenosis and possibly a contralateral occlusion, the carotid endarterectomy is performed first. Although there are no data to support the belief that we are saving patients from stroke, nevertheless, we justify this action because we are able to perform carotid endarterectomy with the complication rate well below 1%.

**Dr. Hertzer.** The combined operation performed at The Cleveland Clinic constitutes a small group but one that, nevertheless, is critical. If one considers long-range as well as perioperative complications, it makes just as little sense to send the patient with coronary artery disease home to have a stroke as it does to send the patient with carotid artery disease home to have a myocardial infarction. Presently, combined operations are performed in about 1.7% of the bypass procedures in our clinic. By preference, we would perform the carotid endarterectomy 5 or 6 days before the coronary bypass in the patient in stable condition. Our success in preventing operative strokes by combined operations is so assured that we have now begun to randomize our series. Although, as Prof. Nicolaides has said, there is no evidence to prove that one is really preventing strokes during coronary artery bypass by performing simultaneous carotid endarterectomy, the stroke rate with this combined operation is about 4% in our experience. What may represent is a 2% stroke risk from carotid endarterectomy added to an unchanged 2% stroke risk from coronary bypass itself. During the past 15 months of randomization, there have been approximately 40 patients in either group, but the data must wait about 5 or 6 years for the accumulation of the necessary 250 to 300 patients.

**Question.** What recommendations can you make to aid the vascular surgeon in the community hospital in the detection of coexisting coronary artery disease? If the incidence of stroke in the coronary bypass patient is only 2% and if myocardial infarction in the carotid endarterectomy patient is the same, is this problem being magnified beyond its true significance?

**Dr. Brewster.** First, nuclear imaging techniques are increasingly available throughout community hospital practice. Certainly, with modern day anesthesia and postoperative support, operative mortality rates are low; deaths that do occur are those of patients with covert coronary disease who pass through the system undetected only to sustain a fatal myocardial infarction. Dr. Hertzer's point is worth reinforcing: that is, that long-term survival unquestionably is influenced by coronary angiography. Widespread use of coronary angiography is not feasible and with current economic social pressures, it may be increasingly difficult to apply. Dipyridamole utilized in this fashion is still under investigational restriction but will probably be approved shortly. Of the 54 patients in our series, 16 had chest pain and in 10 of these, definite ECG evidence of ischemia was apparent. However, no arrhythmias or myocardial ischemic events secondary to the intravenous utilization of dipyridamole itself occurred. Aminophylline administered intravenously is apparently a very specific antagonist and promptly relieves this problem.

**Dr. Mitchell Mills (Washington, D.C.).** What is the panel's attitude concerning the practice of simultaneous coronary artery bypass and resection of a large abdominal aortic aneurysm?

**Dr. Hertzer.** There is no question that the incision provides great exposure. Three have been done at our hospital with two survivors and one death. One of the survivors had an extended period of morbidity. Dr. Stanley Crawford has identified the hazard of not operating on the aneurysm within a very short period of time and prefers to fix the aneurysm first and then worry about the heart in some patients. We generally do them within the first 2 weeks after the coronary artery bypass. However, if the aneurysm is symptomatic, the heart usually is not studied in the first place. Collagen-impregnated grafts are available that cut down substantially on the transgraft bleeding.

**Dr. Wright.** I have done several of these combined operations. Dr. Hertzer may have identified the key point, that is, the patient with symptomatic coronary artery disease and a very large or symptomatic aneurysm. The perioperative morbidity for having both the chest and the abdomen open is considerably more than when the operations are staged.

**Question.** What does the panel recommend in a patient having bilateral carotid artery disease and symptomatic coronary artery disease?

**Dr. Hertzer.** If the nature of the coronary disease does
not preclude a preliminary staged carotid endarterectomy, we will stage one side and combine the second. If the coronary status precludes any preliminary operations, then we combine the side that is either more severe, or if they are equally severe, I would combine the left carotid endarterectomy with a coronary bypass in a right-handed person and do the contralateral carotid artery either 10 days later, or if necessary for reasons of additional convalescence, readmit him several weeks later. We do not do bilateral carotid endarterectomies and we certainly do not do them together with coronary bypass.

Professor Nicolaides. We prefer staging operations because of the lower morbidity. In patients needing coronary bypass and with severe lower limb ischemia, unstable angina, and rest pain, we have resisted the temptation to operate on the legs and have performed the coronary operation first. In three particular patients the long saphenous vein was taken from the thigh and not from a lower incision below the knee because of the ischemia at that level.

Question. Can you be more specific in defining the patient having "compensated" coronary artery disease?

Dr. Hertzer. Simply stated, many patients with advanced but compensated disease do not need coronary bypass. They may need Swan-Ganz catheter monitoring and pharmacologic support during other vascular operations such as aortic reconstructions. Moderate stenosis in our study represents something less than 50%. Advanced and compensated disease might be provided by the example of an individual with 100% right coronary occlusion and a normal left system, or a patient with 50% occlusion of the right coronary, 70% occlusion of the anterior descending or, let's say, 100% occlusion of the anterior descending artery that supplied only myocardial scar in a normal circumflex artery. In other words, these patients have something more than only moderate artery disease but are not, on their own merit, candidates for coronary artery bypass. That is our advanced but compensated group.

Question. Dr. Brewster, in your thallium scan you had a group of 10 patients classified as having a persistent deficit. There was a zero incidence of postoperative ischemic events. Is the myocardial scar therefore protective?

Dr. Brewster. Your question implies that the evidence, electrocardiographically or by history, of prior myocardial infarction really increases perioperative risk. This is the conventional belief. Our limited data do not support this. On the other hand, a large area of scar does not preclude other complications such as postoperative ventricular dysfunction or congestive heart failure. It does mark, perhaps, a greater likelihood of these possible complications but in this small group of patients it was not at all predictive.

Professor Nicolaides. The peripheral vascular surgeon must work very closely with cardiologists and cardiac surgeons.

Dr. Hertzer. Before one can concede how safe vascular surgery is (e.g., 1% or 2% mortality rates with aortic reconstructions), one must add up the numbers in one's own hospital. The patients wish to know what their chances are, where you are, with your anesthesiologist, with your postoperative care teams and your intensive care units. They do not necessarily want to know what the death rate in other hospitals, particularly leading vascular surgical clinics of the country, may be. Throughout the Cleveland area the elective rate for aortic aneurysm resection among 39 surgeons in 30 hospitals is 61/2%. That is probably the most reliable barometer of the safety or risk of this operation that I have seen in this country.

Question. Which patients receive Swan-Ganz catheter monitoring and have cardiac outputs as well as peripheral arterial pressures monitored?

Dr. Wright. Basically, all of our peripheral vascular patients have arterial lines placed. All of the lower extremity and abdominal patients have central venous pressure or Swan-Ganz catheters, and who gets which is a little subjective. Primarily those with any prior history of congestive heart failure, valvular heart disease, or prior myocardial infarctions are high on our list of suspicion. The carotid patients receive an arterial line. The overall scenario has been painted several times; that is, atherosclerosis is a diffuse disease involving all of our systems—cardiac, carotid, or peripheral vascular.

Dr. Callow (closing comment). I should like to thank our discussants and our audience for this informative session. Perhaps the best way to end is to quote Dr. Hertzer with his unusually humanitarian observation: "Now, what setting is necessary to follow this approach: skilled and cooperative cardiologists, to be sure; gifted and experienced cardiac surgical teams, absolutely; most importantly, one must add up the numbers in one's own hospital. The patients wish to know what the death rate in other hospitals, particularly leading vascular surgical clinics of the country, may be. Throughout the Cleveland area the elective rate for aortic aneurysm resection among 39 surgeons in 30 hospitals is 61/2%. That is probably the most reliable barometer of the safety or risk of this operation that I have seen in this country."