

# Surgical management of complex acquired cardiovascular disease

George C. Morris, Jr., M.D.  
Gerald M. Lawrie, M.D.

*Houston, Texas*

The most common forms of complex acquired cardiovascular disease associated with coronary artery disease that require surgical treatment are either the serious manifestations of systemic atherosclerosis such as coexistent carotid stenosis, abdominal aortic aneurysm, or other peripheral vascular disease; or alternatively, the cardiac complications of coronary atherosclerosis such as ischemic cardiomyopathy, left ventricular aneurysm, mitral insufficiency, or postinfarction ventricular septal defect.

As regards the former group of conditions, it is well recognized that patients with coronary atherosclerosis are at greater risk of myocardial infarction and death from major surgery. In one study of 587 patients with previous myocardial infarctions who underwent various operations, 6.1% (36/587) of patients had recurrent myocardial infarctions and the operative mortality was 4.3% (25/587).<sup>1</sup>

In contrast to these results has been the favorable outcome in relation to mortality and myocardial infarction in patients with functioning coronary bypass grafts who have undergone subsequent major surgical procedures. In a review of a series of 358 such patients operated on at Baylor College of Medicine, perioperative (30-day) mortality was 1.1%, and the incidence of perioperative myocardial infarction was 1.6%.<sup>2</sup> We have also reviewed our

experience with the treatment of coexistent carotid and coronary artery disease.<sup>3</sup> Of those patients with a history of angina and documented coronary disease who did not undergo coronary bypass prior to carotid endarterectomy, operative mortality was 18.2% (14/77), almost all due to myocardial infarction. However, in patients who underwent prior or simultaneous coronary bypass and then carotid endarterectomy, operative mortality was reduced to 3% (4/135) and was largely the result of non-cardiac causes. Others have had similar experiences.<sup>4</sup>

Furthermore, despite successful surgical correction of their vascular lesions, these patients experience a higher than normal late attrition rate from acute myocardial infarction.<sup>5, 6</sup>

For both these reasons, in symptomatic patients with coronary disease, we recommend coronary surgery prior to major vascular surgery, with the exception of patients with carotid stenosis or large abdominal aneurysms where a combined procedure is performed. This approach ensures low operative mortality rates and enhanced late survival rates in these severely diseased patients.

The benefits of coronary surgery in patients with severe impairment of left ventricular function, although not unequivocally proved, are certainly suggested by a considerable accumulation of data.

Patients with symptoms and signs of congestive heart failure secondary to coronary atherosclerosis have a poor prognosis. In clinical studies of the prognosis of patients with angina pectoris and congestive heart failure, death rates of about 12% to 16% per year have been reported,<sup>7</sup> and this represents about five times the mortality of patients with coronary atherosclerosis, but without congestive heart failure. Thus, it has long

been recognized that a clinical diagnosis of congestive heart failure in patients with angina pectoris has a poor prognosis.

Our early experience with these patients after operation was encouraging.<sup>8</sup> In this series 192 patients with symptoms of congestive heart failure were taking diuretics and had left ventricular end-diastolic pressure over 20 mm Hg and abnormal ventriculograms. Operation was performed with an initial perioperative mortality of 10.4%. In a later report,<sup>9</sup> perioperative mortality was 8.4% and at a follow-up of as long as 6 years, annual attrition was 2.5%. In selected patients, significant improvement in left ventricular function was apparent on left ventriculography, but in others, no change could be discerned. Relief of symptoms of congestive failure and angina and rehabilitation of these patients appeared to be favorably influenced by operation.

Almost all patients in these studies were operated upon primarily for angina pectoris. The question of appropriate therapy for patients with severe impairment of left ventricular function and no angina is difficult to answer, and few data exist on this subject.

Preoperative and postoperative radionuclide ventriculography has been of interest in patients with poor ventricular function. In many patients, significant improvement has been observed even in the absence of preoperative angina (unpublished data). The value of the preoperative response of ejection fraction to nitroglycerin as a prediction of response to operation remains uncertain.

Our approach to these patients has been to offer surgery to patients with symptoms of angina or congestive heart failure or both. Our primary requirement is the presence of good distal coronary arteries with high-grade proximal

lesions. Patients with severe diffuse coronary disease or only mild to moderate stenosis, in our opinion, are not surgical candidates. Other lesions responsible for poor ventricular function, such as cardiomyopathy or valvular heart disease, require exclusion of these patients. With current anesthetic and myocardial preservation techniques and, rarely, the intra-aortic balloon pump, an operative mortality of much less than 10% can be achieved in these patients. Although conclusive evidence is not yet available, we believe that younger, well-selected patients will have improved survival following coronary bypass.

The surgical techniques for repair of left ventricular aneurysms, mitral valve insufficiency, and closure of postinfarction ventricular septal defects are well standardized and attended by reasonably good early success rates. However, as with peripheral vascular disease, late perioperative mortality still occurs secondary to reinfarction, and late survival remains subnormal for the same reason. Thus, like others, we have favored the addition of coronary bypass grafts whenever feasible when performing these procedures.

Acute myocardial infarction had been recognized as the major cause of early and late mortality in cardiovascular surgery for atherosclerosis long before the advent of coronary surgery. Since its advent, the use of the coronary bypass procedure prior to or during the correction of other major lesions has led to

substantial improvement in the early and late results of therapy in these seriously ill patients.

## References

1. Steen PA, Tinker JH, Tarhan S: Myocardial reinfarction after anesthesia and surgery. *JAMA* **239**: 2566-2570, 1978.
2. Crawford ES, Morris GC Jr, Howell JF, et al: Operative risk in patients with previous coronary artery bypass. *Ann Thorac Surg* **26**: 215-221, 1978.
3. Ennix CL Jr, Lawrie GM, Morris GC Jr, et al: Improved results of carotid endarterectomy in patients with symptomatic coronary disease; an analysis of 1546 consecutive carotid operations. *Stroke* **10**: 122-125, 1979.
4. Mahar LJ, Steen PA, Tinker JH, et al: Perioperative myocardial infarction in patients with coronary artery disease with and without aorta-coronary artery bypass grafts. *J Thorac Cardiovasc Surg* **76**: 533-537, 1978.
5. Thompson JE, Austin DJ, Patman RD: Carotid endarterectomy for cerebrovascular insufficiency; long-term results in 592 patients followed up to thirteen years. *Ann Surg* **172**: 663-669, 1970.
6. De Bakey ME, Crawford ES, Cooley DA, et al: Aneurysm of abdominal aorta; analysis of results of graft replacement therapy one to eleven years after operation. *Ann Surg* **160**: 622-639, 1964.
7. Burggraf GW, Parker JO: Prognosis in coronary artery disease; angiographic, hemodynamic, and clinical factors. *Circulation* **51**: 146-156, 1975.
8. Morris GC Jr, Howell JF, Crawford ES, et al: Operability of end stage coronary artery disease. *Ann Surg* **175**: 1024-1030, 1972.
9. Morris GC Jr: Coronary artery surgery and congestive heart failure, in: *Coronary Artery Medicine and Surgery: Concepts and Controversies*. Norman JC, ed. New York, Appleton-Century-Crofts, 1975, p 676.