Cardiac Surgery and Noncardiac Surgery in Elderly Patients With Heart Disease

MORTIMER J. BUCKLEY, MD, FACC, CHAIR, MELVIN D. CHEITLIN, MD, FACC, LEE GOLDMAN, MD, FACC, JOEL A. KAPLAN, MD, NICHOLAS T. KOUCHOUKOS, MD, FACC

Cardiac Surgery in Elderly Patients

The term "elderly" in the cardiac surgical experience refers to patients chronologically aged ≥70 years. Chronologic age is less important than physiologic age; in the physiologically aged patient, techniques used in most surgical procedures are likely to be attended by a markedly increased risk of morbidity and mortality (1).

There are four aspects involved in a decision to perform a cardiac surgical procedure in an elderly patient. The first is the preoperative evaluation; the second, the surgical procedure; the third, the postoperative management in the hospital; and the fourth, long-term benefit to the individual elderly patient.

Preoperative Evaluation

Preoperative evaluation of the elderly patient is comparable with that of younger patients. The clinical history and interpretation of the cardiac catheterization data are the same. The major factor to be sought is the increased risk that aging may contribute to the operative procedure (2–4). Often, the surgical approach is that if an indicated operation can be carried out at reasonably low risk, it should be performed.

The evaluation of this "low risk" in an elderly population is dependent on multiple factors. The first is the patient’s general mental and metabolic state. The patient must also be able to think clearly and be capable of understanding the extent of effort and cooperation required during recovery. The patient who is uncooperative or combative because of confusion or disorientation will be difficult to manage postoperatively and thus have a greatly increased risk. In addition, this disturbed mental state may obviate the potential benefit from the operation. It must be ascertained whether the patient understands and consents to the procedure and is not being cajoled into having an operation because the family thinks it best for him or her to do so.

Assessing operative risk. Before deciding on a surgical procedure, it should be clear that the individual elderly patient will be able to benefit from the surgical procedure. The general physical state of the patient is important in assessing operative risk. Often, the decision to undertake surgery is deferred for a long period of time during which the elderly patient has become inactive; inactivity and poor nutrition may result in borderline cachexia. Despite postoperative hemodynamic improvement, the stress of the operation may not be tolerated by a poorly conditioned, malnourished patient. Preoperative nutrition using a high calorie diet or parenteral supplementary feedings may be indicated to restore the physical strength required for recovery after surgery.

Preoperative pulmonary evaluation. A preoperative pulmonary evaluation can help determine the need for postoperative respiratory care, thereby decreasing postoperative respiratory problems. The pulmonary evaluation should include a history of respiratory illnesses and smoking history. This should be supplemented by spirometry and measurement of arterial blood gases in high risk patients. The presence of chronic bronchitis indicates the need for bronchial hygienic measures. Low arterial oxygen tension (PO2) values and an elevated arterial carbon dioxide tension (PCO2) indicate that there is an increased risk of severe respiratory insufficiency in the postoperative period. An elevated arterial PCO2 is an important predictor of the need for postoperative ventilation.

Drug therapy. Elderly patients may have an increased sensitivity to many narcotics and sedatives. In addition, impaired metabolism of some benzodiazepine drugs may cause higher serum concentrations in elderly patients, resulting in increased effect. The reduction in renal function seen with advancing age may result in increased drug concentrations for drugs principally excreted by the kidneys. (These issues are further discussed under Medical Therapy in the Elderly). The magnitude and metabolic requirements of the surgical procedure may determine the patient’s ability to withstand the stress of operation.

The Surgical Procedure

The tissues of elderly patients are generally more friable and more calcified than those of younger patients, often requiring special surgical techniques for cardiovascular re-
pair. Elderly patients are also prone to have slower wound healing. The friability of their peripheral vessels may make intravenous therapy difficult.

Coronary artery disease is often more extensive and the arteries more calcified than in younger age groups. Cerebral atherosclerosis is common and perfusion techniques must maintain appropriate cerebral perfusion. The institution of cardiopulmonary bypass has produced measurable neurologic changes in up to 30% of elderly patients (3); therefore, careful maintenance of blood pressure and cardiac output is critical in these patients (5). The surgical procedure may also have to be less extensive in the elderly patient. Thus, the surgical approach to the elderly must recognize the limitations of the individual elderly patient, and surgical techniques may have to be modified.

Postoperative Management in the Hospital

The postoperative intensive care unit. The most difficult aspects of the management of elderly patients result from the stress of the operation and unfamiliarity with the intensive care setting; these often cause confusion and inability to cooperate with the staff in the intensive care unit. Prolonged respiratory assistance may be necessary until the patient can cooperate with the efforts of the professional staff. Other organ failure, such as transient renal failure, is more frequent than in younger patients. Physical assistance with coughing and intratracheal suction are often necessary. These problems may result in a longer stay in the intensive care unit than that of the younger patient; greater nursing attention per unit of time is also needed. As a consequence, a postoperative intensive care unit taking care of a large number of elderly patients should have a higher nurse to patient ratio.

Duration of recovery period. The duration of recovery is prolonged for some older patients, both in the hospital and during the remainder of the recovery period. Patients >65 years generally have a hospital stay for coronary artery bypass grafting that averages about 2 days longer than that of patients <65 years, and the length of stay after surgery increases with each increment in age up to age 84 (6). Special care at home or in an extended care facility may have to be planned. This renders the overall recovery period longer and more expensive.

Long-Term Benefit

It is difficult to predict the long-term benefit of surgery in the elderly patient. The preoperative assessment of the physical and mental condition of the elderly patient will help determine whether the 82 year old man with incapacitating angina pectoris will have significant postoperative improvement in exercise capacity or whether his postoperative exercise performance will be only minimally improved because of severe peripheral vascular disease. In properly selected elderly patients who were active before their heart disease became disabling, a marked recovery and restoration to a full life-style are often dramatic.

Age and risk and benefits of coronary bypass surgery. In the Coronary Artery Surgery Study (7), age >65 years was an independent predictor of mortality after coronary artery bypass graft surgery, although data from other series are less convincing. In general, it appears that the key issue is one of proper selection of patients; otherwise healthy elderly persons have an excellent prognosis after coronary artery surgery and the presence of associated medical diseases is a major correlate of the mortality rate in the elderly (8). Despite the higher operative risk of coronary artery bypass graft surgery in the elderly, the outcome in carefully selected elderly patients appears to be favorable (9). The frequency of relief of angina is comparable with that in younger patients. Although there are no randomized trial data limited to elderly patients, “high risk” elderly patients, who have more severe angina, left ventricular dysfunction or left main coronary artery disease, seem most likely to benefit from surgery in terms of survival and symptoms, compared with elderly patients receiving medical therapy.

Summary

From these studies, it can be concluded that the selection of an elderly patient for surgery must take into account not only the severity of cardiac disease, but also the patient’s desire for surgical intervention and his or her ability to tolerate the requirements of surgery. If these conditions are met, and we can anticipate that the planned procedure will result in an outcome that the patient seeks, surgery can be undertaken in elderly patients for the same indications as in younger patients. Good results may be obtained, but entail a greater intensity and duration of care and associated increased costs.

Nonsurgical interventional procedures, including coronary angioplasty and balloon valvuloplasty, are appealing in elderly patients who may poorly tolerate the stress of thoracotomy. The appropriate role of these alternative interventional options must await carefully controlled data.

Noncardiac Surgery in Elderly Cardiac Patients

Assessing the Risk

Patients who have cardiac disease and who undergo noncardiac surgery are at markedly increased risk compared with patients who do not have underlying cardiac disease. Elderly patients are at higher risk than younger patients, in part because they have more extensive coronary artery disease and also because they are more likely to have a variety of noncardiac conditions including pulmonary, hepatic and renal diseases and electrolyte abnormalities that may ad-
versely affect the cardiovascular system during surgery and hence increase the likelihood of cardiac complications.

Data also indicate that patients >70 years have a higher risk of major cardiac complications than do younger patients, even after controlling for clinically apparent cardiac and noncardiac disease (10). This may in part be due to an underestimation of the presence or extent of coronary artery disease or left ventricular dysfunction in sedentary elderly patients, in whom the stress of the planned surgical procedure may far exceed the stresses imposed by routine activities.

An appropriate preoperative evaluation should be carried out to define the extent of myocardial ischemia and left ventricular dysfunction in elderly patients before noncardiac surgery. Preoperative tests should include an electrocardiogram (ECG) and chest X-ray film and, in selected circumstances, noninvasive diagnostic tests such as thallium exercise testing, or invasive tests such as cardiac catheterization.

Elderly patients who are unable to perform mild to moderate amounts of exercise appear to be at especially high risk (11). Dipyridamole thallium scanning (12), which has been shown to be helpful in assessing cardiac risk in patients with peripheral vascular disease, may be useful in assessing cardiac risk in sedentary elderly patients who are unable to exercise.

Intraoperative Monitoring

Intraoperative ECG monitoring appears more sensitive for detecting myocardial ischemia if it includes both leads II and V<sub>6</sub> to assess anterolateral and inferior wall ischemia. In addition, patients who have serious left ventricular dysfunction and who are at high risk based on clinical indexes should have a pulmonary artery catheter placed for hemodynamic monitoring during major noncardiac surgery. The transesophageal echocardiogram also may be used to detect myocardial ischemia by regional wall motion abnormalities or systolic wall thickening abnormalities. This procedure can also elicit signs of left ventricular dysfunction, such as a decrease in ejection fraction or decreased contractility.

References