Operative technique for coronary bypass surgery

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Our current practice of myocardial revascularization is described herein. Standardization of operative technique is stressed and, although there are minor individual differences among our staff, these principles are followed routinely. Uncomplicated, elective patients are perfused with the 6 LF bubble oxygenator; however, the TMO membrane provides oxygenation for complex procedures such as reoperations, revascularization combined with valve repair, or replacement and multiple bypass grafting in patients with poor left ventricular function. Generally, perfusion is normothermic, except for high risk patients, reoperations, combined valve cases, and in unstable patients who require emergency revascularization. In these selected cases, systemic hypothermia and intermittent injection of a cardioplegic solution via the aortic root (or left coronary ostia in aortic valve cases) are used to enhance myocardial protection. Normotensive perfusion pressures are strictly maintained.

Blood conservation has been emphasized in the past 2 years. Foremost among these techniques are careful hemostasis and return of all sponge and oxygenator blood to the patient. In most patients a unit of blood can be withdrawn

at the outset for transfusion postoperatively. During the operation hematocrit readings are kept in the 23% to 25% range in complex cases and 18% to 20% in routine procedures. In the Intensive Care Unit shed mediastinal and pleural blood is autotransfused back to the patient. Utilizing these methods, transfusions have been reduced to approximately 1.5 units per patient on the average. Routine techniques for cannulation are as follows. The arterial perfusion cannula is inserted into the ascending aorta followed by superior and inferior caval cannulation and venting, either by a short left atrial cannula through the right superior pulmonary vein or by a left atrial-ventricular vent inserted similarly. Caval tapes are still preferred for total cardiopulmonary bypass.

The area of critical perfusion deficit is revascularized first either with vein or with internal mammary artery graft. Most frequently, veins are procured from the femoral area; however, if the veins are too large the calf is opened. Veins are prepared delicately and distension is avoided. The adventitia is kept intact and metallic clips are applied to side branches. Vein specimens are stored briefly in heparinized saline. When the left internal mammary artery is mobilized, a pedicle of vein and artery together are dissected from the chest wall. Ordinarily, only the left internal mammary artery is used unless coronary vessels are especially small or veins unsuitable.

Distal anastomoses are accomplished first; frequently grafts are staged so that one bypass is completed before the next is begun. The distal vein graft anastomosis is completed with interrupted 6-0 silk sutures under anoxic arrest, whereas the proximal anastomosis is performed with a running 5-0 synthetic suture while the heart is beating. A nondisposable punch is now used to extract an oval opening in the aorta. The internal mammary artery graft is performed in interrupted 7-0 silk without optical magnification. Mammary arteries are reserved for anterolateral wall coronary vessels and are contraindicated in large coronary vessels, especially in left ventricular hypertrophy. Emergency revascularization usually dictates the more expeditious vein graft procedure.

These safe and reliable techniques have undergone slight modification in the past decade. Refinements in oxygenator perfusion, blood utilization and myocardial protection account largely for the greater safety and lower morbidity related to these procedures.