Current Status of Heart Transplantation: the Stanford Experience

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Ten years have now passed since orthotopic transplantation of the human heart was first performed in South Africa. Since that time more than 350 cardiac transplant procedures have been carried out by 66 different transplant teams throughout the world. One hundred and forty of these operations have been performed at Stanford University. Although it is clear that cardiac transplantation has not proved to be the panacea that some early investigators had enthusiastically predicted, considerable progress has been achieved in terms of expectations for survival and rehabilitation after transplantation of the heart. This enhanced outlook has derived not from any single development, but rather from a cumulative series of improvements through the past decade. The most important of these include refinement of criteria for selection of suitable candidates for transplantation, identification of several important contraindications to transplantation, the institution of effective prophylaxis for control of coronary atherosclerosis in the cardiac allograft, recognition of the importance of fastidious surveillance of heart recipients for infection and vigorous efforts to identify and treat infectious complications without delay, routine utilization of transvenous cardiac biopsy to aid in the diagnosis and management of rejection, the use of antihuman thymocyte globulin prepared in rabbits as a powerful adjunct to standard immunosuppression, the development of various immunologic monitoring techniques for early diagnosis of rejection, and finally, retransplantation of the heart in cases of uncontrollable allograft rejection or rapidly progressive graft atherosclerosis.

Indications for and Contraindications to Transplantation

Heart transplantation is reserved for patients with end-stage cardiac disease for whom no other surgical or medical therapy is likely to afford benefit and whose chances for survival without transplantation for more than a few months are considered very low. This establishment of prognosis is based upon routine history and physical examination, cardiac catheterization data, coronary arteriography, and occasionally endomyocardial biopsy. In addition, psychosocial factors that may affect the potential for long-term survival and rehabilitation after transplantation are carefully scrutinized. In Table 35.1 the characteristics of patients most likely to benefit from cardiac transplantation, as defined by correlative analysis of the Stanford experience, are summarized.

During the past 10 years awareness of several absolute and relative contraindications to transplantation has evolved. It has become apparent that postoperative survival rates vary inversely with increasing patient age, reflecting a generally poor tolerance for immunosuppressive therapy among older patients. At the present time, therefore, we usually limit heart transplantation to patients less than 50 years of age.
Table 35.1. General criteria defining the patient most likely to benefit from cardiac transplantation

1. Age is less than 50 years
2. Duration of disease is less than 5 years
3. Pulmonary artery mean pressure is less than 40 mmHg
4. Pulmonary vascular resistance is less than 8 units
5. Renal and hepatic dysfunction secondary to cardiac decompensation is not severe
6. There is no evidence of active infection or recent pulmonary infarction

Early in our experience it was observed that the normal right ventricle (RV) of the transplanted heart could not sustain the acute load imposed upon it by severely and chronically elevated pulmonary vascular resistance in the recipient. Indeed, three of the first twenty patients who underwent cardiac transplantation at Stanford died within the first 24 h postoperatively as a result of acute donor right ventricular failure. Currently, therefore, patients having fixed pulmonary vascular resistances greater than 8–10 Wood units are not considered to be suitable candidates for isolated transplantation of the heart. Reversibility of pulmonary vascular resistance is assessed by hemodynamic responses to nitroprusside infusion. The possibility of combined transplantation of the heart and one or both lungs in patients with excessive fixed pulmonary hypertension has been contemplated; however, several important questions remain to be answered before clinical application of this procedure can be fully justified.

Although renal transplantation has been carried out with some success among diabetic patients, we have considered insulin-requiring diabetes mellitus to be an absolute contraindication to heart transplantation. Corticosteroid requirements for cardiac allograft recipients tend to be slightly higher than for recipients of unrelated renal grafts. Therefore, an increased likelihood of uncontrollable ketoacidosis in severely diabetic cardiac recipients may be expected. During crises of this sort among diabetic renal allograft recipients, corticosteroids can be withheld. If rejection ensues, such patients can be supported with dialysis. At the present time no analogous alternative exists for the diabetic cardiac transplant patient.

Since immunosuppression is extremely hazardous in the presence of infection, patients with active infection cannot be considered for transplantation of the heart. Selected candidates who develop infection while awaiting a suitable donor heart to become available are withdrawn from consideration until resolution of the infectious process has occurred.

It has also become apparent that patients undergoing transplantation after an episode of recent pulmonary embolism and infarction sustain a highly increased risk of postoperative infection at the site of infarction. Accordingly, cardiac transplantation in such patients is now postponed for at least 1 month after a pulmonary embolic event in order to allow healing of the infarcted pulmonary tissue. This policy has satisfactorily averted early postoperative pulmonary infections of this nature.