Outcomes of Percutaneous Intervention in Cardiac Allograft Vasculopathy
David M. Casey, Randal G. Stringer, Murat Tuzcu, Cleveland Clinic Foundation, Cleveland, Ohio.

Background: In heart transplant patients surviving >1 year after transplantation, cardiac allograft vasculopathy (CAV) remains the leading cause of death. Percutaneous intervention, which has proven effective in native vessel disease, is being increasingly used in the treatment of CAV, however the long term clinical and angiographic outcomes are largely unknown.

Methods: Between January 1995 and December 2000, 27 patients at our institution underwent percutaneous intervention for 48 coronary lesions. There were 25 stenting procedures and 23 percutaneous transluminal coronary angioplasty (PTCA) procedures, with or without atherectomy. Forty of the lesions were de novo. Routine follow-up angiograms were obtained at 12 months; angioplasty was performed earlier if clinically indicated. Restenosis was defined as >50% narrowing of the target vessel segment. Data was collected on the clinical endpoints of cardiac death, non-fatal myocardial infarction, or need for surgical revascularization.

Results: Procedural success was 96% (46/48), and there were no major complications. Clinical follow-up was available for all 27 patients. One patient died 12 days postprocedure of a cardiac arrest, one patient suffered a nonfatal myocardial infarction 13 months postprocedure, and two patients required bypass grafting; one 5 months poststent and the other 12 months postPTCA/atherectomy. No patients were revascularized. Follow-up angiography was available for 78% of the intervened segments. The restenosis rate for all types of intervention was 47% (7/16) at a mean follow-up time of 20.4±13.8 months. Restenosis was seen in 41% (7/17) of stented lesions and in 53% (10/19) of PTCA lesions, not a statistically significant difference.

Conclusions: Percutaneous intervention for the treatment of CAV can be performed safely with high procedural success rates. Restenosis rates are higher than what is seen in native vessel intervention, however the clinical event rate is low. The restenosis rates for PTCA and stents are approximately equivalent. A larger number of patients needs to be followed to determine the most efficacious approach in using percutaneous intervention for CAV.

1183-152 Left Ventricular Systolic Function Early After Heart Transplantation is Related to Subsequent Cardiac Allograft Vasculopathy
Islam A. Bilek, Derek Robinson, Asghar Khaghani, Nicholas R. Banner, Harefield Hospital, Harefield, United Kingdom.

Background: Cardiac allograft injury at the time of transplantation may be related to subsequent cardiac allograft vasculopathy (CAV). We investigated whether the left ventricular systolic function early after heart transplantation is related to subsequent development of CAV.

Methods: We measured the echocardiographic left ventricular fractional shortening (FS) during the first week after transplantation in 117 patients and performed quantitative coronary angiography (QCA) within 4 weeks and again 1 year after transplantation. Angiograms were obtained using a standardized technique after intracoronary GTN.

Results: Ninety-eight patients were males (83.6%) and 18 were females (16.2%); the mean age was 48±11 years. The initial FS was 35±7% after 1 week and 34±7% after 1 year. The initial FS was 35±7%, with a median of 35%. The table below shows the mean decrease in diameter determined by QCA during the first week after transplantation.

<table>
<thead>
<tr>
<th>Year</th>
<th>Initial FS</th>
<th>n</th>
<th>Mean decrease in diameter (mm)</th>
<th>SEM</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 1</td>
<td>≥35%</td>
<td>60</td>
<td>0.290</td>
<td>0.034</td>
<td>0.0098</td>
</tr>
<tr>
<td>0 to 1</td>
<td>&gt;35%</td>
<td>57</td>
<td>0.164</td>
<td>0.034</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion: Improvements in myocardial protection and methods that reduce ischemia-reperfusion injury during transplantation may reduce the risk of subsequent CAV.

1183-171 The Relationship of Allograft Inflammatory Factor-1 (AIF-1) Expression to Rejection Grade in Endomyocardial Biopsies From Cardiac Allograft Recipients
Howard J. Eisen, Sheri E. Ketemen, Michael V. Auferl, Temple University School of Medicine, Philadelphia, Pennsylvania.

Background: Cardiac allograft vasculopathy (CAV) is a major sequela of cardiac transplantation which limits the long term survival of cardiac transplant recipients. The initiation of CAV is believed to involve a chronic immune response of the recipient to the donor vascular antigens which activate immune cells and damage the endothelium, resulting in the elaboration of cytokines and modulation of arterial medial vascular smooth muscle cell (VSMC) gene expression. These cytokines elicit the activation of VSMCs which migrate into the intimal layer and proliferate, causing the vascular narrowing seen in CAV. This cytokine-induced activation and proliferation of medial VSMCs is one of the most critical cellular events in the pathogenesis of CAV. Allograft Inflammatory Factor-1 (AIF-1) t is a 147 amino acid calcium-binding protein which is originally identified and cloned from rat cardiac allografts with chronic rejection. It has presumably been shown to be induced in cultured human VSMCs stimulated with a variety of inflammatory cytokines. Further, over-expression of AIF-1 results in enhanced growth and activation of VSMCs. The relationship of AIF-1 expression to acute cellular rejection is not well understood. Methods: To further explore the relationship of AIF-1 gene expression to allograft rejection, we studied 256 endomyocardial biopsies from 34 cardiac transplant patients for expression of AIF-1 using reverse transcriptase polymerase chain reaction (RT-PCR). GAPDH, a constitutively expressed control gene, was used to determine the presence of mRNA in biopsy specimens. Results: The percentage of biopsies expressing AIF-1 as a function of ISHLT grade were Grade 0-1/16 (9.6%); Grades 1A and 1B-24/161 (39.3%); Grade 2-14/16 (7.7%); Grades 3A and 3B-12/161 (7.1%). AIF-1 expression was enhanced with more severe ISHLT rejection grades.

Conclusion: We conclude that AIF-1 expression is enhanced as a result of cellular rejection. This enhanced expression, if persistent, may link the presence of significant ISHLT grade rejection episodes to the subsequent development of CAV.

Poster Session

1184 Exercise Testing in Specific Populations
Tuesday, March 19, 2002, Noon-2:00 p.m.
Georgia World Congress Center, Hall G Presentation Hour: Noon-1:00 p.m.

1184-137 Blunted Heart Rate Recovery Fails to Predict Coronary Events in Apparently Healthy Individuals
Jerome L. Fleg, Rozbeh Tahernia, Frances E. O'Connor, Jeanette G. Wright, National Institute on Aging, Baltimore, MD.

Background: Blunted heart rate (HR) recovery from exercise has been shown to predict all-cause mortality. However, its effect on cardiac end-points is not known.

Methods: We analyzed HR recovery from maximal treadmill exercise (modified Balke protocol) in 1052 subjects, aged 18-90 yr from the Baltimore Longitudinal Study on Aging from 1979 to 1999, were clinically free of heart disease. HR recovery was defined as the change in HR between peak exercise and 2 minutes post exercise (HRR).

Results: On linear regression analysis, HR2 correlated inversely with age (r=-0.42), sitting HR (r=-0.51) and exercise duration (DUR=r=-0.23), each p<0.001. Over a mean follow-up of 9.1±9.6 yr, coronary events (CE), i.e., angina pectoris, myocardial infarction, or coronary death, developed in 116 subjects. Those experiencing CE were older (65±12 vs 52±17 yr) and had shorter DUR(9±2 vs 11±2.8 min) and smaller HR2 (51±13 vs 57±13 beats/min) each p<0.001 than those who remained event-free. The independent predictors of CE were determined from a Cox proportional hazards model including age, gender, plasma cholesterol (CHOL), hypertension status, smoking status, DUR, exercise-induced ischemic ST segment depression (ST-D) and HR2 (Table). A similar lack of significance was observed when qualities of HR2 were substituted for absolute values in this model.

Conclusions: A Blunted HR2 is not a significant predictor of CE in apparently healthy individuals, independent of conventional risk factors.

1184-138 Diabetes Mellitus and Abnormal Heart Rate Recovery in Patients Without Coronary Artery Disease
Niranjan Seshadri, Naveen Acharya, Michael S. Lauar, Cleveland Clinic Foundation, Cleveland, Ohio.

Background: Diabetes mellitus (DM) is associated with autonomic dysfunction. Heart rate recovery (HRR) after exercise is an easily obtained measure that correlates with decreased parasympathetic function and is known to predict mortality. We sought to determine if DM is independently associated with an abnormal HRR.

Methods: We analyzed 1817 consecutive patients who underwent symptom-limited exercise testing as part of a routine screening program. None had history of coronary disease. HRR was defined as a fall in heart rate during the first minute after exercise of ≤12 beats/minute. DM was defined as a fasting blood glucose ≥126 mg/dl or use of hypoglycemic drugs.

Results: There were 51 patients (2%) who had DM, while 168 (9%) had an abnormal HRR. Increasing blood sugar levels were associated with an abnormal HRR, especially at diabetic levels (Figure). Patients with DM were more likely to have an abnormal HRR