



A Message from Cardiology Associates



Dear Colleagues,

Welcome to the July 2011 issue of our Cardiology Associates' Referring Physician Newsletter. This month's newsletter deals with left ventricular reconstruction with coronary artery bypass grafting (CABG). CABG is the most common type of open-heart surgery in the United States. It is considered to be a very effective method of treating severe blockages in the coronary arteries, especially if the heart's pumping capability has already been weakened. Dr. Bernard Wagman describes a recent case of a Cardiology Associates' patient with poor left ventricular function who underwent successful cardiac treatment with CABG.

About the Author

Dr. Bernard M. Wagman is a CALLC cardiologist who is a senior attending physician in Cardiology at Washington Hospital Center. From 1990-1997, he was an assistant clinical professor at The George Washington University Hospital, and since 2005 has been an associate clinical professor at GW. Dr. Wagman is actively involved in the training of medical residents and Cardiology fellows at both the Hospital Center and GW.

Dr. Wagman has been a committed long distance runner for 37 years and a veteran of 14 marathons. He is passionate about mountain life and culture. He hikes regularly in the great ranges of the world including the Rockies, the Alps, the Andes, and the Himalayas.

LEFT VENTRICULAR (APICAL) RECONSTRUCTION ASSOCIATED WITH CORONARY ARTERY BYPASS GRAFTING



A.B. is a 54-year-old gentleman who presents with a ten-year history of hypertension and increasing shortness of breath. He was admitted to Calvert Memorial Hospital a few weeks prior to initial presentation with increasing shortness of breath, fever, and a cough. He was treated with antibiotic therapy and given a presumptive diagnosis of pneumonia.

He was told of impaired left ventricular function at the time of his discharge and believes himself to have an ejection fraction in the range of 30%. He had no knowledge of a heart attack or prior coronary disease. He denies chest pain, palpitations, or syncope. He does continue to note dyspnea with very modest amounts of exertion.

Social/Personal History:

A.B. smoked up to a pack of cigarettes for the past 20 years. He quit one week prior to today's visit.

Current Medications:

Lisinopril 20 mg daily, metoprolol 25 mg daily, Lasix 20 mg daily, Aldactone 25 mg daily, Zocor 20 mg daily, and aspirin 81 mg daily.

Physical Examination:

He is a well-developed, well-nourished, middle-aged gentleman in no acute distress. Blood pressure is 145/100. Pulse is 70 and regular. The carotid upstroke is diminished without bruit. There are some wheezes noted in the left upper lung fields. The first and second heart sounds are normal. There is a soft S4 gallop. No murmur, rub, or click is appreciated. There is no peripheral edema.

EKG:

Normal sinus rhythm at a rate of 75. There is evidence of left axis deviation, as well as increased precordial voltage and ST-T wave changes consistent with LVH. There is a QS pattern in V1-V3 consistent with a prior septal infarction.

Echocardiogram:

Mildly enlarged left ventricular cavity, with a clear-cut apical mural thrombus. Baseline ejection fraction was 20-25%, with a large akinetic area involving the distal anteroapical and inferoapical segments. Mild to moderate tricuspid regurgitation was seen, with normal pulmonary pressures. Mild mitral regurgitation was also noted.

Nuclear Stress Testing:

The patient experienced dyspnea on exertion but no chest pain symptomatology. Dual-isotope scanning showed markedly increased left ventricular size, with a markedly reduced ejection fraction of 22%. There were multiple segmental wall motion abnormalities consistent with a large prior inferoapical and distal anteroapical infarct. There was no evidence of coexistent ischemia.

Clinical Course:

Based on the patient's young age, poor left ventricular function, and lack of a known acute ischemic event clinically, he was scheduled to undergo coronary arteriographic evaluation in hopes that he might have residual ischemic myocardium and some option for improvement in viable myocardium.

Cardiac Catheterization:

The left anterior descending was a large-caliber vessel which was completely occluded just beyond the takeoff of two moderate-caliber and long diagonal branches. There was some flow seen in the distal left anterior descending on right coronary artery injection through septal collaterals. There was a subtotal stenosis in the distal circumflex just prior to the takeoff of the second obtuse marginal and posterolateral branch.

Cardiac MRI Viability Study:

The patient was scheduled for a cardiac MRI viability study. Findings included a severely dilated left ventricle, with thinning of the mid and distal septum, apex, and distal inferior wall. Left ventricular function was severely reduced, with a baseline ejection fraction of 26%. Viability was found in all segments, with the exception of the distal anteroapical and inferoapical portion.

Open-Heart Surgery:

It was concluded that the patient had significant areas of residual viable myocardium, with the exception of the distal apical segment. The patient underwent coronary artery bypass grafting. A DOR (saver) procedure was performed with removal of left ventricular thrombus, and left ventricular aneurysm repair was performed using TEE guidance.

Postoperative Care:

The patient had an uneventful postoperative course. There were no significant problems with arrhythmia or congestive heart failure. An echocardiogram performed approximately four weeks following surgery demonstrated an ejection fraction of 40%, with only mild hypokinesia in the distal apical segment. No recurrence of thrombus was noted.

Discussion:

This case illustrates three important points:

1. The potential limitations inherent in nuclear stress imaging, especially as it pertains to hibernating myocardium and the logistics of outpatient testing.
2. The value of cardiac MRI in assessing hibernating myocardium.
3. The value of left ventricular reconstruction in association with coronary artery bypass grafting in selected patients who present with severe myocardial dysfunction.

Limitations of Nuclear Stress Imaging:

Nuclear stress results in this case suggested a FIXED defect in the distal two-thirds of the anterior wall, apex, and lateral segments consistent with scar formation. However, it is possible that hibernating myocardium (viable ischemic muscle) might have been discovered with a repeat injection of nuclear material the following day. This is not always feasible in the outpatient setting.

Value of Cardiac MR in Discovering Hibernating Myocardium:

The prognostic importance of detecting myocardial viability depends on two major issues. First, medically treated viable myocardium is a harbinger of future nonfatal ischemic events and higher overall mortality. Secondly, patients with significant viable myocardium have an annual mortality rate fourfold greater in those treated medically compared to those with successful revascularization procedures.

Discrimination between viable and nonviable dysfunctional myocardium allows patients to avoid risks of revascularization if they are unlikely to benefit.

Dobutamine MRI studies have shown equivalent and in many cases superior detection of hibernating myocardium when compared to nuclear imaging techniques.

Value of Left Ventricular Reconstruction Associated with Coronary Artery Bypass Grafting:

The formation of scar tissue after myocardial infarction leads to changes in left ventricular shape and function (remodelling). A number of surgical techniques have been developed to restore left ventricular shape and improve left ventricular function.

The most commonly used techniques are the endoventricular repair with or without an endoventricular patch introduced by DOR. Pooled data from 62 studies in over 12,000 patients shows an early operative mortality of 6.9%. Thirty-day mortality on similar patients at the Washington Hospital Center is significantly better at 3.3%. Long-term survival was 88.5%, 71.5%, and 54% for one, five, and ten years respectively. This compares quite favorably with the natural history of left ventricular aneurysms where the reported five-year mortality is from 12% to 45% depending on the study. Early mortality was mainly cardiac in origin and predominantly caused by heart failure. Ventricular arrhythmias were the second most common

cause of death. Patients with a left ventricular aneurysm and three-vessel coronary disease and patients with clinical heart failure clearly had improved survival with surgical therapy.

A critical aspect of endoventricular reconstruction involves "sizing" of the residual left ventricular cavity. This is usually done using an intracavitary balloon or commercially available "shaping device." This avoids the earlier surgical problems whereby a residual left ventricular cavity was smaller than ideal and frequently produced restrictive physiology postoperatively.

Combining coronary bypass grafting with left ventricular reconstruction clearly improves late-term survival and provides relief of symptomatic angina. Revascularization of viable myocardium remote from the aneurysm improved compensatory contractile function and may reduce the risk of late ventricular arrhythmias.

References:

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Our Locations

Annapolis Cardiology Office

2002 Medical Parkway, Suite 500
Annapolis, MD 21401
Phone: 410-573-6480
Fax: 410-573-9413

Annapolis Vascular Office

2002 Medical Parkway, Suite 520
Annapolis, MD 21401
Phone: 410-571-8430
Fax: 410-573-5981

Bowie Office

4175 N. Hanson Court
Suite 100
Bowie, MD 20716
Phone: 301-809-6880
Fax: 301-805-4233

Irving Street 4800N

106 Irving Street, NW
Suite 4800N
Washington, DC 20010
Phone: 202-726-5484
Fax: 202-726-4587

Kent Island Office

1630 Main Street
Suite 208
Chester, MD 21619
Phone: 410-643-3186
Fax: 410-643-4098

K Street Office

2131 K Street, NW
Suite 800
Washington, DC 20037
Phone: 202-822-9356
Fax: 202-331-0451

Olney Office

18109 Prince Philip Drive
Suite 225
Olney, MD 20832
Phone: 301-774-5810
Fax: 301-774-0188

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