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Saphenous Vein Graft Aneurysm Presenting as a Large Mediastinal Mass Compressing the Right Atrium

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Aneurysmal dilatation and rupture of a vein graft with formation of a pseudoaneurysm are rare but well-known complications of coronary artery bypass grafting.[1] We describe a patient in whom a saphenous vein graft aneurysm was discovered 13 years after uneventful coronary artery bypass surgery. The patient presented with a large mediastinal mass with compression of cardiac chambers. Cardiac magnetic resonance imaging (MRI) and coronary angiogram allowed the correct diagnosis. The patient died suddenly and an autopsy confirmed the presence of the aneurysm.

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A 53-year-old man was admitted to the Veterans Affairs Medical Center for workup of a mediastinal mass discovered on a routine echocardiogram. The patient's history was significant for hypertension, hypercholesterolemia, and peripheral vascular disease. At age 40 years he underwent coronary artery bypass grafting with insertion of 3 reversed saphenous vein grafts (1 to the left anterior descending artery, 1 to the first diagonal branch, and 1 to the posterior descending artery). The saphenous vein was noted to be of good quality and caliber at operation.

Beginning at age 51, angina pectoris reappeared, and 6 months earlier exertional dyspnea appeared. On admission, he was in overt heart failure. No precordial murmurs or bruits were audible and his lungs were clear.

Admission chest radiograph was interpreted as showing a normal mediastinum with an enlarged cardiac contour and clear lung fields. The echocardiogram showed a dilated heart with global hypokinesia and an estimated ejection fraction of 20%. On the apical 4-chamber view a 10 × 7 cm mass, located at the right atrioventricular groove, was visualized with compression of the right atrium and right ventricle (Figure 1). Color Doppler failed to show flow within the mass. Chest tomography revealed a multilobulated anterior mediastinal mass that appeared to be contiguous with the heart and was suggestive of malignancy. The MRI demonstrated a large mediastinal mass, which was not part of the cardiac chambers, compressing the right ventricle. Cine-MRI images of the mass revealed an area of flow void vessel in its margin suggesting a pseudoaneurysm (Figure 2).

Cardiac catheterization revealed severe native 3-vessel coronary artery disease with 2 occluded saphenous vein grafts. The third saphenous vein graft attached to the right coronary artery had marked aneurysmal dilatation (Figure 3). There was no hemodynamically significant right ventricular compression and no left-to-right shunt or fistula by oximetry. Angiography did not opacify the mass, suggesting that most of the aneurysm was filled with thrombus. Due to severe native coronary disease

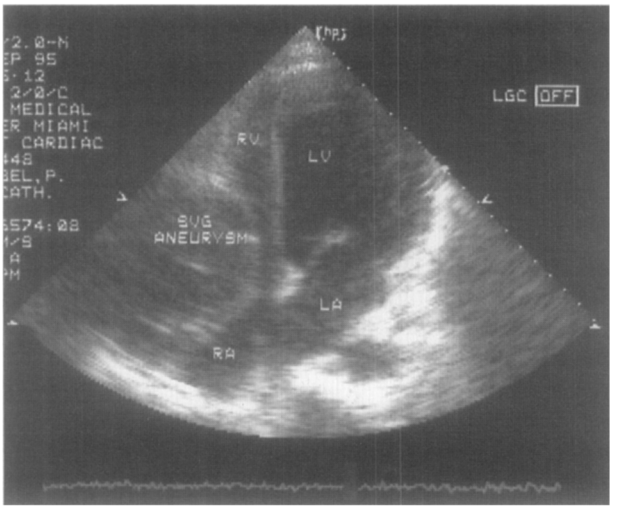

FIGURE 1. Echocardiography (apical 4-chamber view) showing a large mass occupying the right atrioventricular groove. LA = left atrium; LV = left ventricle; RA = right atrium; RV = right ventricle; SVG = saphenous vein graft.

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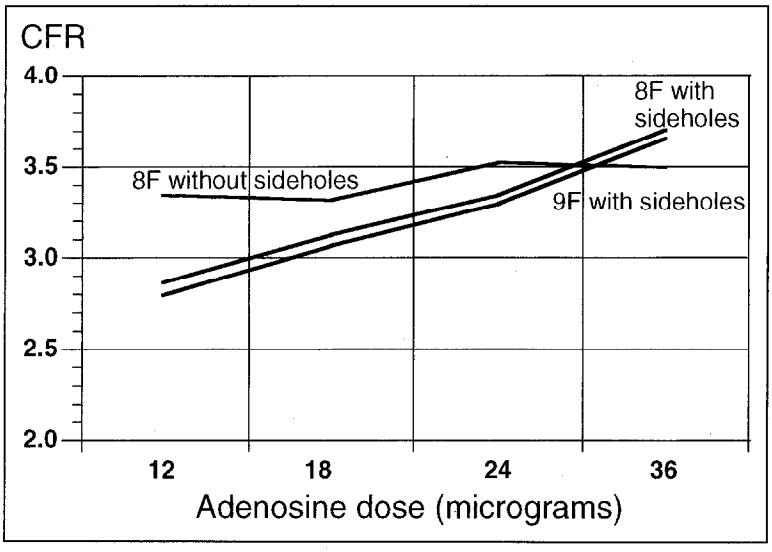

FIGURE 1. When 8F guiding catheters without side holes were used, the coronary flow reserve (CFR) did not increase with increasing doses of adenosine ($p = 0.5447$). However, when 8Fr or 9Fr guiding catheters with side holes were used, coronary flow reserve increased significantly with increasing doses of adenosine ($p < 0.0001$ and $p = 0.0001$, respectively).

Using the Doppler FloWire, a comparison of the flow velocity proximal and distal to a stenosis was originally tested as a means of assessing the significance of a lesion. More recently, investigators have advocated the measurement of CFR, the response of the coronary flow velocity to a maximal vasodilatory stimulus, to assess lesion significance. In the absence of a hemodynamically significant lesion, a maximum vasodilatory stimulus should provoke ≈250% increase in flow velocity. Because of its short half-life and few adverse effects, intracoronary adenosine is considered to be the safest and most reliable drug to provoke this response. Typically, interventional guiding catheters are used (1) to place the Doppler FloWire across the lesion in question (either before or after intervention), and (2) to deliver adenosine to the coronary circulation.

The current study found that CFR measurement is affected by guiding catheter selection. In the absence of side holes, a maximum vasodilatory response was provoked using intracoronary adenosine dose of 12 μg, similar to current recommendations.[3] However, with side-hole guiding catheters, a maximum response required an approximate doubling of the adenosine dose. This suggests that a significant amount of the vasodilator was injected through the side holes out into the peripheral arterial circulation, rather than into the coronary artery.

There were a number of limitations to this study. This was an animal, not a clinical, study. Although the number of experiments was sufficient to achieve statistical power, the sample size was small. Because of the great technical difficulty in engaging the porcine right coronary artery with 9F catheters, only the left coronary artery was studied. A larger study in humans, testing both right and left coronary arteries, will be necessary to confirm these findings.

Measurement of CFR is dependent on both guiding catheter selection and vasodilator dose. Larger doses of adenosine should be used to assess CFR when guiding catheters with side holes are used.

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