Case report - Coronary

Right atrial mass: tumor or aneurysm?

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Abstract
Accurate diagnosis and the surgical therapy is challenging for a mediastinal growth. After coronary artery graft surgery in 1982 and coronary reoperation in 1992, a patient was admitted for right atrial tumor. Echocardiography and MRI scan did not reveal precise tumor delineation. Histological studies proved a saphenous vein graft aneurysm.

1. Introduction
Mediastinal and cardiac tumors are relatively uncommon and diagnosis is difficult. While metastases from carcinoma and lymphoma occur in 10–20%, primary cardiac tumors are found in only 0.2% [1]. Almost three-quarters are benign with a myxoma being diagnosed in up to 50% [1]. Angiosarcomas and rhabdomyosarcomas are common malignant tumors. True or false aneurysms following coronary artery bypass grafting (CABG) may rarely mimic a cardiac tumor [2].

2. Clinical summary
A 63-year-old man with a history of arterial hypertension, posterior myocardial infarction and CABG presented in 1998 with a right atrial mass. Triple coronary bypass surgery had been performed in 1982 with saphenous vein grafting (SVG) of the left anterior descending (LAD), circumflex (CX) and peripheral right coronary artery (RCA). After 10 years follow up, a coronary angiogram in the work-up for progressive angina pectoris demonstrated complete occlusion of both LAD and CX grafts. The RCA graft was slightly ectatic. Echocardiography showed a circular structure close to the right atrium of 2 cm in diameter. Coronary reoperation was performed in 1992 with internal thoracic artery grafting to LAD and SVG to RCA. Peripheral CX was then found too small for bypass grafting. In 1998 after routine echocardiography, an MRI scan had revealed a right atrial tumor, presumably a myxoma. Anatomical limits could not exactly be determined and possibility of right ventricular roof infiltration was considered. A clear determination of intra- or extracardiac location of the tumor was impossible. At this time the patient refused an operation, although a malignant process was not ruled out. While repeat echocardiography demonstrated progressive growth with increased right atrial flow in 1999, there was no sign of heart failure. Repeat coronary angiography (Fig. 1) revealed significant stenosis (black arrow) of the proximal SVG to the RCA (big white arrows) with some contrast enhancement suggesting tumor vascularization (small white arrows). MRI scan showed both superior and inferior vena cava to be compressed by a laminated tumor and severe restriction of the right atrial cavity (Fig. 2). At a second reoperation in our institution in January 2000, on cardiopulmonary bypass, a tumor of 7 × 6 × 4 cm in size was found. Its medial border was adherent to the right atrial wall and caudal to the diaphragmatic inferior vena cava. The SV bypass graft adherent to the right atrial wall was removed with the tumor. In the absence of pericardium because of previous cardiac operation a Dacron patch reconstruction of the caudal right atrium and inferior vena cava was performed in a short period of deep hypothermic circulatory arrest (20 °C, 24
A segment of saphenous vein was interposed to reconstruct the RCA bypass. Tumor histopathology revealed a partly thrombotic and thin-walled SVG aneurysm (134 g in weight) with some smooth muscle cell layers. It was not possible to classify it as a true or false aneurysm. The postoperative course was uneventful except for an interim junctional rhythm. Anticoagulation with phenprocoumon was initiated for 6 months because of extensive patch reconstruction of the right atrial wall. After 18 months of follow up the patient was doing well with a normal sinus rhythm.

3. Discussion

Aneurysms of saphenous vein bypass grafts (SVG) to coronary arteries were reported first in 1975 [3]. While minor degree of dilatation of SVGs has been noted to be as high as 14% at 6–12 years after CABG [4], very large aneurysms of SVG have been reported infrequently. It may take 8–20 years for aneurysms to unfold [2], prevalence however, is expected to increase with an upcoming caseload in CABG surgery.

The exact mechanism of aneurysmal changes of SVGs has not been established. Possibly different mechanisms are at work depending on the site of the aneurysm. The lack of circular muscles around the venous valves may lead to thinning and dilatation around these areas. Fibrous intimal hyperplasia and intimal narrowing appear in most SVGs after 2–3 months. Atherosclerotic process is often observed as early as 3–4 years after operation. Hypertension, hypercholesterolemia, hyperlipidemia and elevated triglycerides have been implicated in atherogenesis of SVGs [5, 6]. A distinction should be made between a true aneurysm and a pseudoaneurysm. Pseudoaneurysms mostly develop from breakage of sutures at proximal or distal anastomotic sites. Rigidity of the conduit, motion of the grafts, graft placement under tension across the epicardial surface, improper placement of anastomotic sutures, perioperative infection all contribute to development of pseudoaneurysms. Kalimi et al. [2] reported 61% of SVG aneurysms are true aneurysms compared to 38% being classified as pseudo-aneurysms. Clinically one cannot differentiate them based on age, sex, clinical features, size or the time of presentation after CABG.

Asymptomatic hilar or mediastinal mass was the presenting clinical feature in many patients [7]. Often they become clinically evident when compressing the right atrial cavity, occluding bypass grafts or coronary arteries with symptoms of angina or chest pain [2,8]. Rupture indicates an emergency situation [9]. Angiography, transesophageal echocardiography (TEE), magnetic resonance imaging (MRI) or computed tomography (CT) have all been used in delineation of cardiac or mediastinal masses [1,2]. Even with these investigations a clear determination and delineation of tumor could be impossible—as seen in our patient.

Indication for surgery in SVG aneurysms is not obvious. About 66% of all patients suffering from SVG aneurysm undergo surgery [2]. Other treatment options for SVG aneurysm are coil implantations [8] and embolization procedures [10]. Kalimi et al. [2] reported death in 6.5% in operated patients and in 31% in non-operated cases although there was no full follow up. In our case, there was no feature of primary malignancy. The indication for operation was an imminent inflow occlusion due to progressive growth effecting extreme right atrial compression. Intraoperative findings compelled reconstruction of the right atrium even in hypothermic arrest.
Significant morbidity and mortality are associated with both true and pseudoaneurysms of SVG. Therefore we advocate early surgical intervention on detection of an SVG aneurysm.

References