Surgical repair of a large coronary artery aneurysm with arteriovenous fistula

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Coronary artery aneurysms and fistulas are rare clinical conditions in adult patients. Herein we describe a successful surgical repair of an unusually large aneurysm of the right coronary artery (RCA) with a fistula to the right ventricle (RV) in an elderly patient.

Clinical Summary

A 71-year-old man had dyspepsia, chest pain, and shortness of breath of a few months' duration. He had two recent inferior myocardial infarctions. Other relevant history included paroxysmal atrial fibrillation, hypertension, hypercholesterolemia, chronic obstructive airway disease, and gastroesophageal reflux. He was an ex-smoker and had left nephrectomy for renal cell carcinoma 8 years earlier. The coronary angiogram demonstrated severe stenoses of the left anterior descending and left circumflex coronary arteries as well as a large fusiform aneurysm of the RCA. The aneurysm of the RCA was 7 × 6 cm and communicated with the RV (Figure 1). Echocardiography also demonstrated akinesia of the inferior septal wall, a left ventricular ejection fraction of 50% to 55%, and a sclerotic aortic valve with grade 2/4 aortic regurgitation.

A coronary bypass operation was performed via a median sternotomy with cardiopulmonary bypass, mild hypothermia (32°C), and crystalloid cardioplegia. The aneurysm was overlying the atrioventricular groove (Figure 2, A). The distal vessel beyond the aneurysm appeared normal. The aneurysmal segment of artery was opened (Figure 2, B). There was no evidence of atherosclerosis or any clot formation inside the aneurysm. The aneurysm was resected and the communication to the RV was closed. The RCA was bypassed with a saphenous vein graft. The left internal thoracic artery was anastomosed to the left anterior descending coronary artery and its diagonal branch as a sequential graft. The saphenous vein graft was anastomosed to the obtuse marginal vessel. The patient was discharged home on day 7 after an uneventful recovery and remained free of angina at 8 months of follow-up.

Discussion

An aneurysm of the coronary artery is defined as an abnormal dilatation of an artery with a diameter of 1.5 times or more that of an adjacent normal coronary artery.¹ Most coronary artery aneurysms are atherosclerotic in origin, but some may be congenital.¹ Although the incidence of concomitant coronary artery aneurysm with arteriovenous fistula is unknown, coronary artery fistula is present in 0.1% to 0.2% of all patients undergoing coronary angiography.²

The etiology of the fistula formation in our patient is unclear. He did not have any connective tissue disorders or chest trauma. The fistula could have been congenital in origin and the gradual aneurysmal dilation of the RCA could have occurred as a result of high flow of blood from a high-pressure to a low-pressure chamber. Interestingly, there was no apparent atherosclerosis of the wall of the aneurysm. On the other hand, minor atherosclerotic changes may have resulted in an aneurysmal dilation with subsequent fistula formation into the RV. As described previously, large coronary aneurysms may rupture into a cardiac chamber with resulting fistula formation.^{3,4} Patients with coronary fistula tend to have features of left-to-right shunt with volume overload, congestive heart failure, or infective endocarditis and rarely rupture of the aneurysm. Few options

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Received for publication Nov 4, 2005; accepted for publication Nov 16, 2005.

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J Thorac Cardiovasc Surg 2006;131:1167-8
0022-5223/\$32.00

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doi:10.1016/j.jtcvs.2005.11.039

Figure 1. Echocardiographic demonstration of the fistula from the aneurysmal RCA to the RV.

have been described for dealing with coronary fistulas, including ligation with or without bypass to the distal coronary vessel and tangential arteriorrhaphy.⁵

Complete resection of the aneurysm, closure of the fistula under direct vision during cardioplegic heart arrest, and coronary bypass provided a safe operation and good outcome.

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Figure 2. Intraoperative view of the aneurysm of the RCA (A) with the probe placed into the orifice of the normal distal RCA (B).