

Natural History of Inadvertent Aorta-Saphenous Vein-Coronary Vein Bypass Graft

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Inadvertent distal anastomosis of an aortocoronary bypass graft to a coronary vein is a rare but potentially serious complication of coronary artery bypass surgery. We describe a patient in whom such a conduit was discovered only incidentally 17 years after its creation. This case illustrates the pertinent features of this anomaly and demonstrates that it can have a benign natural history.

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Inadvertent anastomosis of a saphenous vein bypass graft to a coronary vein is a rare but potentially disastrous complication of coronary artery bypass graft (CABG) surgery. In virtually all reported cases [1-5] the resulting aortocoronary vein fistula has been recognized soon after surgery and corrected by repeat operation or percutaneous embolization of the saphenous vein graft. Thus, little information exists regarding the natural history of this anomaly. We describe a patient in whom an inadvertent aorto-saphenous vein-coronary vein conduit was created during CABG surgery in 1984 and discovered incidentally 17 years later. This case demonstrates that this anomaly may have a benign prognosis.

A 75-year-old male presented for evaluation of progressive exertional dyspnea. Seventeen years earlier he had developed exertional dyspnea and had been found to have an eccentric stenosis of the proximal left anterior descending (LAD) coronary artery. This was treated with CABG surgery using a reversed autologous saphenous vein bypass conduit. The operative report describes distal anastomosis of the saphenous vein to "an unusually thin-walled" LAD coronary, but the operation was otherwise unremarkable and the patient recovered uneventfully.

For the next 16 years the patient experienced only occasional exertional dyspnea. In year 17 his symptoms worsened and an exercise test was positive for dyspnea, ST segment depressions and a reversible thallium-201 perfusion defect of the left ventricular apex at low workload.

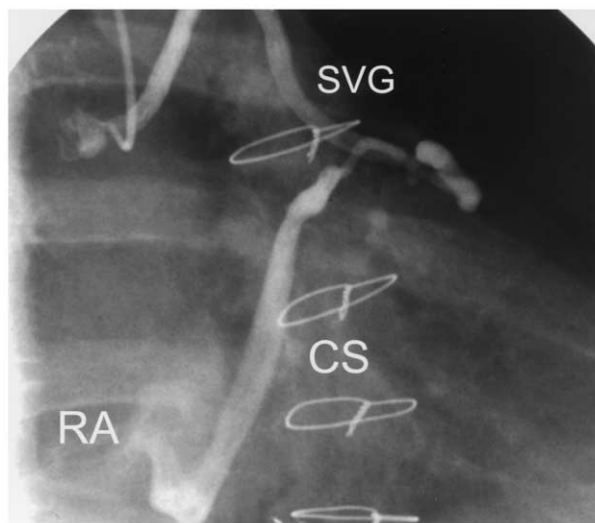


Fig 1. Selective angiogram of the aorta-saphenous vein-coronary vein graft (SVG) in the right anterior oblique projection, demonstrating distal anastomosis to the great cardiac vein with subsequent drainage into the coronary sinus (CS) and right atrium (RA).

Angiography performed through the right radial artery demonstrated a patent, although atheromatous, saphenous vein graft arising from the aorta and traversing to the anterior surface of the heart. Close inspection demonstrated distal anastomosis of this graft to the great cardiac vein at the junction of its middle and distal thirds, with rapid contrast opacification of a dilated coronary sinus and subsequently the right atrium (Fig 1). Results of right heart and coronary sinus pressure and oximetry measurements are given in Table 1. Systemic and pulmonary blood flows were both calculated to be 5.6 L/min and pulmonary vascular resistance was 1.0 Wood units. The native coronary circulation was remarkable only for an isolated lesion of the proximal LAD coronary (Fig 2).

After consideration of several potential treatments, it was elected to proceed with primary stenting of the original LAD coronary stenosis. A 3.0 × 15 mm AVE stent was placed and the patient was discharged home from the outpatient unit 6 hours later. His symptoms subsequently resolved.

Comment

As demonstrated by the operative note in this case, inadvertent aorto-saphenous vein-coronary vein fistula results when a coronary vein is mistaken for the adjacent coronary artery during creation of the distal graft anastomosis. While this anomaly has historically been the least common of the various arterial-venous communications known to complicate CABG surgery, its incidence might be expected to increase as newer techniques for

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Table 1. Pressure Measurements and Oxygen Saturations

	SVC	IVC	Right Atrium	Coronary Sinus	Right Ventricle	Pulmonary Artery	Femoral Artery
Pressure (mm Hg)	4	4	5	6	37/5	34/8	125/65
Oxygen saturation (%)	74%	76%	76%	80%	77%	76%	97%

Oxygen saturations are the average of duplicate measurements at each site.

IVC = inferior vena cava; SVC = superior vena cava.

minimally invasive and robotic CABG surgery disseminate from innovative centers into less skillful hands.

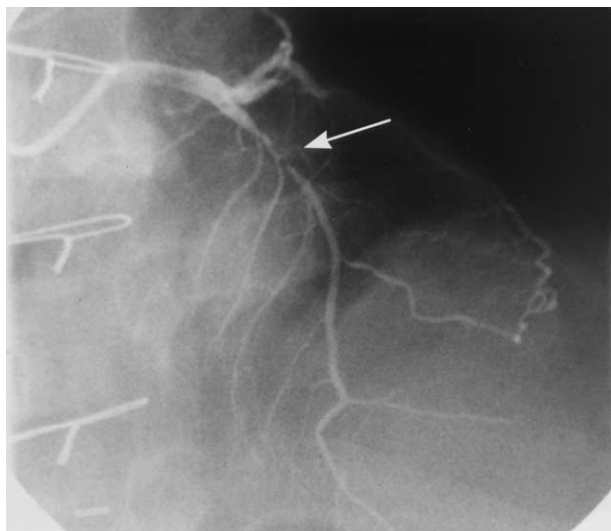
As with any cardiac left-to-right shunt, the natural

history of this anomaly should depend primarily on the magnitude by which it increases pulmonary blood flow. In our patient, the finding of a high coronary sinus oxygen saturation (80%, normal being typically < 50%) suggested that aortic blood made a significant contribution to coronary sinus flow. Nevertheless, we were unable to detect a significant oxygen step-up across the right side of the heart. This is in contrast with some previous reports [5] but consistent with the associated finding that our patient's pulmonary artery pressure and resistance remained low 17 years after creation of the shunt. It has further been hypothesized that fistulas of this type might produce myocardial ischemia as a consequence of coronary steal [3]. The present case, in which symptoms of myocardial ischemia remained infrequent for years after creation of the fistula and were subsequently relieved by LAD angioplasty, suggests against such a mechanism.

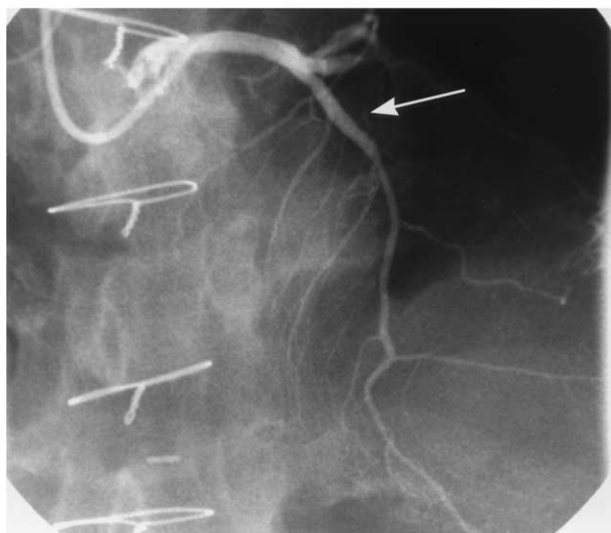
The treatment of iatrogenic aorto-saphenous vein-coronary vein fistulas is controversial, with both repeat surgery [2], percutaneous antegrade embolization of the graft [4], and retrograde embolization through the coronary sinus [1] being advocated. In our patient, the absence of any evidence of right heart volume overload 17-years after creation of the shunt suggested that the most effective therapeutic option would be to simply treat the native coronary stenosis by primary stenting. We did not attempt coil occlusion of the vein graft for fear of distal embolization in this very senescent conduit.

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A



B

Fig 2. (A) Selective left coronary angiogram demonstrating eccentric stenosis (arrow) of the proximal left anterior descending (LAD) coronary artery. (B) Appearance following placement of a 3.0 × 15 mm intracoronary stent (arrow) across the LAD lesion.