CASE REPORT

A rare case of a giant saphenous vein graft aneurysm with right atrial fistula formation

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SUMMARY

A 57-year-old hypertensive and dyslipidaemic man with a history of coronary artery bypass graft 19 years previously, presented with severe exertional angina and dyspnoea despite optimal anti-ischaemic pharmacological therapy and previous percutaneous coronary intervention to the left circumflex artery. CT revealed an aneurysm of the saphenous vein graft to the posterior left ventricular branch of the right coronary artery. The aneurysm had formed a fistulous connection with the right atrium. Initially, luminal reconstruction with serial stents was deemed the most appropriate treatment strategy. However, the procedure was abandoned due to the inability to visualise the graft distal to the aneurysm and the significant shunt to the right atrium. Surgical correction of the right atrial wall defect and replacement of the diseased grafts led to complete resolution of the patient's symptoms.

BACKGROUND

Aortocoronary saphenous vein graft aneurysms (SVGAs) constitute a rare complication of coronary artery bypass grafting. In addition, the formation of a fistulous connection between the SVGa and right atrium has only been reported in a handful of cases to date. Since percutaneous and surgical approaches are both widespread treatment options, a multi-modality imaging strategy and multidisciplinary approach are paramount to optimise the individualised decision-making process. We describe the detailed assessment and management of a 57-year-old man with refractory angina 19 years postcoronary artery bypass graft (CABG) due to a SVGa with fistulous connection to the right atrium, highlighting the importance of such comprehensive investigations even for usual cardiac symptoms.

CASE PRESENTATION

A 57-year-old man was referred to our hospital, with refractory severe exertional angina (Canadian Cardiac Society Class III) and dyspnoea (New York Heart Association Class III), despite optimal pharmacological therapy and prior percutaneous coronary intervention (PCI) to the left circumflex artery, in a district general hospital. He had a history of hypertension, dyslipidaemia and CABG 19 years previously, with a left internal mammary artery graft to the left anterior descending artery and two SVGs, one to an intermediate branch (Int) and the other to the posterior left ventricular branch (PLV) of the right coronary artery (RCA). Furthermore, 10 years previously, the patient had undergone PCI to the proximal SVG-PLV graft due

to recurrent angina and severe ostial graft stenosis. Other medical history included bilateral lower limb amputation due to severe peripheral vascular disease.

INVESTIGATIONS

Angiography at the district general hospital revealed a patent LIMA-LAD (left internal mammary artery to left anterior descending) and SVG-Int grafts. The stented ostial SVG-PLV was patent but with poor distal (TIMI II) flow and the possibility of an aneurysm immediately distal of the stent. Further three-dimensional volume-rendered and curved multiplanar reformatted CT demonstrated a SVG (40×35 mm) with a fistulous connection to the right atrium ([figure 1A, B](#)). The aneurysm was lined with thrombus, particularly at the superior aspect. There was also evidence of coronary ectasia in the proximal to mid-segment of the SVG (8.6×11 mm) with narrow entry and exit points to the aneurysm (approximately 2.5 mm). The distal SVG segment appeared patent and inserted onto the PLV with good distal run-off. Therefore, after multidisciplinary team discussion, percutaneous luminal reconstruction was attempted, as described previously.¹

TREATMENT

Right femoral arterial access was established and the SVG-PLV cannulated with a 6 Fr multipurpose (MPA) guiding catheter. Despite using an angioplasty wire supported by an over-the-wire balloon, the distal RCA could not be accessed nor visualised. Thus, deep intubation of the MPA enabled access to the SVG aneurysm and, using an exchange-length wire, the MPA was replaced with a diagnostic pigtail catheter. High-pressure contrast injection delineated the aneurysmal lumen and revealed a significant shunt to the right atrium ([figure 1C, video 1](#)). Thus, attempt at percutaneous exclusion was abandoned, necessitating a surgical approach.

At surgery, the LIMA was identified and the two SVGs were encountered during heart mobilisation: one to an intermediate branch and the other to the PLV of the RCA. The tops of both SVGs were aneurysmal. In the mid-course of the PLV graft, there was a large aneurysm, with a 1 cm neck, that had ruptured into the right atrium. On mobilising the aneurysm, the whole right atrial wall crumbled, leaving a 4 cm defect ([figure 2A](#)).

The right atrium was double cannulated with caval snares to allow the PLV graft aneurysm to be opened, and the right atrial wall was closed directly with a running suture ([figure 2B](#)). The aneurysmal top ends were underrun with Teflon felt support to

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Figure 1 Three-dimensional volume-rendered (A) and curved multiplanar reformatted (B) CT images, demonstrating the SVG aneurysm (40×35 mm) (open arrow) and its fistulous connection to the RA (closed arrow). The aneurysm was lined with thrombus, particularly at the superior aspect. There was also evidence of coronary ectasia in the proximal to mid-segment of the saphenous vein graft (8.6×11 mm), with narrow entry and exit points to the aneurysm (approximately 2.5 mm). The distal SVG segment appeared patent and inserted onto the PLV with good distal run-off (not shown). (C) Left-anterior-oblique view of contrast injection into the saphenous vein graft aneurysm (open arrow), demonstrating a large shunt into the right atrium (closed arrow). There was right atrial pressure-wave morphology at this position. Ao, aorta; LV, left ventricle; RA, right atrium; SVG, saphenous vein graft.

exclude them and double bypass grafting was undertaken to replace the two diseased grafts.

OUTCOME AND FOLLOW-UP

The patient made an uncomplicated recovery and was discharged with resolution of symptoms.

DISCUSSION

Aortocoronary SVGAs occur in approximately 0.07% of grafts and fistulous formation to the right atrium has only previously been reported in seven case-reports.^{2 3} We describe one additional case of a patient presenting with recurrent angina and dyspnoea. The aetiology of SVGAs is poorly understood but likely involves distinct pathophysiological processes for early and late

aneurysm formation (ie, >5 years post-CABG). The latter is thought to result from a combination of exposure to arterial pressures, endothelial dysfunction and changes in smooth muscle orientation in the vicinity of valve sites.⁴ The history of hypertension and the coexisting aneurysm in the SVG-Int in the patient described here support this view, and the presence of a stent may have contributed to greater aneurysmal growth in the SVG-PLV.

Video 1 Left-anterior-oblique view of contrast injection into the saphenous vein graft aneurysm with a pigtail catheter. There is no filling of the graft distal to the aneurysm. Three distinct phases of contrast flow in the right heart can be distinguished; shunt into the right atrium, right ventricular filling and ejection phase into the pulmonary artery.

Figure 2 Intraoperative pictures during surgical repair of the saphenous vein graft. (A) In the mid-course of the SVG to the PLV there was a large aneurysm, with a 1 cm neck, that had ruptured into the RA (top arrow). (B) Opened aneurysmal vein graft (bottom arrow) with caval snares cannulating the RA. PLV, posterior left ventricular branch; RA, right atrium; SVG, saphenous vein graft.

Multimodality imaging and multidisciplinary team discussion, as illustrated here, are pivotal in the management of such patients.

Learning points

- ▶ Common cardiovascular symptoms may underline a rare diagnosis.
- ▶ Percutaneous interventions and surgical correction are highly successful treatment strategies.
- ▶ The rarity of the condition necessitates comprehensive investigations with multimodality imaging as well as multidisciplinary team discussion among a cardiac surgeon, and interventional and non-interventional cardiologists.

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REFERENCES

- 1 Patterson T, Webb I, Redwood SR. Percutaneous luminal reconstruction of giant saphenous vein graft aneurysm. *JACC Cardiovasc Interv* 2015;8:e141–2.
- 2 Dieter RS, Patel AK, Yandow D, *et al.* Conservative vs. invasive treatment of aortocoronary saphenous vein graft aneurysms: treatment algorithm based upon a large series. *Cardiovasc Surg* 2003;11:507–13.
- 3 Ramirez FD, Hibbert B, Simard T, *et al.* Natural history and management of aortocoronary saphenous vein graft aneurysms: a systematic review of published cases. *Circulation* 2012;126:2248–56.
- 4 Vlodaver Z, Edwards JE. Pathologic changes in aortic-coronary arterial saphenous vein grafts. *Circulation* 1971;44:719–28.

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