

Saphenous Vein Graft Aneurysm after Coronary Artery Bypass Grafting

Kengo Nishimura, MD, Yoshinobu Nakamura, MD, Shingo Harada, MD, Munehiro Saiki, MD,
Akira Marumoto, MD, Yasushi Kanaoka, MD, and Motonobu Nishimura, MD

Saphenous vein graft (SVG) aneurysms are an unusual but potentially fatal complication after coronary artery bypass grafting (CABG). We report a case of multiple SVG aneurysms 23 years following CABG. Although the patient was on dialysis and had a poor left ventricular function, the aneurysms were successfully excised, and the ascending aorta was uneventfully replaced to be possible for percutaneous coronary intervention in the near future. (Ann Thorac Cardiovasc Surg 2009; 15: 61–63)

Key words: saphenous vein graft aneurysm, coronary artery bypass grafting

Introduction

A saphenous vein graft (SVG) aneurysm after coronary artery bypass grafting (CABG) is a rare but potentially fatal complication. We report a case of multiple SVG aneurysms 23 years following CABG.

Case

A 71-year-old man underwent a triple CABG with SVGs to the left anterior descending artery (LAD), left circumflex artery (LCX), and right coronary artery (RCA) in 1983. Since 1996, he had been on dialysis because of chronic renal failure. In 2001, he underwent coronary arteriography (CAG) for his recurrent anterior chest pain. Because the CAG showed the occlusion of SVGs to the LAD and LCX, as well as a patent SVG to the RCA, in 2002 he underwent redo CABG to the distal LAD using the left internal thoracic artery (LITA). In

September 2006, he again began to feel occasional chest oppression and underwent CAG. It showed a huge aneurysm of SVG to the RCA (Fig. 1) and a patent LITA. It also showed that his native RCA was occluded at the proximal portion and that blood flow of the distal RCA was supplied through the LCX. An electrocardiogram showed an abnormal Q in III, aVF, and V4, as well as an inverted T wave in V5 and V6. Echocardiography showed poor left ventricular wall motion and an ejection fraction of 28.4%. Enhanced chest computerized tomography (CT) showed multiple SVG aneurysms at the proximal anastomosis in the ascending aorta (Fig. 2).

We decided to treat the patient's SVG aneurysms for the prevention of rupture. The third time sternotomy was performed and a tight fibrous adhesion was dissected. A cardiopulmonary bypass was established with arterial cannulation into the right axillary artery and right common femoral artery, and a double venous cannulation was established into the superior and inferior vena cava. The aneurysmal SVGs to the LAD and LCX were found at the proximal anastomosis site in the ascending aorta. Also, a huge aneurysmal SVG to the RCA resembling a ping-pong ball with maximal diameter of 3 cm was noted next to the right atrium, and one was also found at the proximal anastomosis site (Fig. 3a). The SVG aneurysm was opened (Fig. 3b). It showed wall formation and was considered to be a true aneurysm. The proximal site was patent, but the distal

From Division of Cardiovascular Surgery, Tottori University Faculty of Medicine, Yonago, Japan

Received January 18, 2008; accepted for publication January 30, 2008

Address reprint requests to Motonobu Nishimura, MD: Division of Cardiovascular Surgery, Tottori University Faculty of Medicine, 36-1 Nishi-cho, Yonago, Tottori 683-8504, Japan.

©2009 The Editorial Committee of *Annals of Thoracic and Cardiovascular Surgery*. All rights reserved.

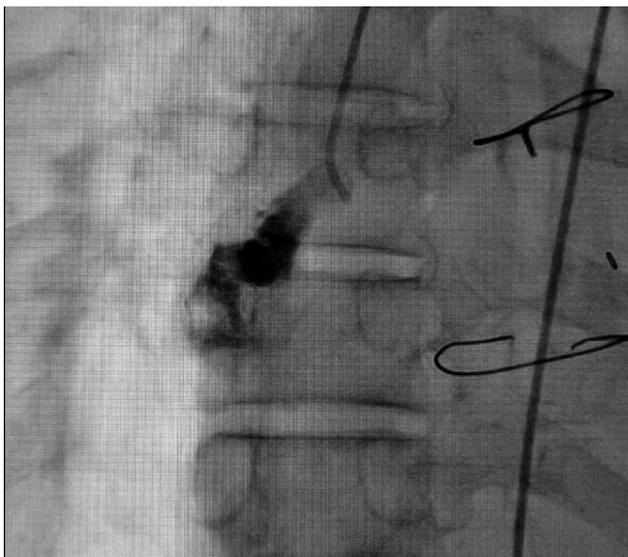


Fig. 1. Coronary arteriography (CAG) demonstrated the occlusion of an aneurysmal saphenous vein graft (SVG) to the right coronary artery (RCA) in the midportion.

side was occluded. We decided to replace the entire ascending aorta to remove the total aneurysmal portion. The ascending aorta was replaced with a 26 mm sealed graft with antegrade selective cerebral perfusion under moderate hypothermia. Although a high operative risk was anticipated because of the patient's chronic renal failure and poor left ventricular function, the postoperative course was uneventful.

Discussion

The natural history of the SVG aneurysm has not been clearly documented. Several investigators reported that SVG aneurysms are a rare complication of CABG, occurring at an estimated rate of less than 1%,¹⁻⁴ although it is possible that only a minority of cases might come to clinical attention. Atherosclerosis and associated thrombosis are among the prominent histopathological findings.⁵ Kalimi and colleagues reviewed 50 cases of SVG aneurysm.³ Thirty patients had true aneurysms, 17 had pseudoaneurysms, and the remaining 3 could not be categorized into either group. Many patients in the true aneurysm group, such as the present case, were asymptomatic (47%). The next most common presenting symptom in this group was myocardial infarction (MI) (23%), followed by angina (13%) and chest pain (13%). On the other hand, in the pseudoaneurysm group chest pain was the leading symptom (29%),

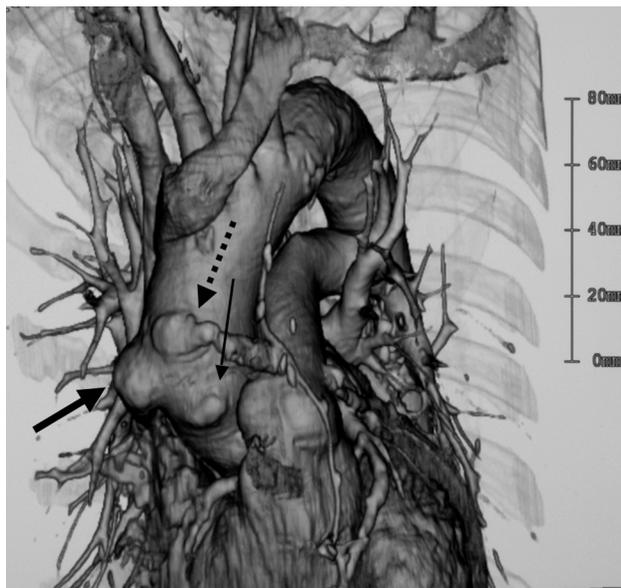


Fig. 2. Three-dimensional chest computerized tomography (CT) showing saphenous vein graft (SVG) aneurysms in the ascending aorta.

The aneurysmal SVGs to the left anterior descending artery (LAD) (thin solid arrow), left circumflex artery (LCX) (dashed arrow), and right coronary artery (RCA) (thick solid arrow).

followed by angina (24%), MI (12%), and bleeding (12%). Only 12% of this group was asymptomatic. The time of presentation after CABG was similar in both groups: the true aneurysm group was 10.1 years, and the pseudoaneurysm group was 9.7 years.³

SVG aneurysms can be detected as hilar masses on chest roentgenogram. CT and magnetic resonance imaging (MRI) are useful to exclude other pathologies and to estimate the size of the aneurysm, and may also show contrast imaging.⁶ An evaluation of any suspected SVG aneurysm should include coronary angiography to determine the patency and any other coronary stenosis that should be addressed at the time of operation.^{1,3} In the present case, 3-dimensional chest CT was useful to detect the aneurysms.

Complications of SVG aneurysms include distal embolization, MI, and fistula formation.^{3,7} Rupture causes cardiac tamponade or hemothorax, and it is rapidly fatal.⁶ Because these aneurysms may present with an unpredictable course, they should be surgically resected or ligated. Kalimi and colleagues reported that 31 of 50 patients (62%) underwent surgical ligation of SVG aneurysms.³ Another option is catheter-based coil embolization,⁸ which is recommended in high-risk

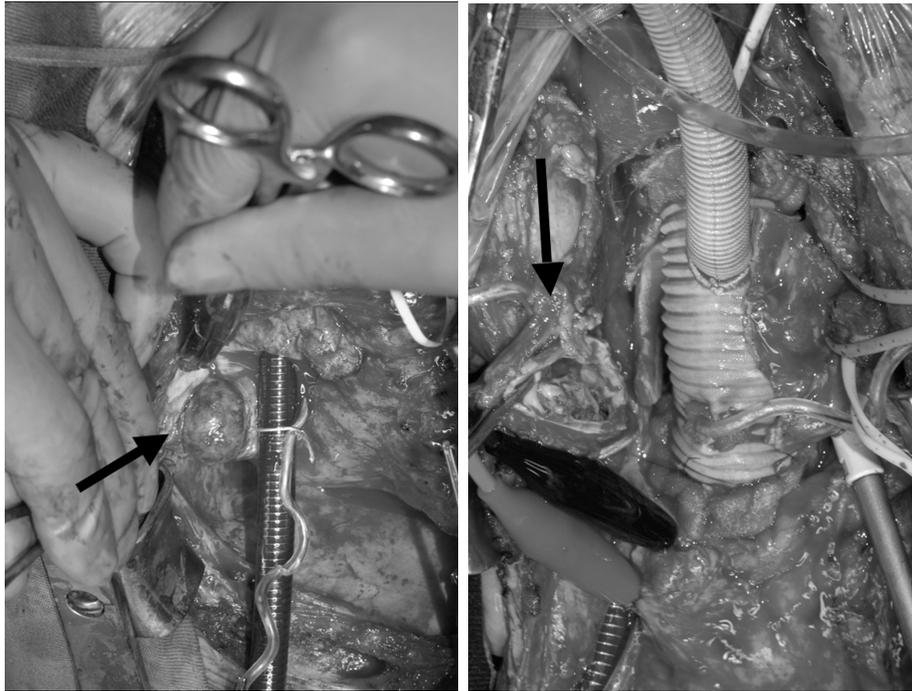


Fig. 3. Intraoperative view of the saphenous vein graft (SVG) aneurysms.
a: The aneurysmal SVG for the right coronary artery (RCA) resembled a ping-pong ball next to the right atrium (arrow).
b: The SVG aneurysm showed wall formation (arrow).

surgical patients and could reduce the risk of occlusion of major coronary arteries by thrombi and seal off fistulae.^{3,6)} In the present case, catheter-based treatment was considered to be difficult because the ascending aorta itself was enlarged because of SVG aneurysms at the proximal anastomosis site. Although the patient was on dialysis and had a poor left ventricular function, the aneurysms were successfully excised and the ascending aorta uneventfully replaced to be possible for percutaneous coronary intervention (PCI) in the near future.

SVG aneurysms usually became evident approximately 10 years after CABG. We should keep in mind the possibility of this postoperative complication when following CABG patients using SVGs.

References

1. Williams ML, Rampersaud E, Wolfe WG. A man with saphenous vein graft aneurysms after bypass surgery. *Ann Thorac Surg* 2004; **77**: 1815–7.
2. Roth M, Sprengel U, Kraus B, Klövekorn WP, Bauer EP. Symptomatic aneurysm of a saphenous vein graft with compression of the right atrium. *Heart Surg Forum* 1999; **2**: 338–40.
3. Kalimi R, Palazzo RS, Graver LM. Giant aneurysm of saphenous vein graft to coronary artery compressing the right atrium. *Ann Thorac Surg* 1999; **68**: 1433–7.
4. Gruberg L, Satler LF, Pfister AJ, Monsein LH, Leon MB. A large coronary artery saphenous vein bypass graft aneurysm with a fistula: case report and review of the literature. *Catheter Cardiovasc Interv* 1999; **48**: 214–6.
5. Topaz O, Rutherford MS, Mackey-Bojack S, Prinz AW, Katta S, et al. Giant aneurysms of coronary arteries and saphenous vein grafts: angiographic findings and histopathological correlates. *Cardiovasc Pathol* 2005; **14**: 298–302.
6. Parry DJ, Winburn IC, Wilkins GT, Bunton RW. Expanding retrograde saphenous vein graft aneurysm treated with endovascular coiling. *Ann Thorac Surg* 2005; **80**: 2374–6.
7. Le Breton H, Pavin D, Langanay T, Roland Y, Leclercq C, et al. Aneurysms and pseudoaneurysms of saphenous vein coronary artery bypass grafts. *Heart* 1998; **79**: 505–8.
8. Shapeero LG, Guthaner DF, Swerdlow CD, Wexler L. Rupture of a coronary bypass graft aneurysm: CT evaluation and coil occlusion therapy. *Am J Roentgenol* 1983; **141**: 1060–2.