An Unusual Case of Rise in Pulmonary Arterial Pressure and Right Ventricular Dysfunction

Philippe Willems, MD, Veronique Cyr, MD, Giovanni Romanelli, MD, Alexis Matteau, MD, Yves Provost, MD, and Francois Tournoux, MD, PhD, Montreal, Quebec, Canada

INTRODUCTION

Saphenous venous graft (SVG) aneurysms are a very rare complication of coronary artery bypass graft surgery. They are often asymptomatic, and they may be incidentally discovered on chest radiography.\(^1\) We present an unusual case of a patient who developed acute dyspnea and right ventricular dysfunction 30 years after coronary artery bypass graft surgery. Echocardiography showed a massive aneurysm of the SVG to the first obtuse marginal artery causing mechanical compression of the pulmonary trunk and a rapid rise in the pulmonary arterial pressure. The diagnosis was then confirmed on contrast computed tomography.

CASE PRESENTATION

A 59-year-old man presented to the emergency department for chest pain and acute dyspnea. His medical history included chronic renal failure with subsequent kidney transplantation, hypertension, dyslipidemia, and coronary artery disease. He had no history of varicose veins or collagen tissue disease. In 1988, he underwent coronary artery bypass graft surgery with a left internal mammary artery graft to the left anterior descending coronary artery and SVGs to the right coronary artery, to the first diagonal, and to the first obtuse marginal artery. In July 2009, the patient was diagnosed with three aneurysms of the SVG to the first obtuse marginal artery on routine radiography (Figure 1), and close follow-up by computed tomography was performed regularly over the course of 7 years. In June 2016, the second aneurysm was found to be increased in size and the pulmonary trunk to be slightly compressed (Figures 2A and 2B). Because the patient was asymptomatic and the compression of the pulmonary trunk was mild, echocardiographic follow-up was planned 6 months later. This study was performed in December 2016 and showed increasing extrinsic compression of the pulmonary trunk without hemodynamic repercussion: transpulmonary flow maximal velocity was 2 m/sec, and peak gradient was 16 mm Hg. Right ventricular size and function were normal (Figure 3, Video 1), as was estimated pulmonary arterial systolic pressure. The apical four-chamber view also showed the most distal aneurysm now compressing the lateral wall of the left ventricle (Video 1).

Two weeks later, the patient presented to the emergency department with acute dyspnea and sharp chest and back pain. This pain was different from his past angina episodes. Physical examination was remarkable for sinus tachycardia (110 beats/min) and preserved hemodynamics (blood pressure 124/89 mm Hg). Urgent echocardiography showed that the compression of the pulmonary trunk by the second aneurysm was now severe (Figure 4A, Video 2). Continuous Doppler interrogation of pulmonary transvalvular flow found greatly increased velocity and peak gradient (3.5 m/sec and 49 mm Hg, respectively) compared with those measured 2 weeks before (Figure 4B), with new mild right ventricular dysfunction. The apical four-chamber view did not show any change in the compression of the lateral wall by the most distal aneurysm (Figure 4C). A new computed tomographic scan confirmed the severe compression of the pulmonary trunk by the second SVG aneurysm (Figure 2C), whose aspect suggested an impending rupture. The ostium of the SVG was first occluded using an Amplatzer device in the catheterization laboratory to avoid rupture of the aneurysm during the open chest surgery. The procedure resulted in only a mild myocardial infarction because of the small territory involved. The patient was then sent to the operating room and underwent surgical ligation of the graft at the aorta, followed by thrombectomy in the graft, allowing complete decompression of the surrounding structures. The operation was successful, and the patient was discharged home soon after.

DISCUSSION

Aortocoronary SVG aneurysm incidence was 0.07% in a case series from a single institution reporting on 5,500 grafts.\(^2\) It usually occurs >10 years after surgery and is a result of atherosclerotic degeneration of the venous graft vessel wall. There is no proven link between the development of SVG aneurysm and a varicose disease of the inferior limbs. Aneurysms mainly affect grafts to the right coronary artery (38%) and the left anterior descending coronary artery (25%) and less commonly the obtuse marginal (11%). The initial clinical presentation varies, but the most common symptoms are chest pain or angina (46%), shortness of breath (13%), and myocardial infarction (8%). Mechanical complications are described in 4% of cases, including right atrial compression, right ventricular compression, and fistula formation.\(^3\) However, compression of the pulmonary artery and right-sided heart failure are a very rare phenomenon described in only a few case reports.\(^4,5\) SVG aneurysms are generally managed conservatively. Surgical repair is performed only in the more severe cases. However, percutaneous occlusion of the graft using an Amplatzer device or a covered stent has also been reported to be helpful in a few case reports and seems to be gaining acceptance as an alternative to surgery in certain cases.\(^3,6,8\)
Conclusion

Aortocoronary SVG aneurysm is a rare phenomenon. In this case, multimodality imaging nicely demonstrated the course of this aneurysm over 7 years and highlighted a very rare and dangerous complication, the compression of the pulmonary trunk. Follow-up of this patient using two different imaging modalities provided an accurate assessment of this SVG aneurysm, its rate of growth, and, finally, its impact on surrounding structures. Such global assessment is critical considering the very
high risk of surgery. In the end, a combined approach using both percutaneous and surgical approaches resulted in a successful outcome for this patient.

**SUPPLEMENTARY DATA**

Supplementary data related to this article can be found at https://doi.org/10.1016/j.case.2018.07.007.

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