Case Report

AORTA

AORTA, October 2015, Volume 3, Issue 5: 167-171
DOI: http://dx.doi.org/10.12945/j.aorta.2015.15.001

Received: January 02, 2015
Accepted: June 11, 2015
Published online: October 2015

Left Ventricular Outflow Tract Pseudoaneurysm after Aortic Valve Replacement

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Abstract

Left ventricular outflow tract pseudoaneurysm is an uncommon complication following aortic valve replacement (AVR), occurring most frequently secondary to endocarditis. We present a case of a 47-year-old female with a history of intravenous drug abuse and a past surgical history of two AVRs (2001 and 2009 with aortic root replacement for endocarditis) who presented with symptoms of lower extremity weakness. Subsequent radiologic imaging revealed the presence of a left ventricular outflow tract pseudoaneurysm, which was surgically managed with a homologous conduit.

Key Words

Left ventricular outflow tract (LVOT) • Aortic valve replacement • Pseudoaneurysm

Introduction

Prosthetic valve reoperation for a pseudoaneurysm with a history of endocarditis is a known complication after aortic valve replacement (AVR). As the aneurysm enlarges, life threatening complications such as rupture, thrombosis and compression of coronary vasculature may occur [1-3]. Persistent endocarditis can lead to deterioration of the aortic annulus and cavitary formation within the aortic sinuses. Reoperation in such cases corrects severe and progressive valvular insufficiency. We present our approach to a left ventricular outflow tract (LOVT) pseudoaneurysm in a young female with a history of intravenous drug abuse and prosthetic valve endocarditis.

Case Presentation

A 47-year-old female presented with left lower extremity weakness and fatigue that caused her to fall while getting out of bed. Her past medical history was significant for intravenous drug abuse, endocarditis, and hepatitis B and C. Surgical history was significant for AVR with a mechanical valve in 2001 and aortic root replacement with a bioprosthetic valve in 2009 secondary to endocarditis. Blood cultures were negative.

Transthoracic echocardiogram (TTE) revealed questionable aortic root dissection, normal left ventricular function, and moderate mitral regurgitation (Figure 1A). Transesophageal echocardiogram (TEE) revealed a questionable 6 cm aortic root abscess versus pseudoaneurysm (Figure 1B) without signs of vegetation. Discontinuity of the aortic valve from the mitral annulus and left ventricular outflow tract

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Published by Science International Corp.
ISSN 2325-4637

Accessible online at:
http://aorta.scienceinternational.org

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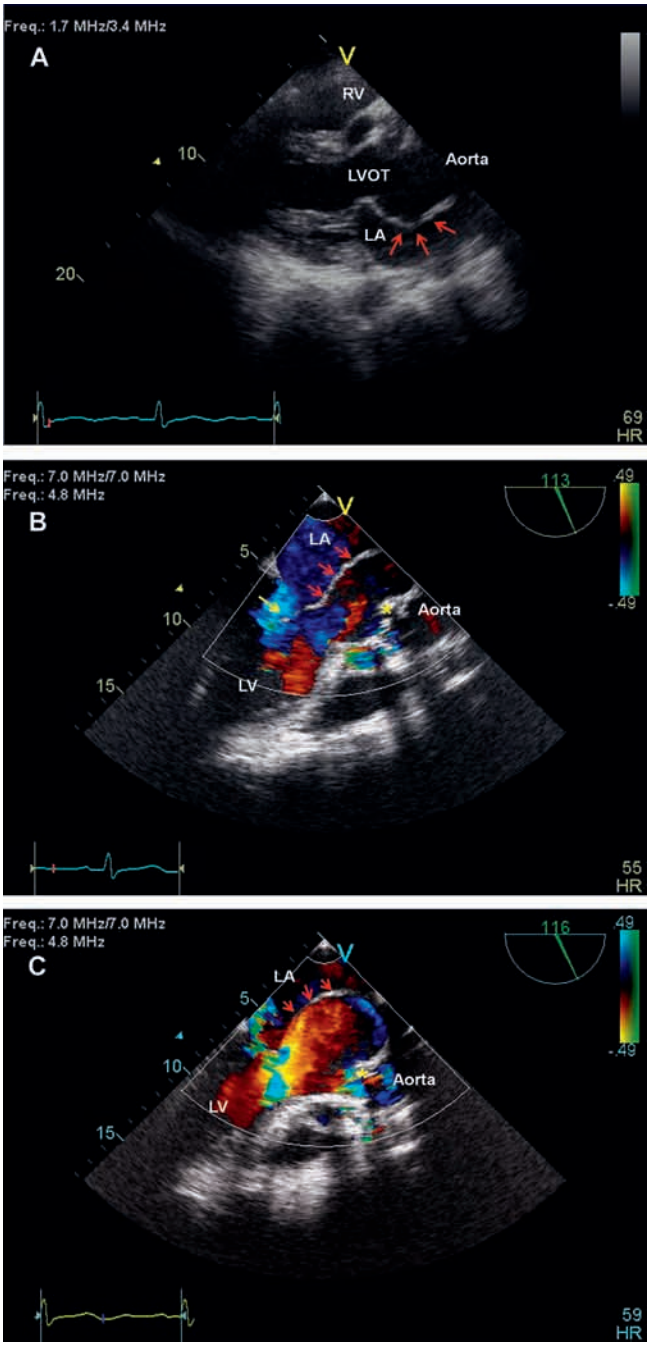

Figure 1. *Panel A*. 2D Echocardiogram. Parasternal long axis view showing aneurysmal left venticular outflow tract (arrows). *Panel B*. TEE showing gross displacement of bioprosthetic aortic valve (asterisk) with aneurysmal dilatation pressing into the left atrium (arrow: mitral valve). *Panel C*. Aneurysm expanded with left ventricular contraction; aortic valve (asterisk). RV = right ventricle; LA = left atrium; LV = left ventricle; LVOT = left ventricular outflow tract.

produced a paravalvular leak. No thrombus or abscess was noted. The supplemental video demonstrates in color flow loops the course the blood flow takes into the aneurysm, with outpouching into the left atrium (Figure 1C; see supplemental Video 1 at http://dx.doi.org/10.12945/j.aorta.2015.15.001.vid.01). For surgical evaluation, a CT scan of the chest revealed a 6.5-cm aneurysm in a bilobed fashion around the anterior aspect of the LVOT proximal to the prosthetic aortic valve (Figure 2A-C). Three dimensional volume reduction images were obtained from the CT scan that further outline the size and location of the aneurysm (Figure 2D).

The patient underwent repeated sternotomy with cardiopulmonary bypass (CPB). The pseudoaneurysm was cultured. A 23 mm homograft (CryoLife, Georgia, USA) was inverted and placed in the left ventricular outflow tract, which was reconstructed using Prolene sutures. The homograft root was then sewn to the reconstructed outflow tract using continuous Prolene sutures of three interruptions.

The graft was pulled back through, thus reconstructing the native aorta. Because the coronary buttons were far from the aortic valve, a Cabrol technique was performed anastomosing the right and left main coronary arteries to a piece of vein graft. A tube graft was not used given the possibility of infectious etiology of the site. A proximal anastomosis was done from the native aorta to the homograft root using continuous Prolene suture.

Intraoperative TEE assessment showed poor contraction of the ventricles, thus coronary artery bypass anastomosis was performed to the left anterior descending and posterior descending arteries with proximal anastomosis to the newly created ascending aorta. An intra-aortic balloon pump was placed and the patient was weaned off CPB. TEE confirmed an ejection fraction of 35-40% with moderate inotropic support (Figure 3B). CPB and cross clamp times were 289 and 152 min, respectively.

Intraoperative LVOT aneurysm cultures were negative for growth. Pathology found a vegetation on the ring of the explanted aortic valve. Postoperatively, a peripherally inserted central venous catheter was placed for long term antibiotic therapy. Methadone therapy was continued under the care of a substance abuse specialist. The patient recovered uneventfully and was discharged on postoperative day 7. Primary

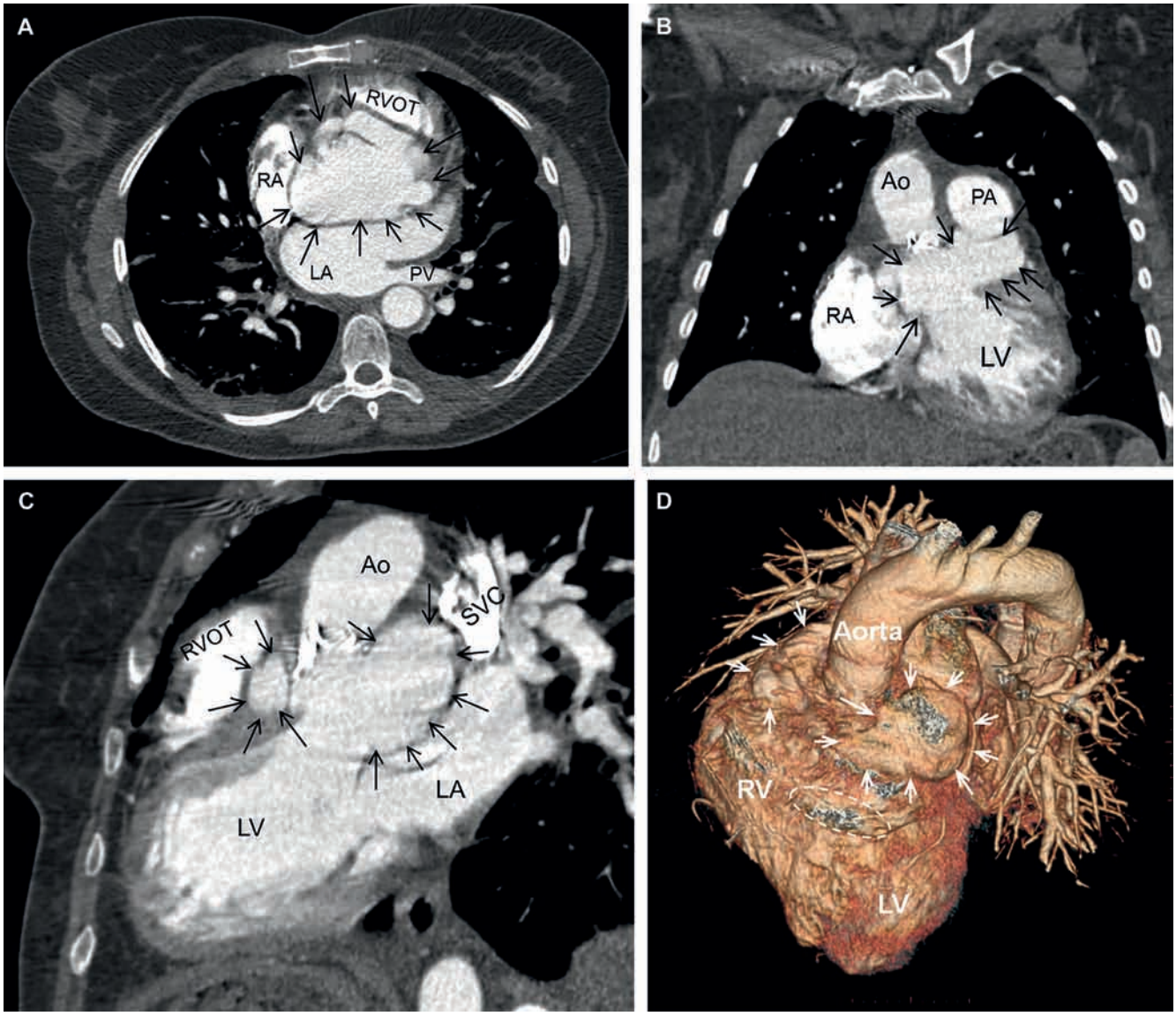

Figure 2. Contrast enhancement axial (*Panel A*), coronal (*Panel B*), and oblique (*Panel C*) computerized tomography (CT)-scan showing the dilation at the aortic root (black arrows). Note: bilobed configuration, best seen in oblique and coronal (*Panel B* and *Panel C*) planes. Contrast-enhanced CT demonstrates all cardiac chambers and arrows outline the pseudoaneurysm. *Panel D.* 3D Volume reduction preoperative image delineates the outpouching of the suspected pseudoaneurysm (arrows) on both sides of the aorta. Dashed oval: Right ventricular outflow tract (selectively removed to visualize the out pouching). RV = right ventricle; LV = left ventricle; RA = right atrium; PA = pulmonary artery; Ao = aorta; RVOT = right ventricular outflow tract; SVC = superior vena cava.

care follow up 3 years later found the patient in good health and without complications.

Discussion

Left ventricular outflow tract pseudoaneurysm is a consequence of valvular degeneration, endocarditis and suture dehiscence following AVR [4]. It is unknown whether this patient developed a new endocarditis or never completely eradicated her prior infection. The vague symptoms of lower extremity weakness in our case were likely hemodynamic in origin from reduced cardiac output. The surgical approach taken was based upon an extensive history

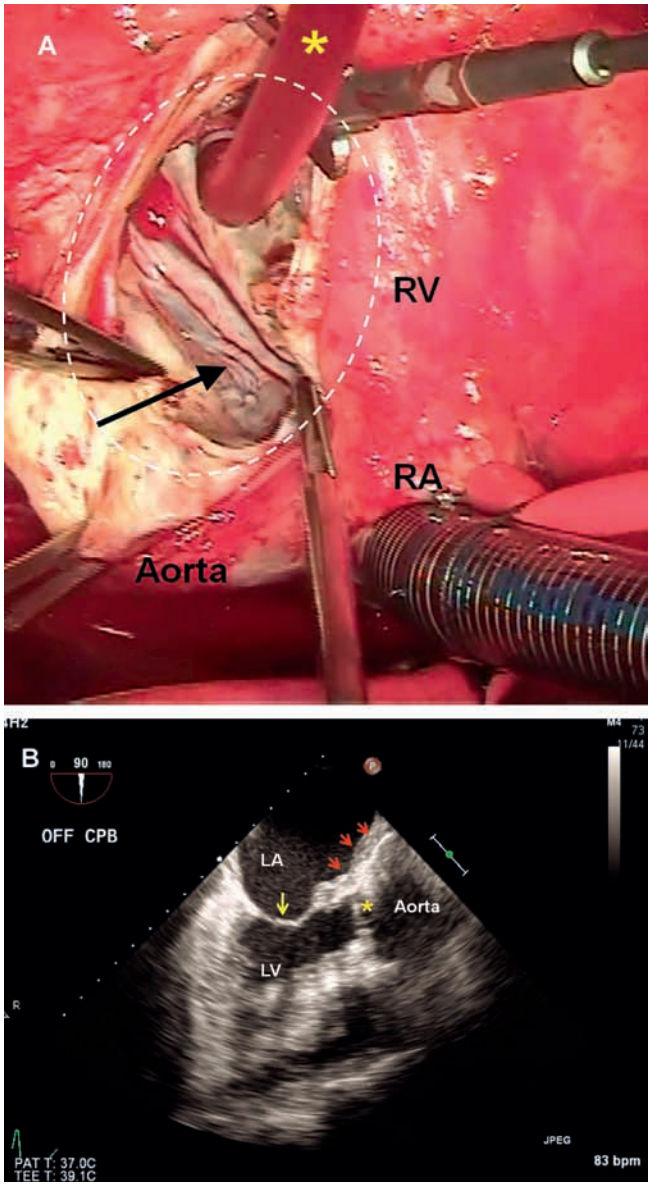

Figure 3. *Panel A*. Pseudoaneurysm cavity (arrow, dashed oval), the red tube is passed through into the left ventricle (asterisk). *Panel B*. Postoperative TEE showing the implanted homograft (red arrows), and aligned aortic (asterisk) and mitral valves (yellow arrow). RA = right atrium; RV = right ventricle.

of persistent and/or recurrent infection even though the cultures taken during this procedure were negative for growth. Homograft valve was chosen for this patient based on its capacity to resist reinfection [4].

Approximately 20% of late mortality is attributed to valve related complications after aortic valve surgery [5]. LVOT pseudoaneurysm is a rare but serious complication following AVR. With late prosthetic valve endocarditis, the infection tends to colonize the sewing ring of the valve. Tight sutures can tear through the LVOT wall, causing suture dehiscence. High-velocity blood flow in the LVOT can enter the tear and form a paravalvular leak. Whether from infectious etiology or suture technique, dehiscence of the suture line can cause LVOT pseudoaneurysm formation.

In noninfective cases, pseudoaneurysm formation is correlated with larger diameter aortic root, and morphologic changes occur at the aortic annulus after AVR [6]. In a composite graft, development of pseudoaneurysm of the ascending aorta may occur secondary to dehiscence of the suture line at the aortic annulus, coronary ostia, or distal graft anastomosis.

Patients with LVOT pseudoaneurysm commonly present with vague and nonspecific symptoms that mimic those of coronary artery disease. In a case report of a 73-year-old male with prior mechanical AVR, LVOT aneurysm presented with angina secondary to compression of the left main coronary artery and its major branches [3]. Schaap et al. [3] performed a Bentall procedure with a BioValsalva 25-mm prosthesis for infectious etiology. Castillo-Sang et al. [7] presented a 70-year-old female with aortic root pseudoaneurysm 3 years after AVR presenting with shortness of breath. She underwent an AVR within a Dacron graft and Cabrol anastomosis of the coronary arteries. This presentation may have been similar to the 2009 intervention undertaken in our case where the patient underwent root and AVR surgery. Another important consideration in patients who present with similar cardiac complications is the need for rescue coronary artery bypass grafting due to compromised native circulation as a result of the current disease process itself or extensive prior surgical intervention [8].

Acknowledgments

We acknowledge the assistance of Drs. Ruben Kandov and Faisal B. Saiful for assistance with the echocardiograms.

Conflict of Interest

The authors have no conflict of interest relevant to this publication.

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Cite this article as: Shariff MA, Martingano D, Khan U, Goyal N, Sharma R, Rizvi SB, Motivala A, Asgarian KT, Nabagiez JP. Left Ventricular Outflow Tract Pseudoaneurysm after Aortic Valve Replacement. AORTA (Stamford). 2015;3(5):[167–171]. DOI: http://dx.doi.org/10.12945/j.aorta.2015.15.001