The Heart Surgery Forum #2004-1133
8 (3), 2005 [Epub April 2005]
doi:10.1532/HSF98.20041133

Online address: www.hsforum.com/vol8/issue3/2004-1133.html

Left Ventricular Outflow Tract False Aneurysm Late after Aortic Valve Replacement

Federico Bizzarri, MD,[1] Lucio Braconi, MD,[1] Alessandra Rossi, MD,[2] Carlo Sorbara, MD,[2] Pier Luigi Stefano, MD[1]

[1]Unita' Operativa di Cardiochirurgia, Azienda Ospedaliero-Universitaria,
[2]Unita' Operativa di Anestesia, Rianimazione e Terapia Intensiva Post Operatoria, Azienda Ospedaliero-Universitaria, Careggi, Firenze, Italy

ABSTRACT

We describe an unusual case of left ventricular outflow tract (LVOT) pseudoaneurysm late after aortic valve replacement. A 77-year-old man, who had undergone aortic valve replacement with mechanical prosthesis 7 years ago, presented, asymptomatic, with a transesophageal echocardiography (TTE) diagnosis of a large cavitary mass arising behind the aortic wall. The orifice of the pseudoaneurysm was successfully surgically closed and the aortic root reconstructed with cryopreserved homograft.

CASE REPORT

Subvalvular pseudoaneurysm in the setting of acquired aorto-left ventricular discontinuity is a rare but potentially fatal complication of aortic valve surgery, aortic valve endocarditis, and chest trauma. Its origin is in the intervalvular fibrous body connecting the mitral to the aortic valve, and the partial detachment of the proximal suture line of the sewing ring of the prosthetic valve is the most probable etiology in case of aortic valve surgery, with or without an infective disease.

We report a successful surgical repair on a patient with this potentially catastrophic complication under extracorporeal circulation and aortic root replacement with criopreserved homograft.

A 77-year-old male patient was transferred to our hospital with the diagnosis of LVOT false aneurysm. The patient had undergone replacement of the aortic valve 7 years ago because of stenosis due to rheumatic disease, using a 25-mm mechanical valve (Omnicarbon, Medical CV, Incorporated, Inver Grove Heights, Minn, USA). The aortic valve was severely stenotic, fibrosed, thickened, and the aortic annulus heavily calcified. The technique of insertion was made with interrupted 2-0 Ti-Cron stitches having annular pledgets. The postoperative course was uneventful and the patient recovered quite well. Follow-up was not regular and an occasional transthoracic echo evaluation done a week before the hospital reentry revealed a normofunctioning aortic prosthesis and the presence of a posterior aneurysmatic cavity, expanding during systole and collapsing during diastole.

The patient was monitored with TEE using an omniplane 2 TEE probe with a Philips Sonos 5500 echocardiography machine, following ASE/SCA Guidelines [ASE/SCA 1999]. Intraoperative TEE assessment was identified, from the midesophageal (ME) five-chamber ME long-axis (LAX) views (Figure 1), the presence of an echo-free pulsatility cavitary lesion with systolic expansion and diastolic collapse was located posteriorly in the intervalvular region and expanding behind aortic the root. From the ME LAX view, the pulsatile area appeared close, to the base of the anterior mitral leaflet, the medial wall of the left atrium, and the posterior aortic root. The color Doppler visualized a direct communication with the LVOT through a dehiescence in the mitral–aortic continuity (the width of the neck was 0.9 cm), without any fistulous communication with other chambers (left atrium or aorta). Color flow Doppler (Figure 2) was assessed early systolic flow from LVOT to pseudoaneurysm, as aliased flow of brief duration distending the cavity; subsequently, during diastole, flow was seen emptying from the cavity into the LVOT with concomitant reduction in its size. The maximal pseudoaneurysm area determined by planimetry, was 5.11 cm^2 in systole, decreased to 1.44 cm^2 in diastole, with a percentage area change of 72%.

The marked pulsatility and the distinct dynamic feature of the pouch, expanding during isovolumic contraction and early systole and collapsing in diastole, confirmed the diagnosis of *unruptured intervalvular pseudoaneurysm*.

The comprehensive TEE exam excluded the presence of concomitant mitral or aortic regurgitation, and visualized a good performance of the left ventricle.

The patient underwent redo aortic valve surgery with extracorporeal circulation under moderate hypothermia. After cross-clamping and cardiac arrest, the aorta was opened, the prosthetic valve removed, and the LVOT evaluated.

Received September 7, 2004; accepted November 15, 2004.

Address correspondence and reprint requests to:Dr. Federico Bizzarri, MD, Unita' Operativa di Cardiochirurgia, Azienda Ospedaliero-Universitaria Careggi, Viale Pieraccini, 50100, Firenze, Italy; 39-055-4277765; fax: 39-055-4277702 (e-mail: fbizzarri@netscape.net).

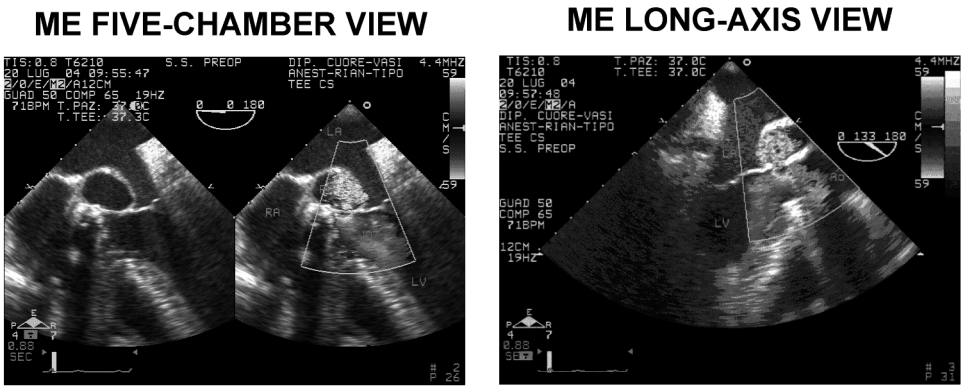

Figure 1. Two-dimensional and color flow Doppler midesophageal (ME) five-chamber view and long-axis (LAX) view. Echo-free cavitary lesion, located posteriorly in the intervalvular region and expanding behind the aortic root.

A fibrotic chronic orifice was localized at the level of an old left-noncoronary sinus connecting to a cavity empty of clots with no communications to the left atrium and/or the aorta. The anterior leaflet of the native mitral valve was separated from the nadir points of the left and noncoronary aortic annulus. The superior wall of the pseudoaneurysm was seen through the subaortic recess. No signs of endocarditis were detected. Left ventricle–aorta continuity (mitro–aortic continuity) was reestablished with a 25-mm homograft implanted with several interrupted 4-0 Ti-Cron stitches, and the anterior leaflet of the mitral valve was reattached to the aortic root to close the pathologic communication with the recess using interrupted 2-0 Ti-Cron stitches with pledgets. Postoperative TEE assessment (Figure 3) visualized good function-

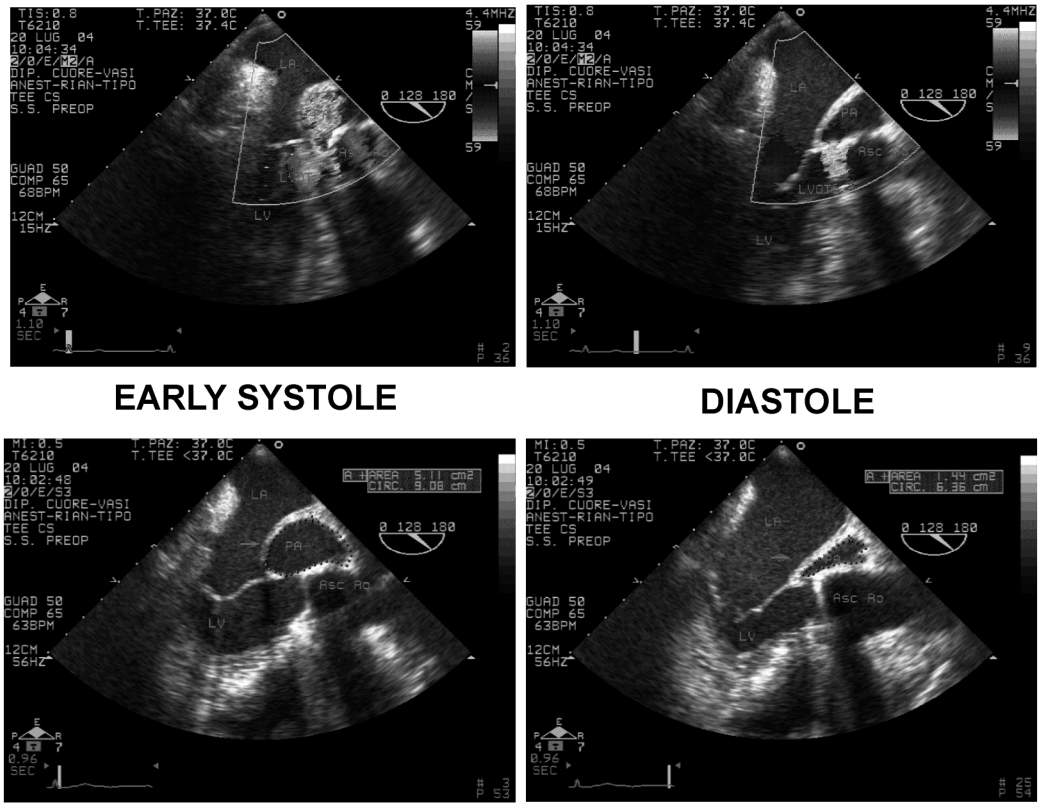

Figure 2. Color flow Doppler and two-dimensional midesophageal (ME) long-axis (LAX) view. The color flow Doppler view shows a turbulent flow (aliased flow) into the cavity during early systole, with an evident flow convergency region; during diastole, a turbulent flow (aliased flow) is evident away from the cavity into the LVOT. The two-dimensional view in systole and in diastole show an expansion and a collapse of the cavity during the cardiac cycle (5.11 cm^2 vs 1.44 cm^2).

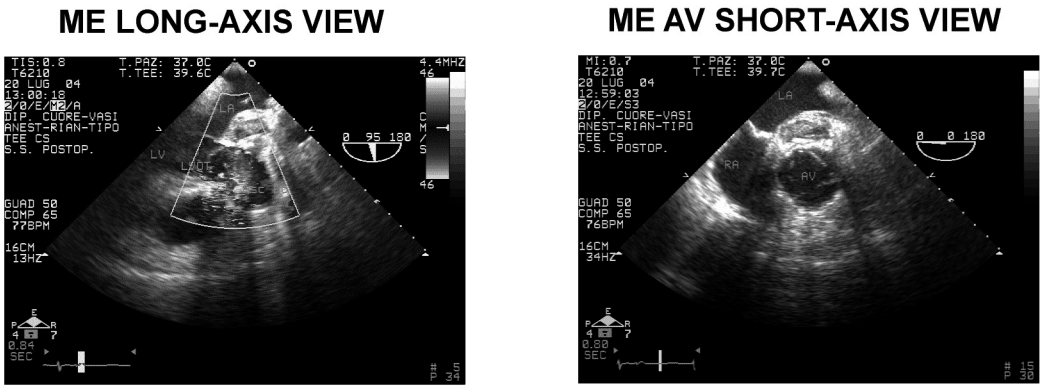

Figure 3. Color flow Doppler midesophageal (ME) long-axis (LAX) view and two-dimensional ME aortic valve (AV) short-axis (SAX) view. The color flow Doppler view shows a normal flow (blue flow) away from the LVOT to the Asc Ao during systole; the preoperative cavity is no more echo-free and no more injected; two-dimensional view shows normal excursion of the leaflets of the homograft's AV.

ing of the homograft implanted, without gradient, leaks or regurgitant valve, and a normal mitral valve. The pathologic cavity (pseudoaneurysm) appeared completely excluded and collapsed.

Postoperative course was uneventful and the patient was discharged after 7 days in good and stable health conditions.

COMMENT

Mitral–aortic discontinuity may be uncommonly congenital [Liatha 2002]or more frequently acquired, the latter more often as a complication of severe endocarditis with formation of subannular abscesses and extensive tissue destruction.

LVOT false aneurysm formation can be secondary to a traumatic disease [Taliercio 1998], congenital, and may be a catastrophic complication of aortic valve surgery [Delgado 1999], with or without infective involvement of mitral-aortic continuity, due to the possibility of a rupture in the pericardium or the left atrium, a fistulate in the left auricola or aorta, and compress the left coronary artery main trunk [Parashara 1995] or mitral valve, causing systolic compression and severe regurgitation [Espinosa-Caliani 2000] with heart failure.

In some instances, the false aneurysm remains intact and appears as a pulsatile cavity, echo free,with systolic expansion, localized posteriorly, with the orifice lined to the anterior mitral leaflet, bordered with the medial wall of the left atrium and posterior aortic root, but surgical indication is mandatory when the diagnosis is done because of these potential complications.

Other than intervalvular abscesses, the echocardiographic appearance of pseudoaneurysm is the systolic expansion and diastolic collapse together with the systolic turbulent flow demonstrated by the color Doppler technique [Afridi 1995, Borges 2002].

As previously mentioned, most of these unusual complications are due to infective endocarditis, but, for this patient, anatomical and surgical data suggested a mechanical complication, secondary to the previous surgical procedure. The pseudoaneurysm was probably created by a chronic inflow of a high-velocity jet from the left ventricle and the aorta through a weak point in the pledgets-suturing site.

Diagnosis can be made by a transthoracic echocardiographic examination. Transesophageal echocardiography can provide a better image quality and identify the origin of the pseudoaneurysm, its location, and its relationship with the left ventricle and the prosthetic aortic valve.

In conclusion, left ventricle false aneurysm occurs rarely after aortic valve replacement and may result in many catastrophic events as heart failure, sudden death due to rupture, and angina due to coronary artery compression. Diagnosis may be made by transthoracic echocardiography, transesophageal echocardiography, CT scan, and angiography. Surgical repair is mandatory to relieve symptoms and prevent sudden death.

REFERENCES

Afridi I, Apostolidou MA, Saad RM, Zoghbi WA. 1995. Pseudoaneurysm of the mitral-aortic intervalvular fibrosa: dynamiccharacterization using transesophageal echocardiographic and doppler techniques. J Am Coll Cardiol 25:137-45.

Borges AGR, Suresh K, Mirza H, et al. 2002. False aneurysm of the mitro-aortic intervalvular fibrosa after uncomplicated aortic valve replacement. J Am Soc Echocardiogr 15:743-5.

ASE/SCA Guidelines for performing a comprehensive intraoperative multiplane transesophageal echocardiography examination: recommendations of the American for Intraoperative Echocardiography and the Society of Cardiovascular Anesthesiologists Task Force for Certification in Perioperative Transesophageal Echocardiography. 1999. J Am Soc Echocardiogr12:884-990.

Delgado C, Barturen F. 1999. Seudoaneurisma de la fibrosa mitroaortica secundario a la desinsercion parcial de una protesis mecanica aortica. Rev Esp Cardiol 52:348-50.

Espinosa-Caliani JS, Montijano A, Melero JM, Montiel A. 2000. Pseudoaneurysm in the mitral-aortic intervalvular fibrosa. A cause of mitral regurgitation. Eur J of Cardiothorac Surg 17:757-9.

Liotta D, Diluch A, Malusardi A, Del Rio M. 2002. Congenital mitral-aortic discontinuity. Ann Thorac Surg 73:274-7.

Parashara DK, Jacobs LE, Kotler MN, et al. 1995. Angina caused by systolic compression of the left coronary artery as result of pseudoaneurysm of the mitral – aortic intervalvular fibrosa. Am Heart J 129:417-21.

Taliercio CP, Oh JK, Summerer MH, Butler CF, Danielson GK. 1988. Traumatic left ventricular false aneurysm with significant regurgitation from left ventricular outflow tract to left atrium: delineation by two dimensional and color flow Doppler echocardiography. J Am Soc Echocardiogr 1:354-8.