Aorto-Left Ventricle Fistula in Aortic Valve Endocarditis Found to Mimic Valsalva Sinus Aneurysm Rupture into the Left Ventricle: A case study

Li Ji, MD ^{a,b,1}, Yuman Li, MD, PhD, ^{a,b,1}, Li Zhang, MD, PhD ^{a,b}, Yali Yang, MD, PhD ^{a,b,*}, Mingxing Xie, MD, PhD ^{a,b}

^a Department of Ultrasound, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China; ^b Hubei Key Laboratory of Molecular Imaging, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China

Received October 26, 2019; revision received January 07, 2020; accepted January 10, 2020

Abstract: Aorto-cardiac fistula (ACF) is a rare condition that is often complicated by perivalvular extension of infective endocarditis. Here we report the case of 43-year-old woman with aorto-left ventricle fistula in aortic valve endocarditis, whose echocardiographic manifestations mimicked a ruptured Valsalva sinus aneurysm. The patient was treated successfully with aortic valve replacement and repair of aorto-left ventricle fistula. Based on this rare case, we analyze the factors of misdiagnosis and offer suggestions to improve the diagnostic accuracy of ACF.

Key words: Aorto-cardiac fistula; Valsalva sinus aneurysm; Echocardiography

Advanced Ultrasound in Diagnosis and Therapy 2020;01:018–020

DOI: 10.37015/AUDT.2020.190034

Case report

A 43-year-old woman with a 2-month history of dyspnea, tachypnea, and productive cough, who was initially treated for pneumonia, was admitted to our hospital with progressive chest distress. She had no history of fever. On physical examination, her temperature was 98.2°F (36.8°C), blood pressure 128/74 mmHg, and pulse rate 95 b/min. Precordial auscultation disclosed a grade 2/6 diastolic murmur along the left sternal border. The 12-lead electrocardiogram showed sinus tachycardia with ST-segment elevation and features of left ventricular hypertrophy. Chest X-ray demonstrated cardiac enlargement and pulmonary congestion. Laboratory findings were normal.

Transthoracic echocardiography (TTE) demonstrated a sac-like structure (32×16 mm) located between the left ventricular outflow tract (LVOT) and the aorta. The parasternal long-axis view of left ventricle and apical 5-chamber view showed that the sac expanded to the

LVOT during diastole and collapsed back to the aorta during systole (Fig. 1A, 1B). The parasternal long-axis view of the left ventricle showed the discontinuity of the sac wall (Fig. 1C). Color Doppler flow imaging showed a large shunt from the sac to the LVOT (Fig. 1C). Continuous-wave Doppler echocardiography revealed obstruction of the aortic root in systole owing to the sac collapsing back to the aorta during systole (Fig. 1D). Doppler echocardiography also showed severe aortic regurgitation. No vegetation of the aortic valve was identified. The patient refused transoesophageal echocardiography examination. Therefore, based on her medical history and TTE results, the patient was diagnosed with Valsalva sinus aneurysm rupturing into the left ventricle.

The patient underwent open surgery. Surgery found the presence of aorto-left ventricle fistula (Fig. 2A) and vegetations attached to the aortic valve (Fig. 2B). The patient was treated successfully by aortic valve replacement with a mechanical bileaflet prosthetic

¹ Contributed equally

* Correspondence: Department of Ultrasound & Hubei Key Laboratory of Molecular Imaging, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, 1277 Jiefang Avenue, Wuhan, China
e-mail: chhmao@aliyun.com

2576-2508/© AUDT 2020 • <http://www.AUDT.org>

This is an open-access article distributed under the terms of the [Creative Commons Attribution 4.0 International license](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution and reproduction in any medium provided that the original work is properly attributed.

valve and repair of the aorto-left ventricle fistula. The postoperative course of this patient was uneventful and her clinical symptoms improved remarkably. She

was discharged in good condition two weeks after the operation. The study was approved by an institutional review committee, and she gave informed consent.

Figure 1 Transthoracic echocardiography images. TTE showed that the sac (pentagram) expanded to the left ventricular outflow tract during diastole (A) and collapsed back to aorta during systole (B). TTE showed the discontinuity of the sac wall (pentagram). Color Doppler flow imaging showed a large shunt flow from the sac to left ventricular outflow tract (C). Continuous-wave Doppler showed a peak velocity of 3.5m/s at aortic root (D). AO, aorta; AV, aortic valve; LA, left atrium; LV, left ventricle; RA, right atrium RV, right ventricle.

Figure 2 Intra-operative photos. (A) Perivalvular abscess was located below the attachment of the right and left coronary cusps, and the ruptured abscess was communicating with left ventricle (arrow); (B) Multiple vegetations were identified in the abscess cavity and right coronary cusp. R, right coronary cusp; L, left coronary cusp

Discussion

Perivalvular extension of infective endocarditis (IE) occurs in approximately 10%–40% of native valve IE, especially aortic valves [1]. On rare occasions, perivalvular extension may cause serious complications, including perivalvular abscess, pseudoaneurysm, and further development of an aorto-cardiac fistula (ACF) [2]. ACF is a rare condition that is estimated to account for 2.2% of native valve IE [1]. It increases the risk for mortality and frequently requires surgical intervention.

Despite careful examination, our patient was misdiagnosed as having a Valsalva sinus aneurysm that had ruptured into the left ventricle, based on her echocardiographic features. Factors that might have contributed to misdiagnosis included: (1) The patient did not experience fever; (2) the results of the blood

tests obtained to assess the presence of infection were normal; (3) TTE did not show vegetation; and (4) the echocardiographic features were similar to a ruptured Valsalva sinus aneurysm.

Based on an analysis of these factors, we suggest that the accuracy of an ACF diagnosis could be improved in a number of ways. First, a detailed medical history of the patient should be obtained. Second, transesophageal echocardiography is recommended for the detection of small vegetations as well as valvular lesions to improve the diagnostic accuracy [3]. Third, the sac wall should be carefully observed in multiple views by echocardiography, given that the abscess wall is usually uneven, while a Valsalva sinus aneurysm wall is thin and fibrous [4].

To the best of our knowledge, this case may be the first report of aorto-left ventricle fistula in aortic valve endocarditis mimicking a ruptured Valsalva sinus aneurysm. Although echocardiography is a valuable tool for diagnosing aortic valve endocarditis and its complications, the medical history of the patient and other imaging examinations are essential to make the correct diagnosis.

Conflicts of Interest

All authors concur with the submission and have no financial & commercial conflicts of interest related to this work.

References

- [1] Anguera I, Miro JM, Evangelista A, Cabell CH, San Roman JA, Vilacosta I, et al. Periannular complications in infective endocarditis involving native aortic valves. *Am J Cardiol* 2006;98:1254-60.
- [2] Graupner C, Vilacosta I, SanRomán J, Ronderos R, Sarriá C, Fernández C, et al. Periannular extension of infective endocarditis. *J Am Coll Cardiol* 2002;39:1204-11.
- [3] Habib G, Hoen B, Tornos P, Thuny F, Prendergast B, Vilacosta I, et al. Guidelines on the prevention, diagnosis, and treatment of infective endocarditis (new version 2009): the Task Force on the Prevention, Diagnosis, and Treatment of Infective Endocarditis of the European Society of Cardiology (ESC). Endorsed by the European Society of Clinical Microbiology and Infectious Diseases (ESCMID) and the International Society of Chemotherapy (ISC) for Infection and Cancer. *Eur Heart J* 2009;30:2369-413.
- [4] Cheng TO, Yang YL, Xie MX, Wang XF, Dong NG, Su W, et al. Echocardiographic diagnosis of sinus of Valsalva aneurysm: a 17-year (1995-2012) experience of 212 surgically treated patients from one single medical center in China. *Int J Cardiol* 2014;173:33-9.