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Aorto-left Ventricle Fistula in Aortic Valve Endocarditis Presenting as Valsalva Sinus Aneurysm Rupture in to the Left Ventricle

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Abstract

Aorto-cardiac Fistula(ACF) is often complicated by Infective Endocarditis (IE), which is estimated to occur in less than 2.2% of native valve IE cases [1] and 3.3% of prosthetic valve IE [2]. Echocardiography is an invaluable tool for delineating the valve vegetations, the perivalvular abscess and the abscess's complications. We reported a case of aorto-left ventricle fistula in aortic valve endocarditis, which was presented as ruptured Valsalva Sinus Aneurysm(VAS). Based on this rarely case, we analysis the misdiagnosed causes clearly and offer several suggestions to improve the diagnostic accuracy of ACF.

Keywords: Aorto-cardiac fistula; Infective endocarditis; Valsalva sinus aneurysm

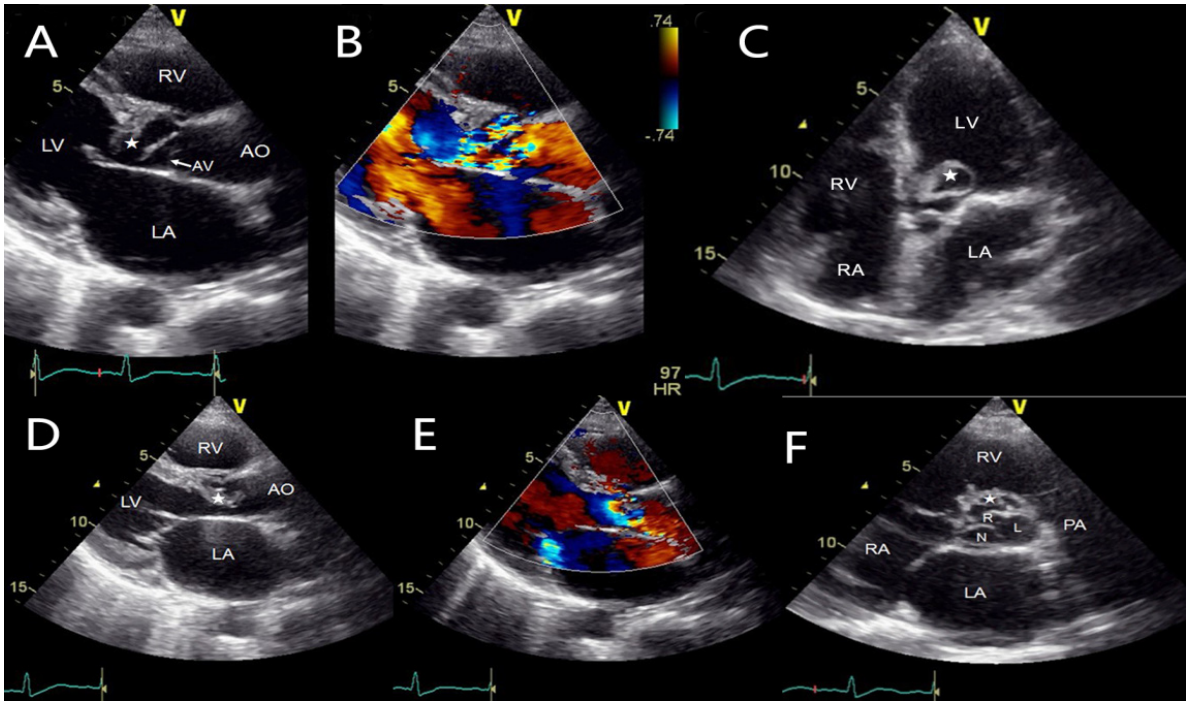
Introduction

Perivalvular extension of IE is common, occurring in approximately 10%-40% of native valve IE [1] and 56% to 100% of prosthetic valve IE [2], especially aortic valves. However, ACF is rarely seen and it is estimated to account for 2.2% of native valve IE cases [1] and 3.3% of prosthetic valve IE [2]. TTE is an invaluable tool in diagnosis of the valve vegetation, the perivalvular abscess and the abscess's complications, especially the fistulas complicating IE. This is a report of aorto-left ventricle fistula in aortic valve endocarditis, which was presented as ruptured VSA.

Case Report

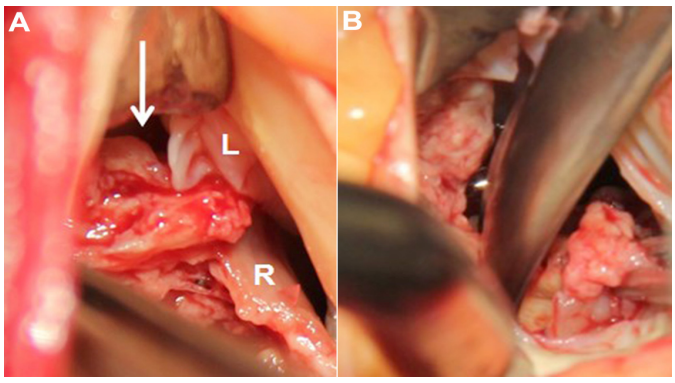
A 43-year-old woman with a 2-month history of dyspnea, tachypnea, and productive cough, who was initially treated for pneumonia, visited our hospital with progressive chest distress. She denied angina-like chest pain and fever. She had no history of systemic hypertension, diabetes or any other cardiocerebrovascular diseases. On physical examination, her temperature was 98.2˚F(36.8˚C), blood pressure was 118/64mmHg and pulse rate was 95/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. The Chest tests roentgenogram demonstrated cardiac enlargement and pulmonary congestion. The blood tests employed to assess of infection, including C-reactive protein (23.2 mg/L) and ASO(63.5IU/ml), yielded normal results.

TTE revealed a sac-like structure (3.2 cm×1.6cm) situated between the Left Ventricle (LV) and the aorta, with a large shunt flowing from the aorta to the sac and to LV(Figure 1). The long-axis and apical-5-chamber view showed that the sac expanded to the LV during diastole and collapsed back to aorta during systole, leading to obstruction of the aortic root (Figures 1A, C, D). A small tissue defect (0.5 cm) was also observed between the right and left coronary cusps, which was associated with severe eccentric aortic regurgitation directed towards the anterior leaflet of the mitral valve (Figures 1A,B). The short-axis view showed that the sac neck was adjacent to the attachment of the right and left coronary cusps (Figure 1F).



Figures 1(A-F): (A, C, D) Long-axis view and apical-5-chamber view showed that the sac (★) expanded to the LV during diastole and collapsed back to aorta during systole, and a small tissue defect(5.0mm) was observed between the right and left coronary cusps. (B) CDFI showed a large shunt flowing from the aorta to the sac and to LV, and severe eccentric aortic regurgitation directed towards the anterior leaflet of the mitral valve was observed. (E) CDFI showed the obstruction of the aortic root during systole. (F) short-axis view showed that the sac neck (★) was adjacent to the attachment of the right and left coronary cusps. (AO: aorta; AV: aortic valve; LA: left atrium; LV: left ventricle; PA: pulmonary artery; RA: right atrium; RV: right ventricle; R: right coronary cusp; L: left coronary cusp; N: non-coronary cusp).

The operative field revealed a perivalvular abscess (2cm×3 cm) located below the attachment of the right and left coronary cusps. The abscess rupture site was approximately 0.3cm in size and communicated with the LV and aorta (Figure 2A). The aortic valve had multiple defects and vegetation on the right coronary cusp (Figure 2B). The perivalvular abscess and vegetations were excised. The site of the abscess rupture was repaired with a Dacron patch, and the infected aortic valves were replaced with valve prostheses.



Figures 2(A,B): Intra-operative photos.(A) Perivalvular abscess was located below the attachment of the right and left coronary cusps, and the abscess rupture site was communicating with LV(arrow).(B) Multiple vegetations were seen in the abscess cavity and right coronary cusp.(R: right coronary cusp; L: left coronary cusp).

Discussion

Perivalvular extension of Infective Endocarditis(IE) represents a further spread of infection from the valvular structures to the surrounding tissue and occurs in approximately 10%-40% of native valve IE, especially aortic valves [1]. However, the incidence may increase to 56% to 100% in patients with prosthetic valve IE [2]. On rare occasions, perivalvular extension may cause serious complications, including perivalvular abscess, pseudoaneurysm, and further development of Aorto-cardiac Fistula(ACF) [3]. Such conditions may lead to increased mortality, there is a greater need for surgical intervention.

Our patient probably first developed a perivalvular abscess that subsequently spread to the aortic root and interventricular septum, ruptured into the aorta and LV, and eventually evolved into an aorto-left ventricle fistula. Accurate detection and delineation of perivalvular complications are crucial for surgical guidance and

overall patient management and surgical guidance. Non-invasive imaging with echocardiography has a specific diagnostic value in measuring the size of the abscess, delineating its location in relation to adjacent structures and determining whether it is complicated by a pseudoaneurysm or ACF. When an ACF forms, a circular or irregular region of reduced echo density can by seen with 2Dechocardiography. Furthermore, a color-Doppler Flow Imaging(CDFI)can demonstrate the flow in its interior, where the aorta communicates with adjacent cardiac chambers.

Several cases of ACF have been previously described in the literature. The first case of aorto-left atrial fistula was reported by Behnam in 1992 [4]. Salah recently collected and analyzed 38 reviewed cases of ACF occurring late after IE [5]. Our case is interesting because of it was misdiagnosed as a Valsalva Sinus Aneurysm(VSA) that had ruptured into the left ventricle. The misdiagnosis can be explained as follows:(1) The patient did not experience fever, chills or joint pain, which would have been indicative of infection;(2) the results of the blood tests obtained to assess the presence of infection were normal;(3) the echocardiography did not show typical vegetations;(4) the characteristic echo imaging in this case, namely, a sac that changed during the cardiac cycle with a characteristic systolic collapse and diastolic expansion and a to-and-fro signal communicating between the sac, the aorta and LV, was similar to that of a ruptured VSA.

Based on this misdiagnosed case, we offer several suggestions to improve the diagnostic accuracy of ACF. First, a detailed medical history of the patient should be obtained, including treatment history. Second, Transesophageal Echocardiography(TEE) is recommended for the detection of small vegetations, as well as valvular lesions to improve the diagnostic accuracy [6]. Third, the sac wall should be carefully observed in multiple planes by echocardiography, given that the abscess wall is usually uneven, while a VSA wall is thin and fibrous [7].

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