

Multimodal images of a rare interventricular septal dissecting aneurysm: A case report

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September 16, 2020

Abstract

We report a rare case of interventricular septal dissecting aneurysm, that resulting from ruptured sinus of Valsalva aneurysm and paravalvular aortic root pseudoaneurysm. A 60-year-old man presented with chest pain and palpitation, the diagnosis was confirmed using multimodality imaging, including transthoracic echocardiography, computer tomography angiogram and coronary angiogram. The patient underwent the modified Cabrol procedure, repaired ruptured sinus of Valsalva aneurysm and closed the communication of the pseudoaneurysm in the department of cardiac surgery. In this case report, we provide information for clinicians diagnostic thought, and highlight the role of multimodality cardiac imaging.

Multimodal images of a rare interventricular septal dissecting aneurysm: A case report

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Funding information: Funds of Yunnan Province Science and Technology Department, China, Grant/Award Number:2017NS331

Abstract We report a rare case of interventricular septal dissecting aneurysm, that resulting from ruptured sinus of Valsalva aneurysm and paravalvular aortic root pseudoaneurysm. A 60-year-old man presented with chest pain and palpitation, the diagnosis was confirmed using multimodality imaging, including transthoracic echocardiography, computer tomography angiogram and coronary angiogram. The patient underwent the modified Cabrol procedure, repaired ruptured sinus of Valsalva aneurysm and closed the communication of the pseudoaneurysm in the department of cardiac surgery. In this case report, we provide information for clinicians diagnostic thought, and highlight the role of multimodality cardiac imaging.

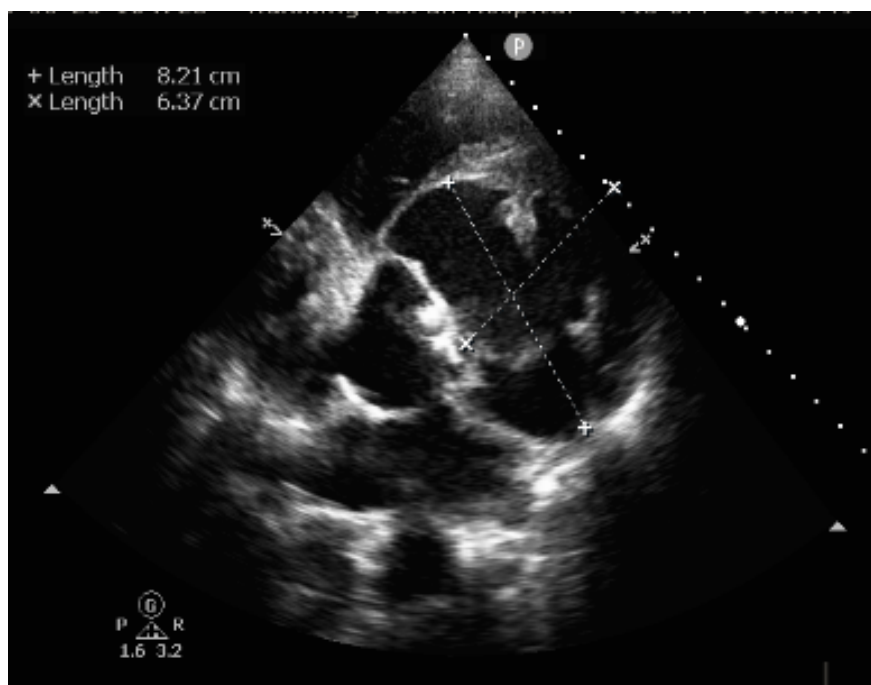
Keywords echocardiography, interventricular septal dissecting aneurysm, sinus of Valsalva aneurysm, pseudoaneurysm

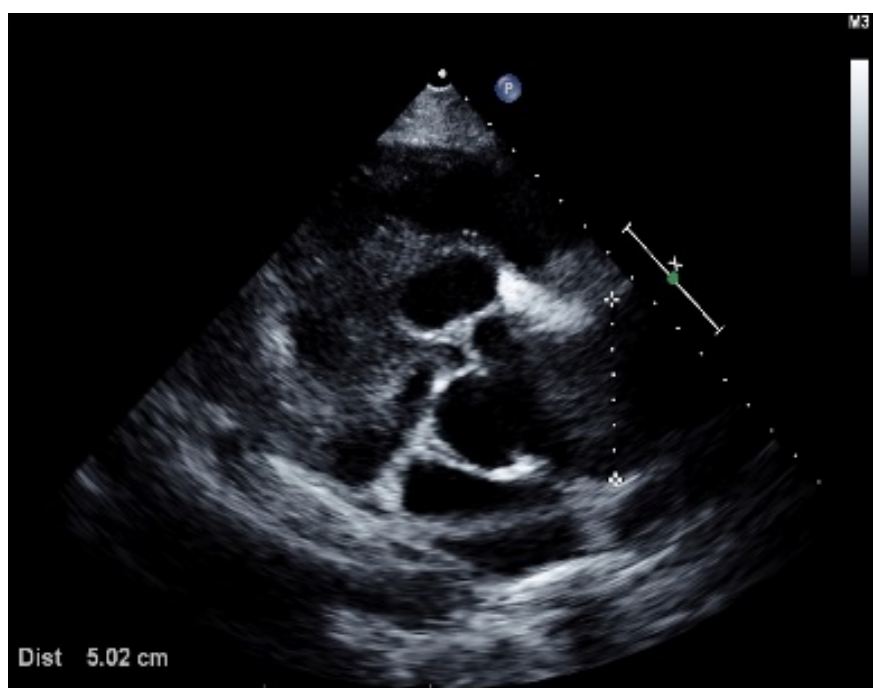
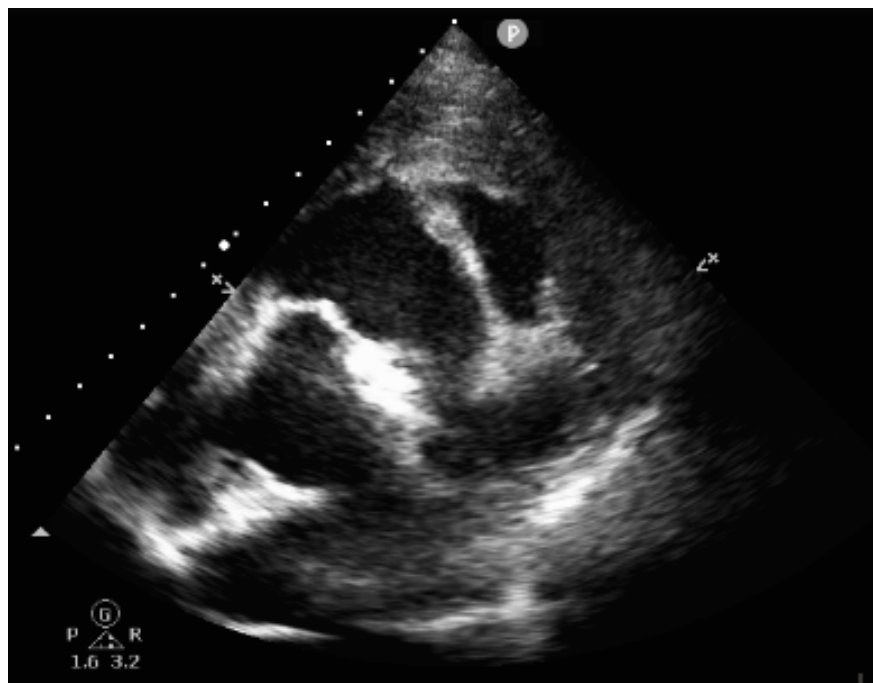
Case Report

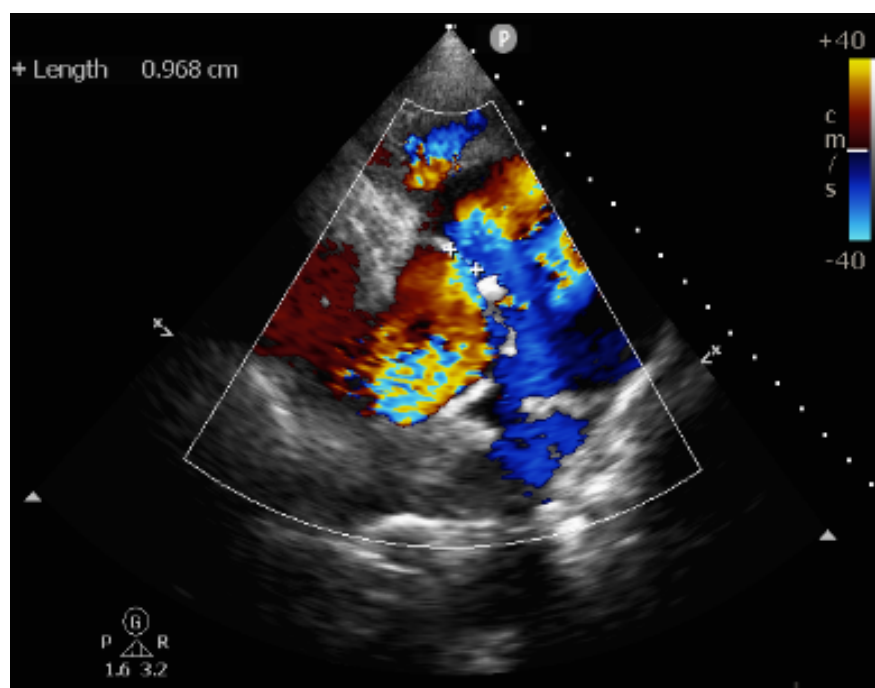
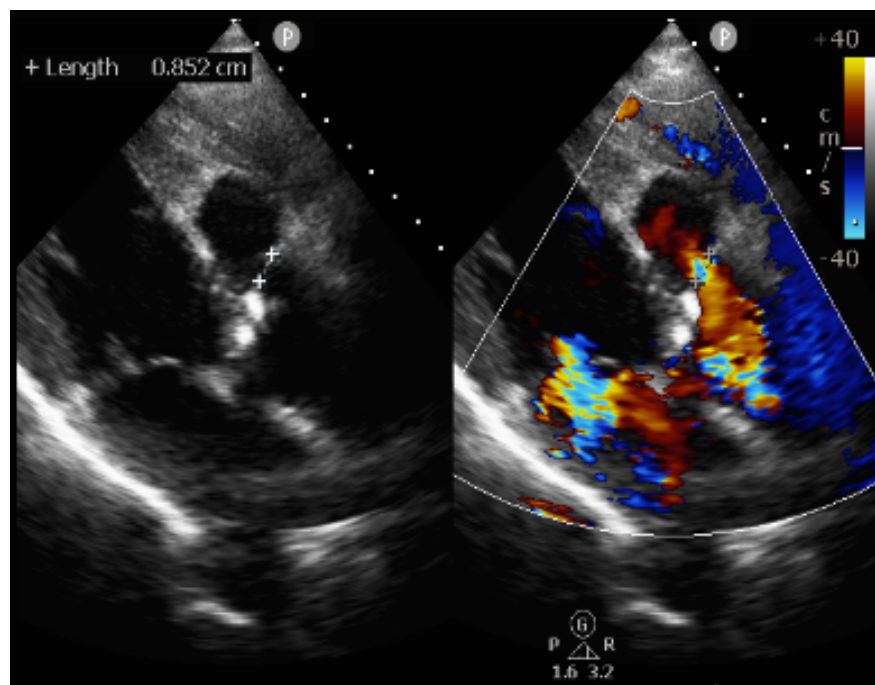
A 60-year-old male patient was referred to our emergency department with the complaint of chest pain accompanied by palpitation for one week, and without fever. He has hypertension, without diabetic, acute myocardial infraction, surgery, and trauma history. His temperature was 36.5, heart rate was 63 bpm, and his blood pressure was 95/61mmHg. he had an oxygen saturation of 95%. Physical examination revealed a regular sinus rhythm and a Grade III systolic murmur at the aortic area. Blood cultures showed negative infected. The value of Brain natriuretic peptide was 965 pg per milliliter, which was significantly increased compared with the normal value. Clinically he had bad left ventricular function and there were no signs of infective endocarditis.

He underwent a bedside transthoracic echocardiography (TTE) in our center. The parasternal long/short axis view, apical four/five chamber view, and apical long axis view were utilized. TTE (Figure 1, Movie S1-S5) demonstrated a large and irregular cystic cavity, located in the interventricular septal (IVS) extending from the basal anteroseptum to anterior wall of the left ventricle, and a cystic cavity sized about 82x63mm, within it, a string-like echo is visible. TTE also showed enlargement of the left atrium and left ventricle diameter and mildly reduced left ventricular ejection fraction with 48% by simpson method. The aortic diameter was 45mm at the sinus of Valsalva and 50mm for the ascending of the aorta.

Simultaneously, the communication was observed between aortic root aneurysm and the dissection in the IVS, and the diameter of the orifice was roughly 10mm. A dual-phase bidirectional blood flow spectrum was detected at the orifice of the cystic cavity. However, we did not detect any shunt flow between the aneurysm and four chambers. Meanwhile, the magnitude of cystic cavity did not change significantly during diastole and systole, because cavity had a wide range of anteroseptum and anterior wall of the left ventricle.







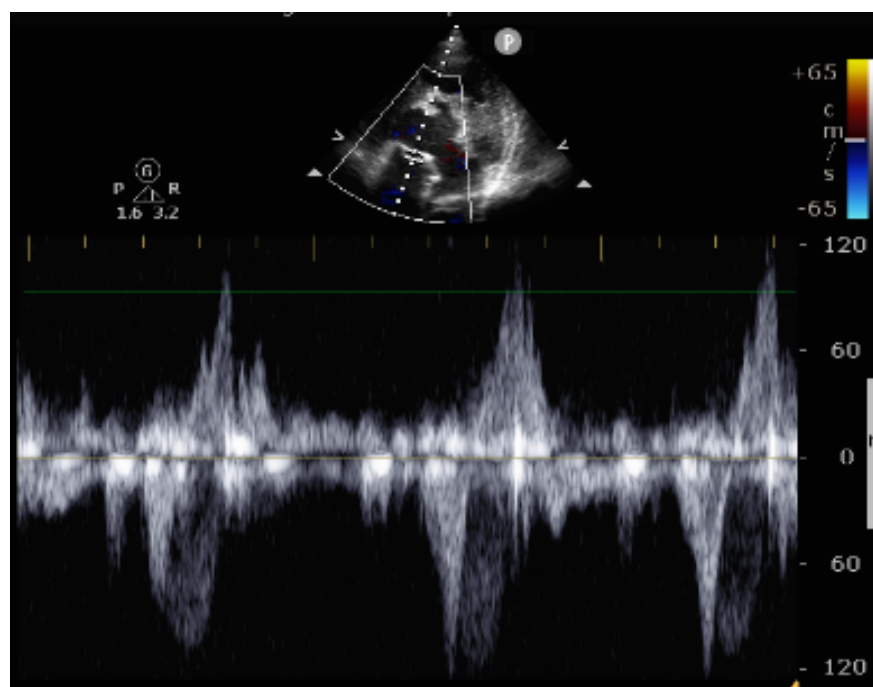


Figure 1 A-C, parasternal long axis and short axis view revealed a cystic cavity, located in the interventricular septal extending from the basal anteroseptum to anterior wall of the left ventricle, within it, a string-like echo is visible. D-F, color doppler and pulse wave doppler revealed that the cystic cavity communicated with aortic root aneurysm through the orifice (as the arrow indicates), and bidirectional blood flow was visible at the orifice. (LA, left atrium; LV, left ventricle; AO, aorta; PS, pseudoaneurysm; IVS, interventricular septal)

Computer tomography angiogram (CTA)(Figure 2, Movie S6) revealed that the patient had bicuspid aortic valve, two coronary sinus, and large aortic root pseudoaneurysm caused by ruptured anterior Sinus of Valsalva (SOV) aneurysm, with a diameter of 75x74x45mm and the neck about was 14mm, which dissecting into IVS. A subsequent coronary angiogram (Figure 3) demonstrated the main trunk and the branch of left coronary artery was clear with no stenosis, the right coronary artery showed slightly stenosis. Therefore, ventricular septal rupture due to acute myocardial infarction was not considered.

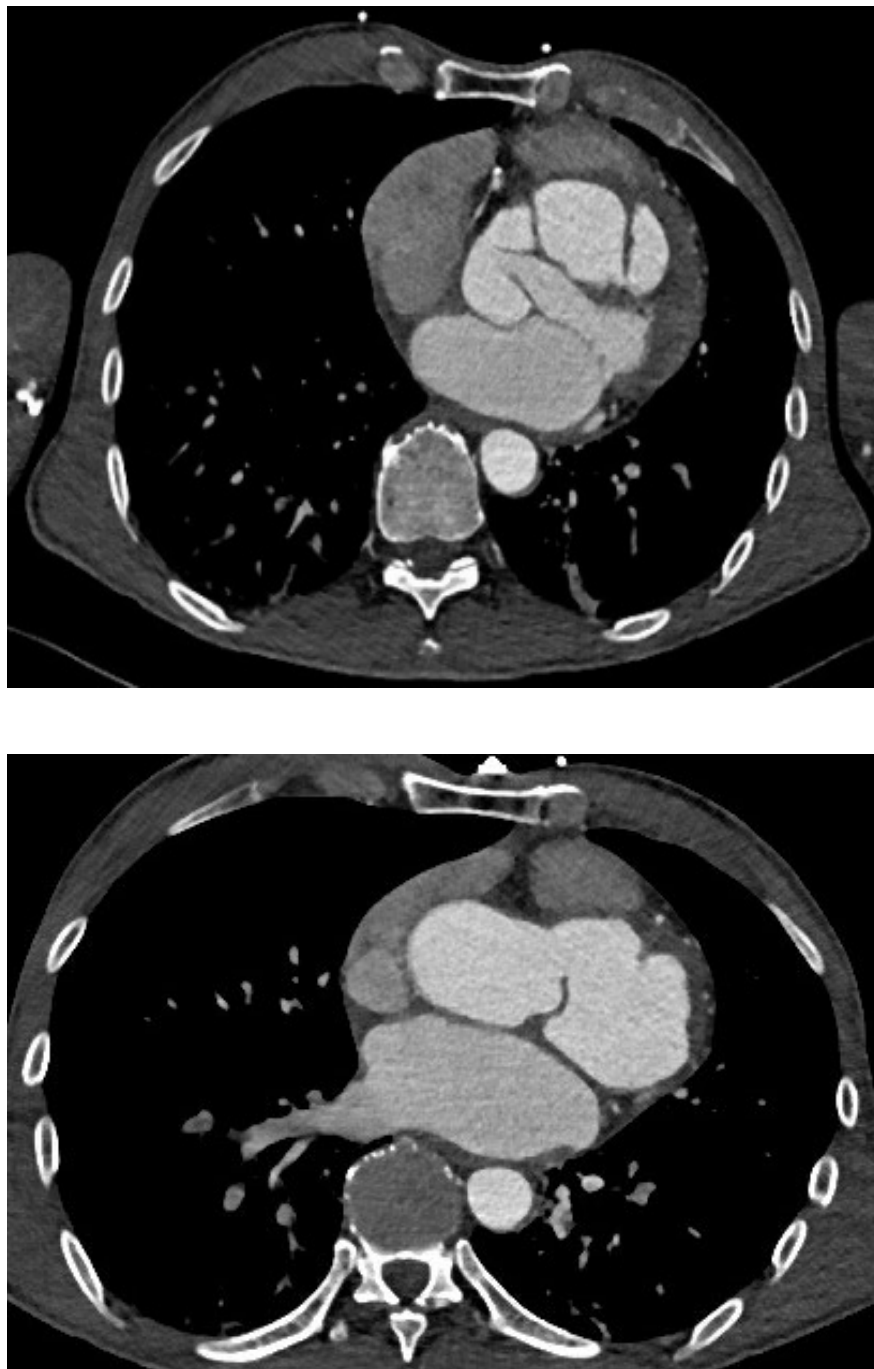
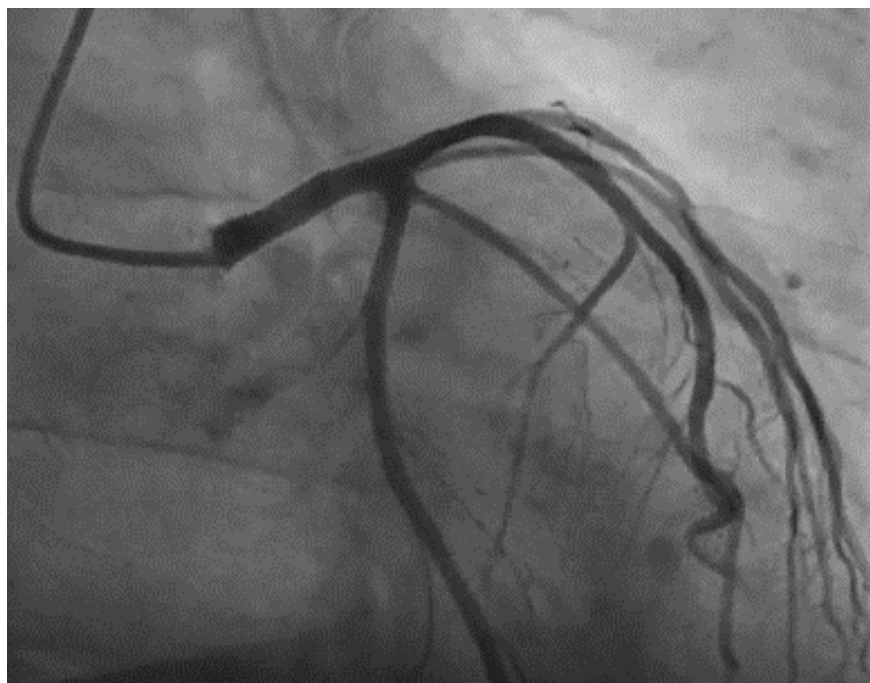




Figure 2 CTA revealed the patient had bicuspid aortic valve, two coronary sinus, and large aortic root pseudoaneurysm caused by ruptured anterior Sinus of Valsalva aneurysm, which dissecting into interventricular septal. (LA, left atrium; LV, left ventricle; AO, aorta; PS, pseudoaneurysm; IVS, interventricular septal; SOV, Sinus of Valsalva)



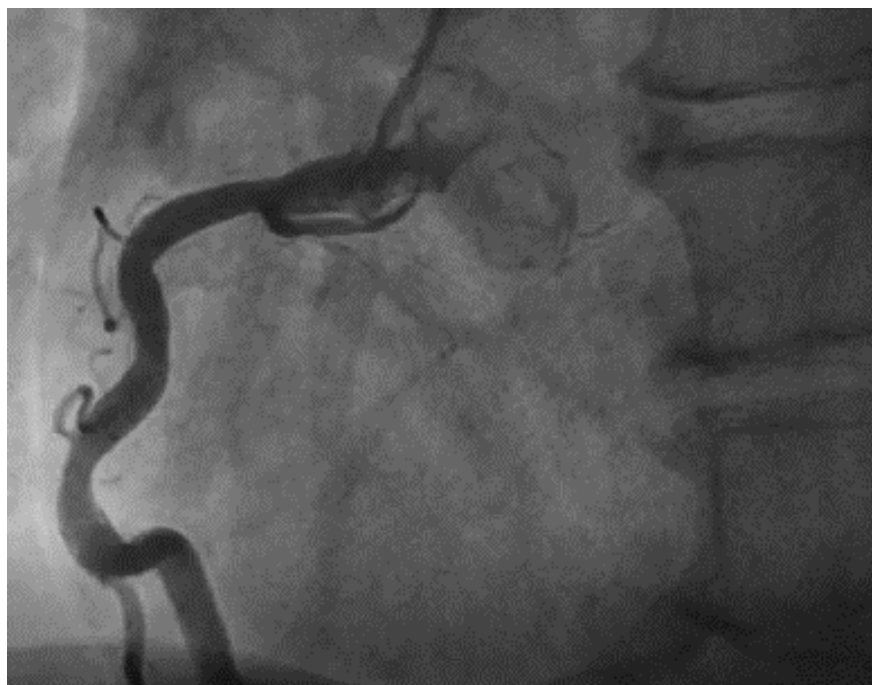
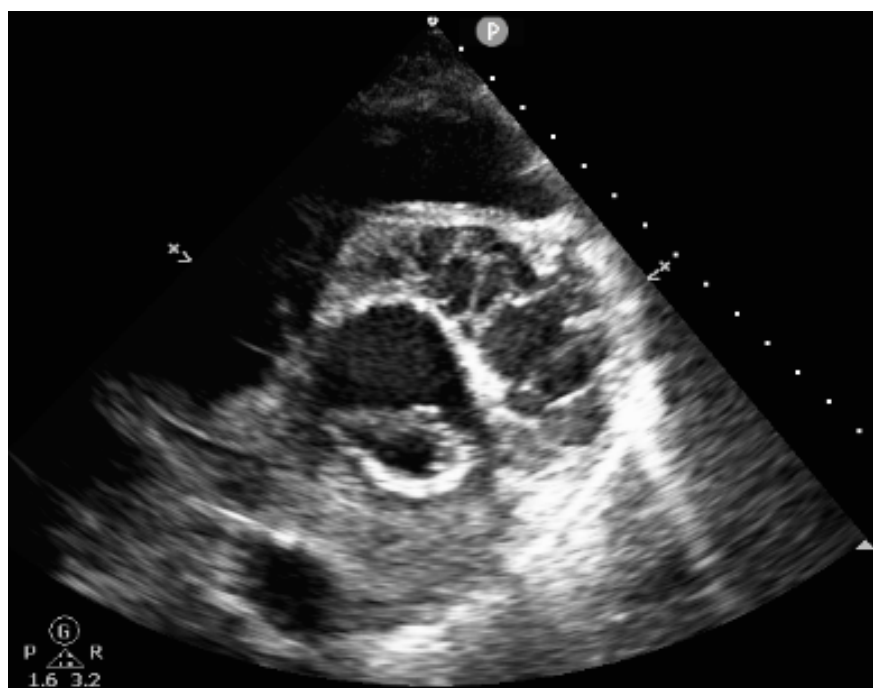


Figure 3 coronary angiogram showed the main trunk and the branch of left coronary artery was clear with no stenosis, the right coronary artery showed slightly stenosis. (LCA, left coronary artery; LAD, left anterior descending artery; LCX, left circumflex artery; RCA, right coronary artery)

In conclusion, the diagnosis was confirmed using multimodality imaging. The final diagnosis was ruptured sinus of Valsalva aneurysm, paravalvular aortic root pseudoaneurysm and interventricular septal dissecting aneurysm. The diagnosis was confirmed intraoperatively, and he underwent the modified Cabrol procedure cardiac surgery, repaired ruptured SOV aneurysm and closed the communication of the pseudoaneurysm with Dacron patching.

On the postoperative follow-up, TTE (Figure 4, Movie s7) demonstrated that the mentioned cystic cavity was separated by a solid component (thrombus organization) and color doppler did not detect communication with aortic artificial blood vessel. One month after operation, TTE was almost impossible to detect the mentioned cystic cavity. The prosthetic aortic valve worked normally and artificial blood vessel kept patency.



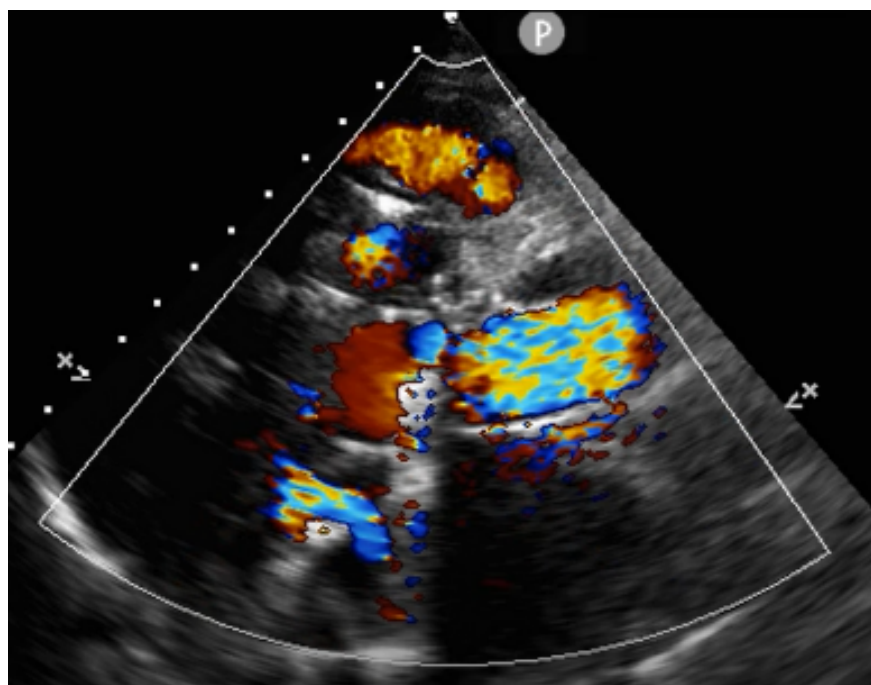


Figure 4 parasternal long axis and short axis view revealed the prosthetic aortic valve worked normally, and the mentioned cystic cavity was separated by thrombus and color doppler did not detect communication with aortic artificial blood vessel.

Discussion

Sinus of Valsalva (SOA) aneurysms defined as a significant dilatation or enlargement of the aortic root area, which located between the aortic valve annulus and the sinotubular junction [1]. The incidences of the right coronary sinus, noncoronary sinus and left coronary sinus aneurysms are approximately 70-90%, 10-20% and <5%, respectively. It is a rare aortic root anomaly, associated with congenital defects in the aortic media, and rarely due to acquired conditions [2]. Rupture of SOV is a rare complication, the consequence of which depends on its location. Rupture can occur into four cardiac chambers, but rarely into the interventricular septum (IVS) [3]. In our case, the patient had bicuspid aortic valve and two coronary sinus, ruptured anterior SOV aneurysm formed paravalvular aortic root pseudoaneurysm, which was communicated with IVS dissecting aneurysm.

Aortic root pseudoaneurysm is usually occurring secondary to trauma, infection, prosthetic valve endocarditis, etc. The main complications of pseudoaneurysms are compression of the surrounding tissue, thrombus formation in the aneurysm cavity, and cardiogenic embolism. In this case, the large pseudoaneurysm invade the IVS dissecting aneurysm extending from the basal anteroseptum to anterior wall of the left ventricle, which the IVS muscle tore two layers to form cystic cavity.

In the literature report, IVS dissecting aneurysm is a rare complication, which caused by ruptured aneurysm of the SOV, congenital coronary artery fistulas, infective endocarditis, or myocardial infarction [4]. We present a rare case of IVS dissecting aneurysm that resulted from a paravalvular aortic root pseudoaneurysm, which may cause significant hemodynamic and anatomical derangements. It has a progressive course and a poor prognosis, and may cause arrhythmias, conduction abnormalities, or congestive heart failure [5]. The complaint of this patient was chest pain and had heart failure initially, one possible explanation is that disrupted aortic root anatomy and massive IVS dissecting aneurysm compresses the coronary arteries leading to myocardial ischemia [6][7].

Conclusion

Echocardiography plays a critical role in the assessment of the location and range of interventricular septal dissecting aneurysm, rupture location, orifice communication and anatomy of the aortic root. More importantly, we highlight the role of multimodality cardiac imaging [8].

Conflict of interest

The authors have no conflicts of interest to disclose.

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Supporting information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Movie S1. parasternal long axis view showed cystic cavity in interventricular septum

Movie S2. parasternal long axis view showed the communication between cystic cavity with aortic root aneurysm

Movie S3. parasternal short axis view showed the communication between cystic cavity with aortic root aneurysm

Movie S4. Four-chamber view showing showed the communication between cystic cavity with aortic root aneurysm

Movie S5. Two-chamber view showing cystic cavity in interventricular septum extended into anterior wall of the left ventricle

Movie S6. CTA revealed the patient had bicuspid aortic valve, two coronary sinus, and large aortic root pseudoaneurysm caused by ruptured anterior Sinus of Valsalva aneurysm, which dissecting into interventricular septal

Movie S7. parasternal long axis view showed the prosthetic aortic valve worked normally and artificial blood vessel kept patency, color doppler did not detect the mentioned cavity communication with aortic artificial blood vessel

