

Specific aortic regurgitation: rupture of Valsalva aneurysm causes aortic valve prolapse and spontaneous valve perforation; Concomitant ventricular septal defect

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Abstract

Severe aortic regurgitation from a ruptured Valsalva aneurysm is rare. We report on a 28-year-old male patient was presented with a Ruptured Sinus of Valsalva Aneurysm by Transthoracic echocardiography. Intraoperatively, a perforated aortic lobe was found to have caused specific aortic regurgitant flow. The patient underwent successful surgery. Intraoperative transesophageal echocardiography provides important information for the surgical plan.

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Specific aortic regurgitation: rupture of Valsalva aneurysm causes aortic valve prolapse and spontaneous valve perforation; Concomitant ventricular septal defect

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Conflicts of Interest: On behalf of all authors, the corresponding author states that there is no conflict of interest.

Informed consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

Data availability statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Abstract

Severe aortic regurgitation from a ruptured Valsalva aneurysm is rare. We report on a 28-year-old male patient was presented with a Ruptured Sinus of Valsalva Aneurysm by Transthoracic echocardiography. Intraoperatively, a perforated aortic lobe was found to have caused specific aortic regurgitant flow. The patient underwent successful surgery. Intraoperative transesophageal echocardiography provides important information for the surgical plan.

Keywords: aortic regurgitation, Ruptured Sinus of Valsalva Aneurysm, valve perforation, transesophageal echocardiography

Case Report

A 28-year-old man was admitted to hospital with dull chest pain for 1 month. Chest radiography showing cardiac enlargement (Fig 1A). Transthoracic and transesophageal echocardiography showed ruptured Valsalva right sinus aneurysm into the right ventricular outflow tract and right coronary valve out into the left ventricular outflow tract with moderate aortic regurgitation (Fig 1B-1C, Video 1 in the Data Supplement). Therefore, we initially considered that aortic regurgitation might be caused by rupture of aortic sinus tumor resulting in right coronary valve prolapse.

Ventricular septal defect was observed intraoperatively, and the tumor burst into the right ventricular outflow tract through the ventricular septal defect. We resected the tumor, repaired it with suture and reinforced it, and repaired the ventricular septal defect with mesh. No aortic valve was damaged during the operation. Transesophageal echocardiography after cardioversion revealed the absence of broken shunt, but moderate-to-severe eccentric regurgitation of the aortic valve (Fig 1D-1E, Video 2 in the Data Supplement). The aortic valve was then explored again, and the left coronary lobe of the aortic valve was perforated with a hole of about 0.3cm (Fig 1F). After evaluation, the aortic valve was replaced. Transesophageal echocardiography showed absence of shunt and no abnormal periaortic flow. Postoperative pathology revealed hyperplasia of aortic valve fibrous tissue, hyalinoid and mucoid changes (Fig 1G-1H). After re-examination, the patient had no history of infective endocarditis and trauma, etc., and was considered to have spontaneous rupture and perforation of the main artery flap.

Discussion

Aortic sinus tumor is a rare congenital disease^[1] that most commonly affects the right coronary sinus (RCS) and non-coronary sinus (NCS) and right coronary sinus (LCS)^[2]. It may be accompanied by ventricular septal defect, aortic regurgitation^[3] and so on. Aortic valve rupture and perforation is more common in infection, trauma, invasive operation^[4-5]. It is rare to see spontaneous perforation of the valve itself resulting in aortic regurgitation. We report here a rare and complex case of severe aortic regurgitation caused by SVA rupture with spontaneous valve perforation. The unique regurgitation pattern begins with a rupture of the right coronary sinus of the aorta, enters the right ventricular outflow tract through the interventricular septum, and also passes through the spontaneous rupture of the LCC pore (Fig. 1I). It is difficult to accurately diagnose this patient's regurgitation using transthoracic echocardiography alone. At the same time, perforation (rupture) may have affected the progression of his disease, and this unique regurgitation is highly prone to severe acute heart failure, because spontaneous perforation is generally small, preoperative esophageal ultrasound did not indicate aortic valve perforation. Intraoperative transesophageal echocardiography is a versatile diagnostic and monitoring tool that facilitates surgical decision making in the operating room^[6]. The pathogenesis of this extremely rare severe aortic insufficiency was accurately diagnosed and successfully treated by real-time transesophageal echocardiography combined with surgery.

Conflicts of interest: All authors have read and approved submission of the manuscript and have no conflict of interest to disclose.

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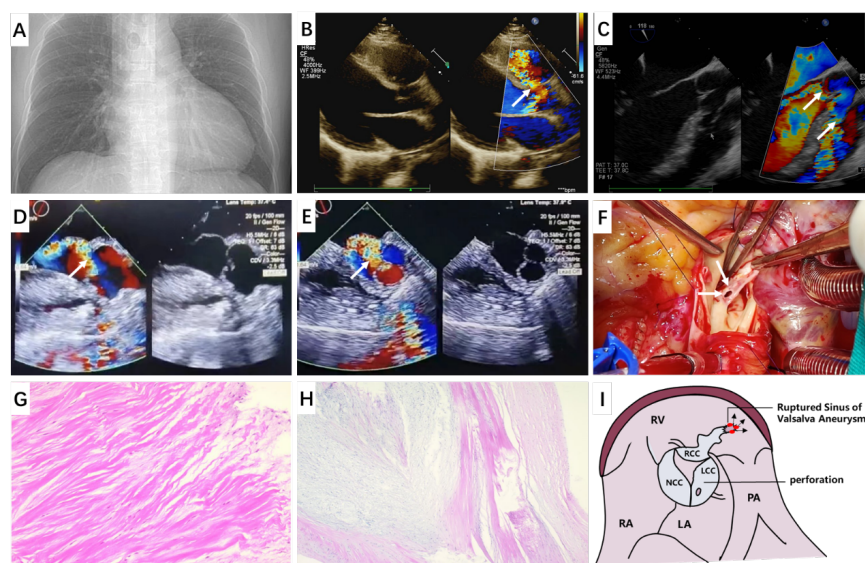
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Figures Legend:

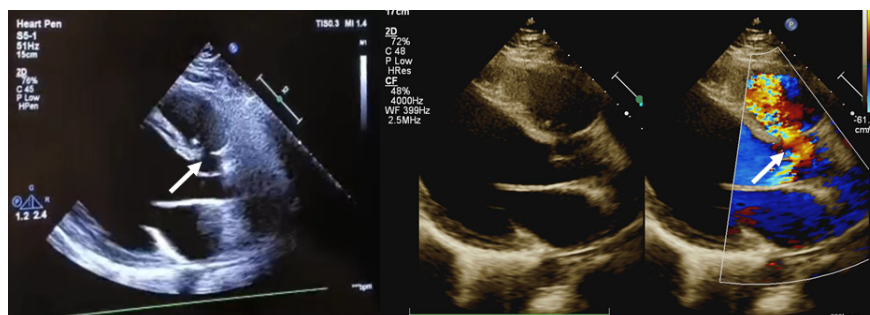
Figure1

chest radiograph showing an enlarged heart (A); Thoracic echocardiography and esophageal echocardiography indicated that the right coronary sinus of the aorta expanded to the right ventricular outflow tract, and the continuity was interrupted, aortic valve prolapse. This image shows the aneurysm and its rupture into the right ventricular outflow tract. Color Doppler (white arrow) shows turbulent flow through rupture and regurgitation of the aortic valve (B, C); Intraoperative esophageal ultrasound indicated that after repair, the broken shunt of the sinus tumor disappeared, but moderate to severe eccentric regurgitation occurred in the aortic valve (white arrow, D, E). Exploration revealed that the left coronary lobe of the aortic valve was thin, with rupture and perforation at the root, about 0.3cm in diameter (white arrow, F). Pathological examination of aortic valve showed hyperplasia of fibrous tissue of aortic valve, hyalinosis and mucoid transformation (G, H). Special aortic valve regurgitation mechanism: Rupture of Valsalva aneurysm, Perforation of the leaflet in the bottom area of the LCC, prolapsed NCC and ventricular septal defect(I). NCC, Noncoronary cusp; RCC, right coronary cusp; LCC, left coronary cusp.

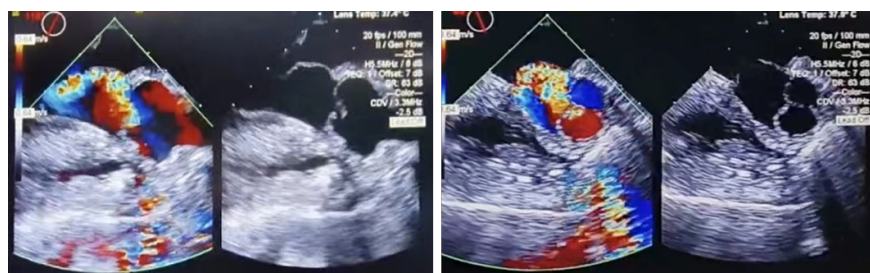


Supplementary materials:

Video 1: transthoracic cardiac ultrasound cue image showing the aneurysm and its rupture into the right ventricular outflow tract. Color Doppler (arrow) showing regurgitation through ruptured turbulence and aortic valve.



Video 2: After the repair of deficient sinus tumor, intraoperative esophageal ultrasound showing the aortic valve was not closed properly, and the right coronary valve was detached into the left ventricle when closed, and a large number of eccentric regurgitation could be seen. Right coronary sinus and right ventricle shunt disappeared.



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