



Acquired Sub-aortic Gerbode Defect Following Tricuspid, Aortic, and Mitral Valve Endocarditis

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Abstract

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BACKGROUND: Communication between the left ventricle and right atrium, termed a Gerbode ventricular septal defect (VSD), was first described in 1838 and later explained with varying etiologies, including congenital and acquired forms. Most of the acquired LV-RA shunts are of either a postoperative or of infective etiology. Among these etiologies, infective endocarditis is a rare cause, and echocardiography is a mainstay of its diagnosis and clinical management.

CASE REPORT: Here, we describe the case of a patient with bacterial endocarditis as a cause of a left ventricle to right atrium shunt, with subsequent intraoperative diagnosis and surgical repair. A 38-year-old man with a history of fever in the past 2 weeks was diagnosed with bacterial endocarditis involving the tricuspid, aortic, and mitral valve. Pre-operative transesophageal echocardiography revealed a severe aortic regurgitation with large vegetations on the right and non-coronary cusps sizing about 1 cm². The mitral valve had mild regurgitation and some filiform vegetations on the ventricular side of the anterior leaflet. The examination showed advanced tricuspid regurgitation with vegetations on the anterior and septal leaflets. The cardiologists also measured severe pulmonary hypertension up to 90 mmHg. During surgery, after careful observation, a communication between the left ventricle and the right atrium was discovered in the area under the junction between the right and non-coronary cusps of the aortic valve. The patient underwent aortic valve replacement with a 25-mm Regent mechanical valve (St. Jude Medical, St. Paul, MN), primary closure of a 5 mm x 5 mm septal defect using polyester 2.0 pledgeted sutures, replacement of the tricuspid valve with 31-mm Epic bio-prosthesis, and curettage of the ventricular side of the anterior mitral valve leaflet. The patient's postoperative course was uneventful and he was transferred at the infective hospital on the 10th post-operative day. After 4 weeks of parenteral antibiotic therapy, the patient was discharged in good conditions.

CONCLUSION: To the best of our knowledge, this is a unique case reported with triple valve endocarditis and Gerbode defect treated with surgery. We encourage meticulous examination of patients with endocarditis to find abnormal communications.

Introduction

Communication between the left ventricle and right atrium, termed a Gerbode ventricular septal defect (VSD), was first described in 1838 and later explained with varying etiologies, including congenital and acquired forms. Most of the acquired LV-RA shunts are of either a post-operative or an infective etiology. Among these etiologies, infective endocarditis is a rare cause and echocardiography is a mainstay of its diagnosis and clinical management. Here, we describe the case of a patient with bacterial endocarditis as a cause of a left ventricle to right atrium shunt, with subsequent intraoperative diagnosis and surgical repair.

Case Presentation

A 38-year-old man with a history of fever in the past 2 weeks was diagnosed with bacterial endocarditis

involving the tricuspid, aortic, and mitral valve. The patient was operated for anal fistula 2 months before the presentation in the hospital. He complained of fever, myalgia, arthralgia, and headaches.

On auscultation, the patient was on tachycardia and a grade 4 / 6 systolic murmur was heard on the left sternal border.

Pre-operative transesophageal echocardiography revealed a severe aortic regurgitation with large vegetations on the right and non-coronary cusps sizing about 1 cm². The mitral valve had mild regurgitation and some filiform vegetations on the ventricular side of the anterior leaflet. The examination showed advanced tricuspid regurgitation with vegetations on the anterior and septal leaflets. The cardiologists also measured severe pulmonary hypertension up to 90 mmHg.

The patient was subsequently taken to the operating room. During surgery, after oblique aortotomy was noted a destroyed non-coronary cusp with vegetations and involvement of the ventricular side of the anterior mitral leaflet by the infection. After careful observation, a communication with the right atrium was discovered in the

area under the junction between the right and non-coronary cusps of the aortic valve. It was verified by the right side after opening the right atrium. The defect had fibrous edges and was measured with a diameter of 5 mm (Figure 1).

The patient underwent aortic valve replacement with a 25-mm Regent mechanical valve (St. Jude Medical, St. Paul, MN) and primary closure of a 5 mm × 5 mm septal defect using polyester 2.0 pledgeted sutures, replacement of the tricuspid valve with 31-mm Epic bio-prosthesis, and curettage of the ventricular side of the anterior mitral valve leaflet.

The patient's post-operative course was uneventful and he was transferred at the infective hospital on the 10th post-operative day. After 4 weeks of parenteral antibiotic therapy, the patient was discharged home in good conditions.

Discussion

Communication between the left ventricle and right atrium was first described by Thurman [1] in 1838. Gerbode *et al.* [2] reported the successful surgical repair of five cases in 1957. The congenital form of the left ventricular–right atrial shunt has historically been more common, but acquired forms of this shunt have been increasingly reported. Acquired non-iatrogenic etiologies include trauma, infective endocarditis, and inferior myocardial infarction. Iatrogenic etiologies include valve surgery, atrial septal defect and VSD repair, percutaneous cardiac interventions such as atrioventricular node ablation, and endomyocardial biopsy.

The diagnosis of an LV-RA shunt is quite challenging, especially in the context of coexisting abnormalities including an additional intracardiac shunt, tricuspid regurgitation, pulmonary artery hypertension, and infective endocarditis, which have to be carefully differentiated from the shunt by further investigations [3].

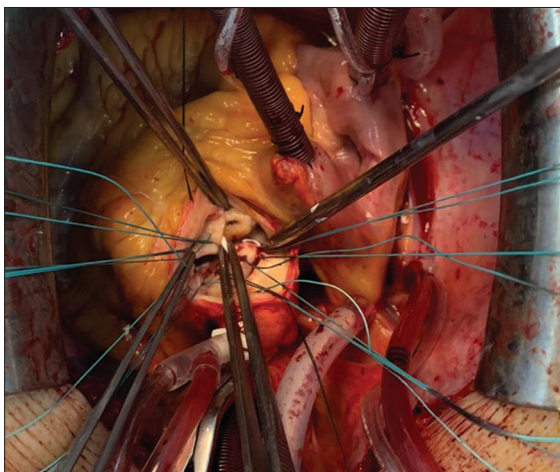


Figure 1: Defect exposed through the aorta

We have a patient with triple valve endocarditis and acquired left ventricle to right atrium shunt. The pre-operative data including TEE failed to detect the communication between the left ventricle to the right atrium shunt, interpreting the high velocity jet as tricuspid regurgitation with a 90 mmHg pulmonary systolic pressure.

Transthoracic echocardiography showed a 62.2% accurate diagnosis, 13.4% inclusive diagnosis, 9.8% missed diagnosis, and 14.5% misdiagnosis rate as reported by Yuan SM [4]. The LV-RA shunts are often misinterpreted as mitral regurgitation, pulmonary hypertension, tricuspid regurgitation, Valsalva aneurysm rupture, and subaortic/high perimembrane/residual VSD.

The accurate diagnostic rate of transthoracic echocardiography in this setting was significantly lower than that of the transesophageal echocardiography or cardiac catheterization. TEE has been demonstrated to be superior to transthoracic echocardiography in the recognition of endocarditis vegetations and associated complications such as fistula and abscess formation [5]. As such, every case of Gerbode VSD deemed or suspected to result from endocarditis as a primary etiology should warrant thorough TEE, examining all atrioventricular and semilunar valves in multiple views for potential vegetations.

A high jet detected in the right atrium with uncertain origin and course has to appeal to additional diagnostic techniques including transesophageal echocardiography, cardiac catheterization, or cardiac magnetic resonance imaging for differential diagnoses. The direction of the jet and calculation of mean and diastolic pulmonary artery pressures from a pulmonary regurgitation jet can aid in distinguishing tricuspid regurgitation with pulmonary hypertension from a Gerbode VSD. A high continuous wave Doppler gradient between the left ventricle and right atrium on echocardiogram is also one of the hallmarks of the Gerbode defect.

An additional distinguishing echocardiographic element to better delineate the Gerbode VSD is the occurrence of an enlarged right atrium with systolic expansion, resulting from the shunt primarily occurring during systole because of the large pressure gradient favoring flow from the left ventricle to the right atrium. This is in contrast to a communication between the aorta and right atrium, which would have flow in both systole and diastole, peaking at endsystole.

During surgery, the defect was found during careful inspection and resection of the aortic valve. The defect had fibrous edges which confirmed the long duration of the infectious process. On the either side, the long standing defect with fibrous tissues around favored and eased the surgical closure minimizing the chances for recurrence.

A recent 6-year observational study of tricuspid valve endocarditis found surgical intervention to be associated with reduced long-term mortality [6]. However,

this study did not exclude patients with concurrent left-sided endocarditis, which they found to predict increased in-hospital and long-term mortality [6]. Studies looking at isolated right-sided endocarditis have shown no difference in in-hospital or long-term mortality between medically and surgically managed patients [7], [8]. Another point of debate is whether to replace or to repair tricuspid valve. In our case, the valve was destroyed and the probability of repair failure was high. On the other hand, the patient received a mechanical prosthesis on the aortic position and would receive life-long anticoagulation. We chose the biological valve for the tricuspid position because of the high incidence of valve-related complications with the mechanical one on the tricuspid position. The long-term results of tricuspid valve replacement are considered satisfactory, and a bio-prosthesis can be recommended due to its good outcome and no need for anticoagulation [9].

Conclusions

To the best of our knowledge, this is a unique case reported with triple valve endocarditis and acquired Gerbode defect treated with surgery. We encourage meticulous examination of patients with endocarditis to find abnormal communications.

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