

RUPTURED SINUS OF VALSALVA AND COMPLETE ATRIOVENTRICULAR BLOCK COMPLICATING FULMINANT COURSE OF INFECTIVE ENDOCARDITIS: A CASE REPORT AND LITERATURE REVIEW

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Patients with infective endocarditis usually developed persistent fever and heart failure, especially when the valve structures are invaded and destroyed. Persistent bacteremia often leads to severe sepsis or overwhelming septic shock. Septic emboli from the vegetation will possibly result in systemic thromboembolism with multiple organ infarction. Patients with infective endocarditis have been reported to present with either ruptured sinus of Valsalva or complete atrioventricular block. However, both of these serious complications occurring in a single patient is rare. In this case report, we present a 54-year-old man with a previous history of alcoholic cirrhosis and chronic renal failure who suffered from a fulminant course of infective endocarditis. Simultaneously, ruptured sinus of Valsalva and complete atrioventricular block further complicated the preexisting septic shock and multiple organ failure.

Key Words: complete atrioventricular block, infective endocarditis, multiple organ failure, sinus of Valsalva rupture
(*Kaohsiung J Med Sci* 2006;22:398–403)

The clinical manifestations of infective endocarditis complicated with either ruptured sinus of Valsalva or complete atrioventricular (AV) block have been separately reported [1,2]. These two manifestations often indicate the rapid and devastating course of bacteria invasion with tissue destruction. However, both complications occurring simultaneously in a single patient with infective endocarditis is rare. The timing of surgical intervention is important for eradicating the vegetation and for tissue repair, but the comorbidities,

unstable hemodynamic status, and overwhelming sepsis make the risk of operation even higher. Here, we report a 54-year-old man with a previous history of alcoholic cirrhosis and chronic renal failure, developing a fulminant course of infective endocarditis and complicated with both ruptured sinus of Valsalva and complete AV block.

CASE PRESENTATION

A 54-year-old man with a previous history of alcoholic cirrhosis with esophageal varices bleeding and chronic renal failure visited our emergency room with the major complaint of tarry stool passage and general weakness. Severe anemia with hemoglobin 5.6g/dL was found and the patient was admitted into the

Received: February 27, 2006 Accepted: March 31, 2006
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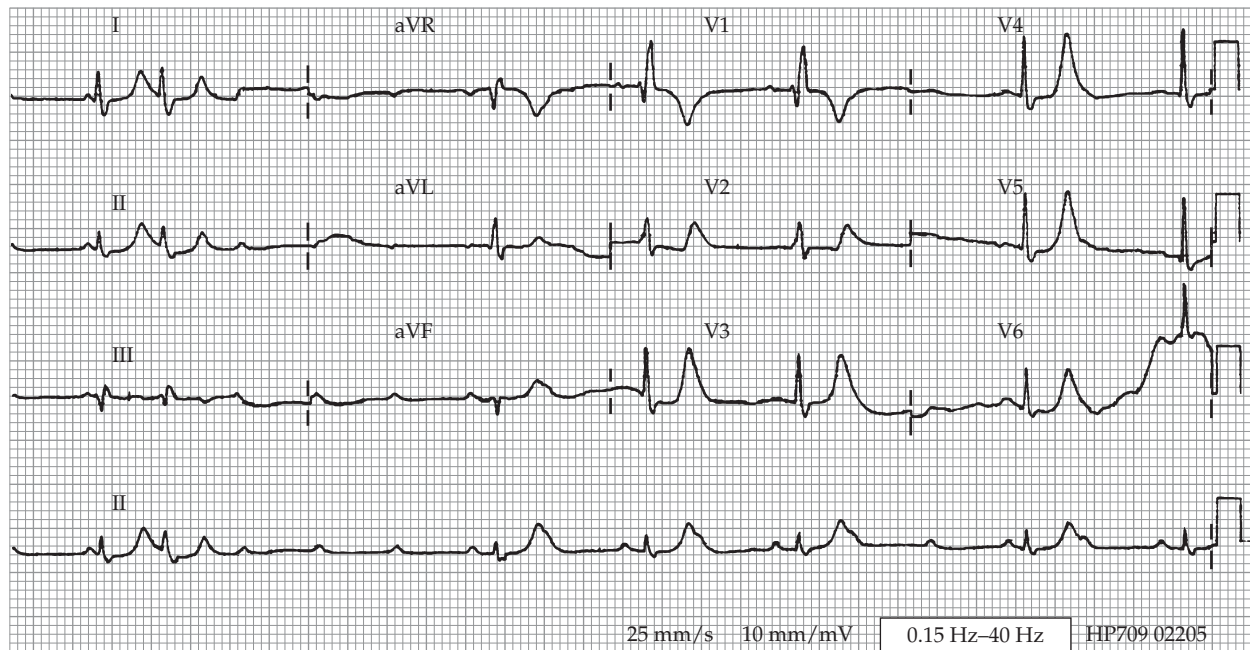


Figure 1. Surface 12-lead electrocardiogram on admission reveals second-degree Mobitz type II with intermittent complete atrioventricular block. High tent T wave was noted.

general ward under the impression of upper gastrointestinal bleeding. Routine surface 12-lead electrocardiogram after admission revealed high-degree AV block (2:1–3:1 AV conduction) and intermittent complete AV block with a heart rate of 40–45 bpm (Figure 1). The patient was then sent to the intensive care unit (ICU) after a temporary pacing wire was inserted for hemodynamic support. Serum potassium was 5.4 mmol/L at that time. Gastrointestinal bleeding and complete AV block were recovered after blood transfusion and temporary pacing backup, and the temporary pacing wire was removed on the 5th day after ICU admission. Normal sinus rhythm with normal PR interval was noted. However, high fever and chills with renal function deterioration developed in the following 4 days, and the patient received hemodialysis on the 9th day after ICU admission. The wound over the previous arteriovenous shunt was found to have pus formation. Culture from the infective wound revealed oxacillin-sensitive *Staphylococcus epidermidis*. Blood cultures also revealed a resistant strain of *S. epidermidis*; intravenous antibiotics vancomycin and meropenem were administered for persistent bacteremia.

On the 12th day after ICU admission, sinus tachycardia, a heart rate of 120 bpm, and dyspnea with respiration rate of 36/minute developed. Chest auscultation revealed a new-onset grade IV/VI continuous

murmur with thrill over the aortic area and a grade IV/VI systolic and diastolic murmur over the left lower sternal border and apical area. RV heave was palpable. Bedside Doppler echocardiography showed severe grade III aortic regurgitation jet through the destroyed aortic valves with moderate mitral regurgitation. A ruptured sinus of Valsalva with turbulent blood flow from the aorta into the right atrium was demonstrated (Figure 2). No obvious vegetation could be identified. Hemodynamic monitoring with pulmonary arterial catheterization showed high cardiac output of 7.0–8.0 L/minute and low systemic vascular resistance of 578 dyn.s/cm⁵. Volume expansion was performed under the impression of septic shock. Unfortunately, liver function deteriorated gradually and gastrointestinal bleeding reoccurred with coagulopathy. The prothrombin time was prolonged, with international normalized ratio of 3.5. Hepatic coma and jaundice developed and overwhelming septic shock worsened in spite of aggressive medical care. Surgical intervention was suggested but the patient's family refused due to the risk of high surgical mortality in the setting of multiple organ failure. On the 21st day after ICU admission, cardiac arrest preceded by sudden complete AV block occurred (Figure 3). Serum potassium was 4.9 mmol/L and pH was 7.31 at that time. The patient passed

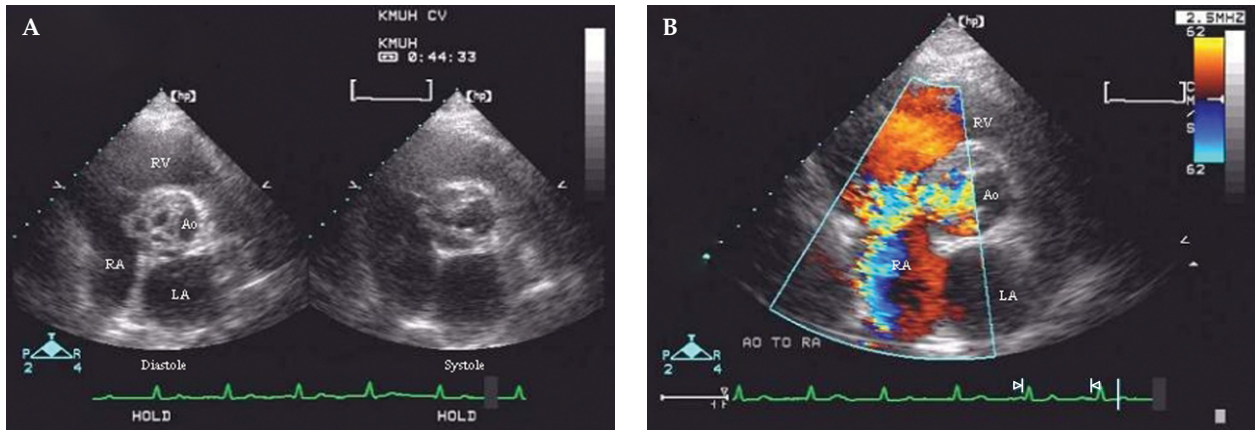


Figure 2. (A) Parasternal short-axis view at the aortic valve plane on 2-D echocardiography. Prolapse of mycotic aneurysm with a small disruption in the aortoseptal continuity are demonstrated. Also note that the orifice surrounded by three destroyed aortic semi-lunar valves remained open during diastole. (B) Color Doppler echocardiography reveals turbulent flow through the ruptured non-coronary sinus of Valsalva, with blood flowing from the aortic root into the right atrium.

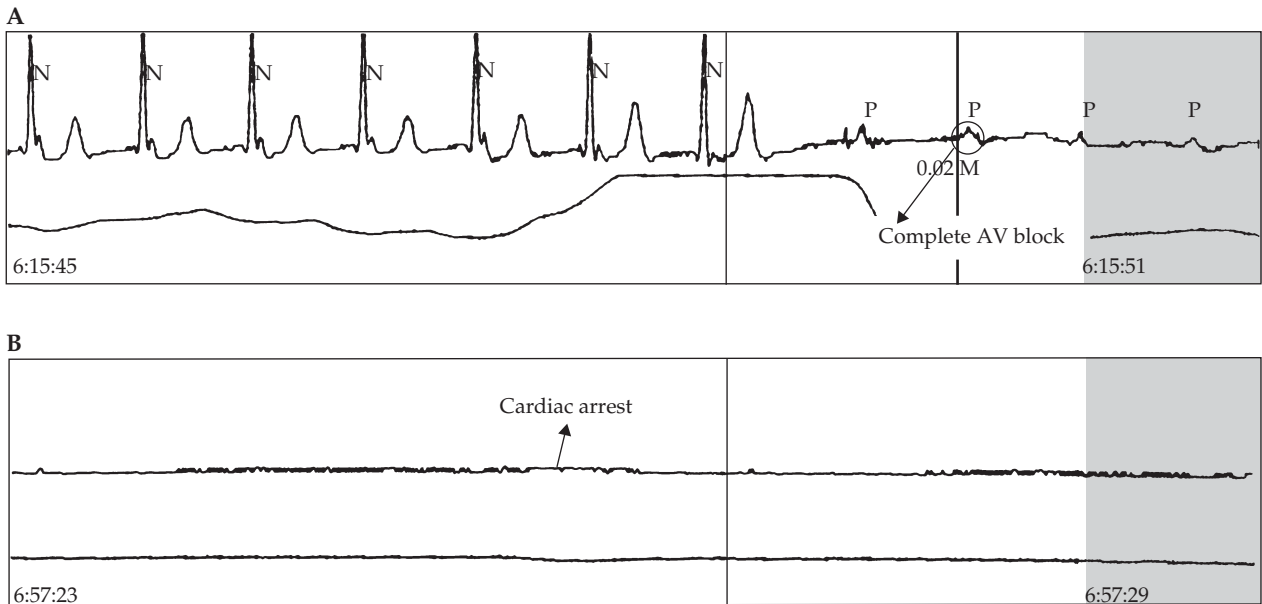


Figure 3. Sudden onset of cardiac arrest preceded by complete atrioventricular block on continuous monitoring in the intensive care unit. No high tent T wave was noted.

away eventually even under extensive cardiac pulmonary resuscitation.

DISCUSSION

We described a case of infective endocarditis complicated with ruptured sinus of Valsalva and complete AV block. The diagnosis of infective endocarditis was suspected immediately when the patient developed

persistent high fever and new onset of cardiac murmur. The mycotic aneurysm and ruptured sinus of Valsalva were documented with bedside color Doppler echocardiography. The turbulence of blood flow detected on parasternal short-axis view was initially misdiagnosed as tricuspid regurgitation flow. The velocity of turbulent flow measured by continuous Doppler was up to 4.79 m/second, with an estimated pressure gradient up to 91.8 mmHg. The result was completely incompatible with the

value of pulmonary artery systolic pressure obtained by right heart catheterization, where the pulmonary artery systolic pressure was only 53 mmHg. This discrepancy prompted us to repeat the echocardiographic examination, and to make the diagnosis of mycotic aneurysm with rupture of sinus of Valsalva into the right atrium. Because both the resolution of the echocardiography machine and the acoustic window of the patients could be impaired, especially in an intubated patient in the ICU setting, special attention should be paid to the unexpected interpretation.

Infective endocarditis complicated with sinus of Valsalva rupture or complete AV block have been reported earlier [1,2]. However, both complications occurring in a single patient with infective endocarditis has rarely been reported. Abe et al described a patient with infective endocarditis who presented with vegetation on the aortic valves [3]. The non-coronary sinus of Valsalva was ruptured and extended into the right atrium, and the electrocardiogram revealed first-degree AV block during the initial admission. Postoperative complete AV block developed after manipulating the mycotic aneurysm; surgical closure of the ruptured sinus of Valsalva was done and a permanent pacemaker was implanted. Another case report by Hayashi et al described a rapidly changing clinical course in a patient with infective endocarditis with rupture of the right sinus of Valsalva [4]. The patient developed transient Adams-Stokes attack with cardiac arrest up to 30 seconds after coughing. The surgical course was completed smoothly. However, the patient died 10 days after the operation due to severe sepsis and disseminated intravascular coagulopathy.

In a series of 50 patients with infective endocarditis, Hayashi et al found that in addition to abnormalities in aortic or mitral valve structure, other predisposing factors including cachexia, chronic alcohol or intravenous drug abuse that compromised host defense mechanism may enhance the susceptibility of infective endocarditis [5]. Our patient was previously diagnosed with alcoholic cirrhosis and chronic renal insufficiency. The complicating and fulminant course of the infective endocarditis might be related to reduced host immunity.

Conduction disturbance found in a case of infective endocarditis should raise the possibility of septal invasion and destruction [2]. However, in our case, another possible factor contributing to complete AV block

could be hyperkalemia. Although the initial potassium level was only 5.4 mmol/L, the patient exhibited intermittent complete AV block. After the initiation of hemodialysis, the potassium level was maintained at 4.0–5.0 mmol/L and the temporary pacing wire was removed because normal sinus rhythm resumed and remained stable for 5 days. The massive blood transfusion and multiple organ failure might raise serum potassium in a short period. In addition, the rapid invasion of septal tissue near the atrioventricular conduction system by the progression of infective endocarditis might also cause conduction failure. Complete AV block with sudden cardiac arrest was found without evidence of any preceding hyperkalemia or metabolic acidosis in this patient. Prolonged temporary pacing could be of value in this setting of unexpected course of such overwhelming infective endocarditis before surgical intervention.

The rare presentation of two serious complications in this case of infective endocarditis necessitated applying greater and serious attention to learn from it. The role of Doppler color flow imaging is paramount in the correct diagnosis and detection of complications from infective endocarditis [6]. Oxygen step-up or aortography might provide direct evidence of diagnosis of sinus rupture of Valsalva but neither was performed in this case because of the patient's critical condition and the risk associated with transportation to the catheterization room. Surgical intervention is the only way to repair the damage of ruptured sinus of Valsalva in a case of infective endocarditis and to restore the hemodynamic status of the patient [7]. In a case with unstable hemodynamic status due to severely ruptured sinus of Valsalva, high-degree AV block and uncontrollable infective status, the decision of an earlier surgical intervention should be kept in mind.

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細菌性心內膜炎併發主動脈竇破裂及完全房室傳導阻滯之急遽病程 — 一病例報告及文獻回顧

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病患感染細菌性心內膜炎可能會產生持續性高燒以及心臟衰竭，特別是在心臟瓣膜結構受到細菌破壞時。持續性的菌血症經常導致嚴重的敗血症，甚至惡化為敗血性休克。另外細菌贅生物所掉落的感染性血栓也可能導致全身性的血栓栓塞，進一步導致多重器官衰竭。曾有文獻報告過細菌性心內膜炎患者併發主動脈竇破裂或是完全房室傳導阻滯。然而這兩種嚴重的併發症同時出現在一個病人身上的情況則非常少見。本文描述一位 54 歲有酒精性肝硬化以及慢性腎衰竭的中年男性，罹患嚴重細菌性心內膜炎的臨床病程。同時併發的主動脈竇破裂與完全房室傳導阻滯更進一步的惡化敗血性休克以及誘發多重器官衰竭。

關鍵詞：完全性房室傳導阻滯，感染性心內膜炎，多重器官衰竭，主動脈竇破裂
(高雄醫誌 2006;22:398-403)

收文日期：95 年 2 月 27 日

接受刊載：95 年 3 月 31 日

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