

Acute chest pain in a triathlete: rupture of the noncoronary sinus of Valsalva into the right ventricle

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Abstract: Sinus of Valsalva (SoV) aneurysm is a rare cardiac disease which can be congenital or acquired. A ruptured SoV aneurysm presents a clinical emergency and can lead to progressively deteriorating heart failure. Therefore, appropriate treatment requires prompt and accurate diagnosis. Most ruptured or nonruptured SoV aneurysms are diagnosed by the means of echocardiography. However, cardiovascular magnetic resonance (CMR) can provide information on precise anatomy and mechanisms due to its excellent soft tissue contrast and high resolution, and thereby allows for optimized preoperative planning of the repair strategy. In the present case, we demonstrate the benefit of CMR in emergency settings.

Keywords: Cardiovascular magnetic resonance (CMR); sinus of Valsalva (SoV); acute heart failure

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Introduction

Sinus of Valsalva (SoV) aneurysm is a rare cardiac disease. The prevalence of aneurysms originating from the right coronary sinus (65–85%) is the highest, followed by the noncoronary sinus (10–30%), and the lowest in the left coronary sinus (<5%) (1,2). A web-based search revealed an onset of the disease at 35 years of age and that males predominated with about two thirds of the clinical cases (3). Furthermore, Asians are more frequently affected than other ethnic groups (4). Often the patient is asymptomatic. However, a ruptured SoV aneurysm presents a clinical emergency due to formation of hemodynamically relevant aortic cardiac shunts. Diagnosis of this disease and other common causes of acute heart failure rely on echocardiography.

Case presentation

A 45-year-old male was admitted to our emergency department because of acute onset of palpitation and chest pain that started a few hours ago. His medical history has

been unremarkable. The patient has frequently taken part in triathlons. His last competition had been eight months ago. Physical examination after admission showed tachycardia with systolic-diastolic cardiac murmur. Transthoracic echocardiography detected a continuous shunt into the right ventricle. The left ventricle was not dilated and showed normal global systolic function and no regional wall motion abnormalities. The right cardiac chambers were enlarged. Laboratory analysis showed creatinine kinase levels of 385 U/L (reference range <171 U/L), creatinine kinase isoenzyme MB levels of 41 U/L (reference range 7–25 U/L) and troponin-T levels of 323 ng/L (reference range <14 ng/L). The transaminase levels (glutamate oxaloacetate transferase, glutamate pyruvate transferase) were also increased with values of 633 U/L (reference range <35 U/L) and 205 U/L (reference range <45 U/L), respectively. Immediately performed transesophageal echocardiography suspected a ruptured aneurysm of SoV. Hence, the patient was transferred to our ICU. Because of elevated troponin-T levels and persistent chest pain the patient underwent coronary angiography. The left (*Figure 1A*) and right coronary arteries

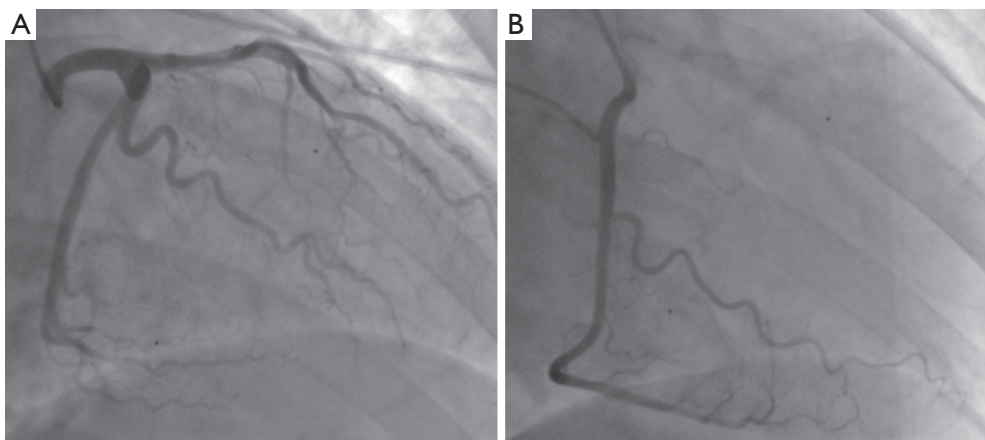


Figure 1 Coronary angiography of the left (A) and right (B) coronary arteries. No signs of stenosis are detectable.

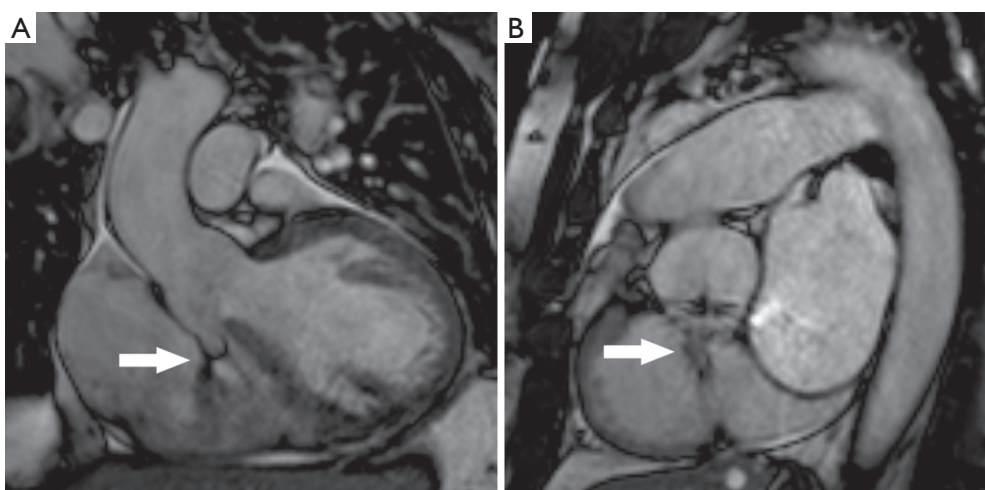


Figure 2 Cardiovascular magnetic resonance of the left ventricular outflow tract (A) and aortic valve (B). The ruptured sinus of Valsalva shows a windsock appearance (arrow) with a jet from the aortic root to the right ventricle.

(*Figure 1B*) showed no signs of stenosis. The thoracic aortogram revealed a contrast jet column directed from one of the aortic sinuses of Valsalva into the right ventricle. For further evaluation of the anatomical relationship we supplemented the diagnostic workup with a cardiovascular magnetic resonance (CMR) examination which revealed a ruptured noncoronary SoV aneurysm with a windsock appearance into the right ventricle (*Figure 2*). The patient was then shifted to the cardiac surgery unit for emergency repair which confirmed a ruptured noncoronary sinus shunting into the right ventricle (1 cm × 1 cm). The defect was repaired successfully with glutaraldehyde-treated autologous pericardium. The postoperative period was uneventful. The patient was discharged from the Division of Cardiac Surgery

eight days following surgery. He was asymptomatic at the first follow-up examination after discharge.

Discussion

Ruptured SoV aneurysms present a clinical emergency because of formation of hemodynamically relevant aortic cardiac shunts that can lead to progressively deteriorating heart failure (5). This rupture can occur with direction towards the right atrium, right ventricle, or left atrium. Therefore, SoV aneurysms should be considered as differential diagnosis for patients who show symptoms of acute heart failure with chest pain and new heart murmurs. Transthoracic echocardiography and transesophageal echocardiography present the main

diagnostic methods (6). However, alternative imaging techniques (CMR, CT) have been previously proposed for the diagnosis of SoV aneurysms (3). In the present case, we demonstrate the benefit of CMR in this emergency setting. Due to its high resolution, this method did not only confirm the diagnosis, but also provided more details about rupture localization, shunt direction and functional compromise of the right ventricle, thus optimizing the preoperative planning of the repair strategy. Therefore, CMR has been proved a useful tool to visualize and confirm the pathology of a ruptured SoV in an emergency setting.

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None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

Informed Consent: Written informed consent was obtained

from the patient for publication of this manuscript and any accompanying images.

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