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Complicated catheter ablation of premature ventricular contractions from the left sinus of Valsalva in a young female. Case presentation

Idiopathic premature ventricular complexes (PVCs) are usually benign and are often treated conservatively. Data regarding radiofrequency catheter ablation (RFA) of PVCs from the aortic sinus of Valsalva are spare. Furthermore, there are limited data regarding complications and their solutions during RFA of PVCs from the aortic sinus of Valsalva. Here we describe a clinical case of symptomatic PVCs in a 27yrold young woman with reduced exercise tolerance and dyspnea. The patient had taken anti-arrhythmic group Ic, II, and III drugs with no significant effect. Successful catheter ablation of PVCs from the left sinus of Valsalva was complicated by acute occlusion of the left main coronary artery (LCA) followed by polymorphic ventricular tachycardia and ventricular fibrillation. Cardioversion and intravenous antiarrhythmic administration restored the sinus rhythm. The LCA was stented with a bioresorbable Magmaris stent with the support of extracorporeal membrane oxygenation that was required due to severe hypotension and ineffectiveness of vasopressors. After the procedure, a favorable angiographic effect was noted. The result of stenting was monitored with IVUS intravascular navigation. The patient was discharged in a satisfactory condition on the 10th day after the procedure. Special attention should be applied to prevent complications and to careful patient selection for RFA in the left sinus of Valsalva, and care must be taken to avoid injury to the LCA. Timely and correct procedures can result in patient survival even after acute LCA injury and occlusion.

Keywords Case report; bioresorbable stent; catheter ablation; complication; ECMO

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Background

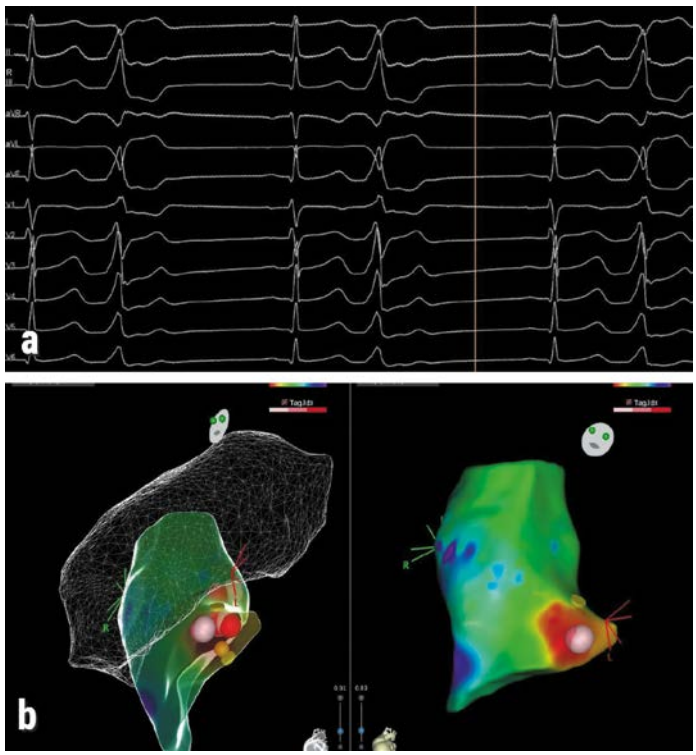
Idiopathic premature ventricular complexes (PVCs) are usually benign and often treated conservatively [1]. Data regarding radiofrequency catheter ablation (RFA) of PVCs from the aortic sinus of Valsalva are spare [2], and only limited data exist concerning the safety of ablation there [3]. In this case report, we describe RFA of ventricular extrasystole (VES) from the sinus of Valsalva in a young woman. The procedure was complicated by acute occlusion of the left main coronary artery (LCA) ostium. Furthermore, there are no other reports of complications and their solutions during RFA of PVCs from the aortic sinus of Valsalva.

Case presentation

Informed consent to publish case details and images was signed by the patient. Patient: 27 yrs, 56 kg, 157 cm height, 1.55 m^2body surface area, presented with a history of symptomatic, idiopathic VES for one year with reduced exercise tolerance and dyspnea. The patient had taken groupIc, II, and III anti-arrhythmic drugs with no significant effect. An electrocardiogram (ECG) showed regular VES (Figure 1a) in the amount of 19498 per 24 hours of monitoring according to Holter ECG monitoring (HECGM). The morphology of the QRS complex indicated the VES to be from the sinus of Valsalva. Visualization of the heart by transthoracic echocardiography and MRI revealed no structural heart pathology and no arrhythmogenic cardiomyopathy.

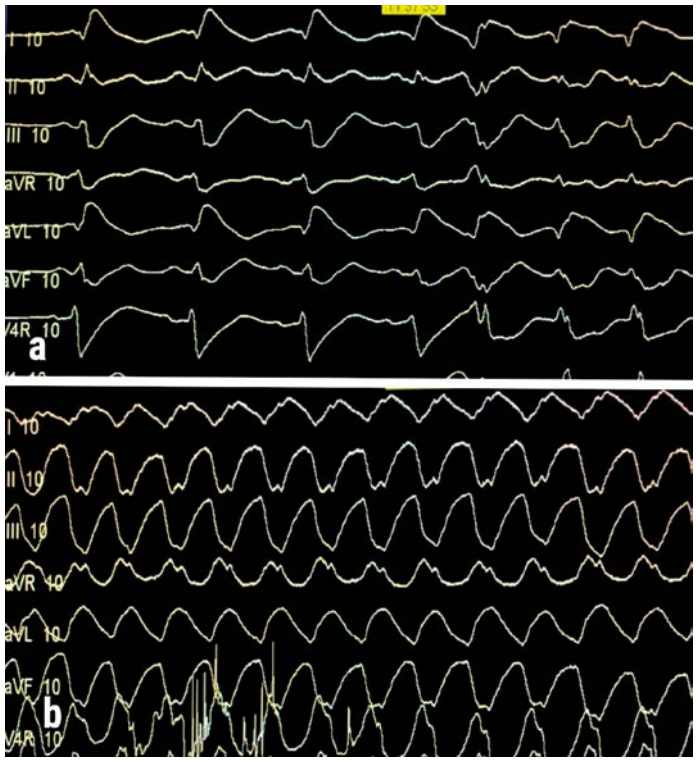
It was decided to perform RFA to treat the VES with the use of the Carto[3] navigation system (Biosense Webster, USA). A standard right femoral vein approach was used to position a 10-pole diagnostic electrode in the coronary sinus. A puncture of the right femoral artery was performed for installation of a SmartTouch ablation electrode (Biosense Webster, USA) in the ascending aorta. An early activation zone was detected in the region of the left sinus of Valsalva with -127ms. The area of the orifice of the LCA was determined with the ablation catheter and marked (Figure 1 b, yellow dot). Therefore, angiography of the coronary arteries was not performed before the ablation procedure. Several RFA applications were performed from under

Figure 1. a) Surface ECG of the patient before catheter ablation. **b)** Activation mapping of the ascending aorta



The zone of the earliest activation is colored red. The yellow dot marks the orifice of the left main coronary artery. Red and pink dots are areas of radiofrequency ablation. The minimum ablation index was 500.

Figure 2. Surface ECG after RFA of VESfrom the left sinus of Valsalva



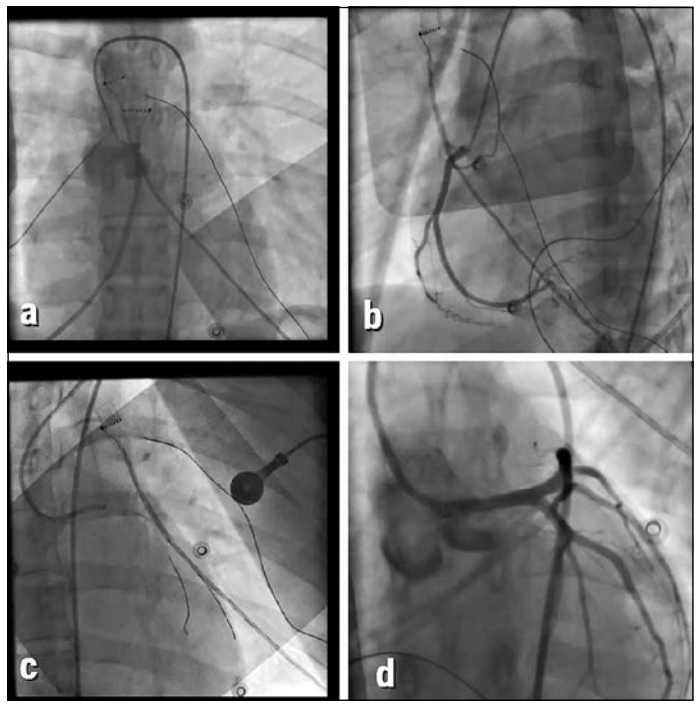
a) Acute elevation of ST segment.
b) Ventricular tachycardia.

the LCA leaflet to minimize the risk of complications, with no effect. Thus, RFA was performed in the left sinus of Valsalva with the achievement of the maximum ablation index of605. Surface ECG showed no VES after last RFA.

After the last RFA and VES disappearance, the patient's monitor showed ST-segment elevation (Figure 2 a). Subsequently, the patient developed ventricular tachycardia (Figure 2 b) with transition to polymorphic ventricular tachycardia and ventricular fibrillation. Cardioversion and intravenous antiarrhythmic administration restored the sinus rhythm.

Coronary angiography was urgently performed, and acute occlusion of the LCA ostium was detected (Figure 3 a), with

Figure 3. Coronary angiography before and after LCA stenting



a) Acute occlusion of the LCA. **b)** Patency of the RCA. **c)** Pre-dilatation of occluded segment with a coronary balloon catheter. **d)** Control angiography with a good angiographic effect.TheLAD and Cx with TIMI grade 3 blood flow.

patency of the right coronary artery (RCA), posterolateral branch (PLB), and posterior descending artery (PDA) (Figure 3 b). Despite vasopressor and antiarrhythmic therapy, invasive blood pressure was 60/40 mmHg with a downward trend. Due to the worsening hemodynamics, it was decided to implant a veno-arterial extracorporeal membrane oxygenation device (ECMO) with subsequent implantation of a stent into the LCA. Considering the young age of the patient, a bioresorbable stent was implanted.

The first procedure was the installation of a peripheral ECMO through the left femoral artery and vein (Figure 4 a). The arterial connection was made with an EBU 3.56Fr guiding catheter (Launcher, Medtronic USA) inserted thro-

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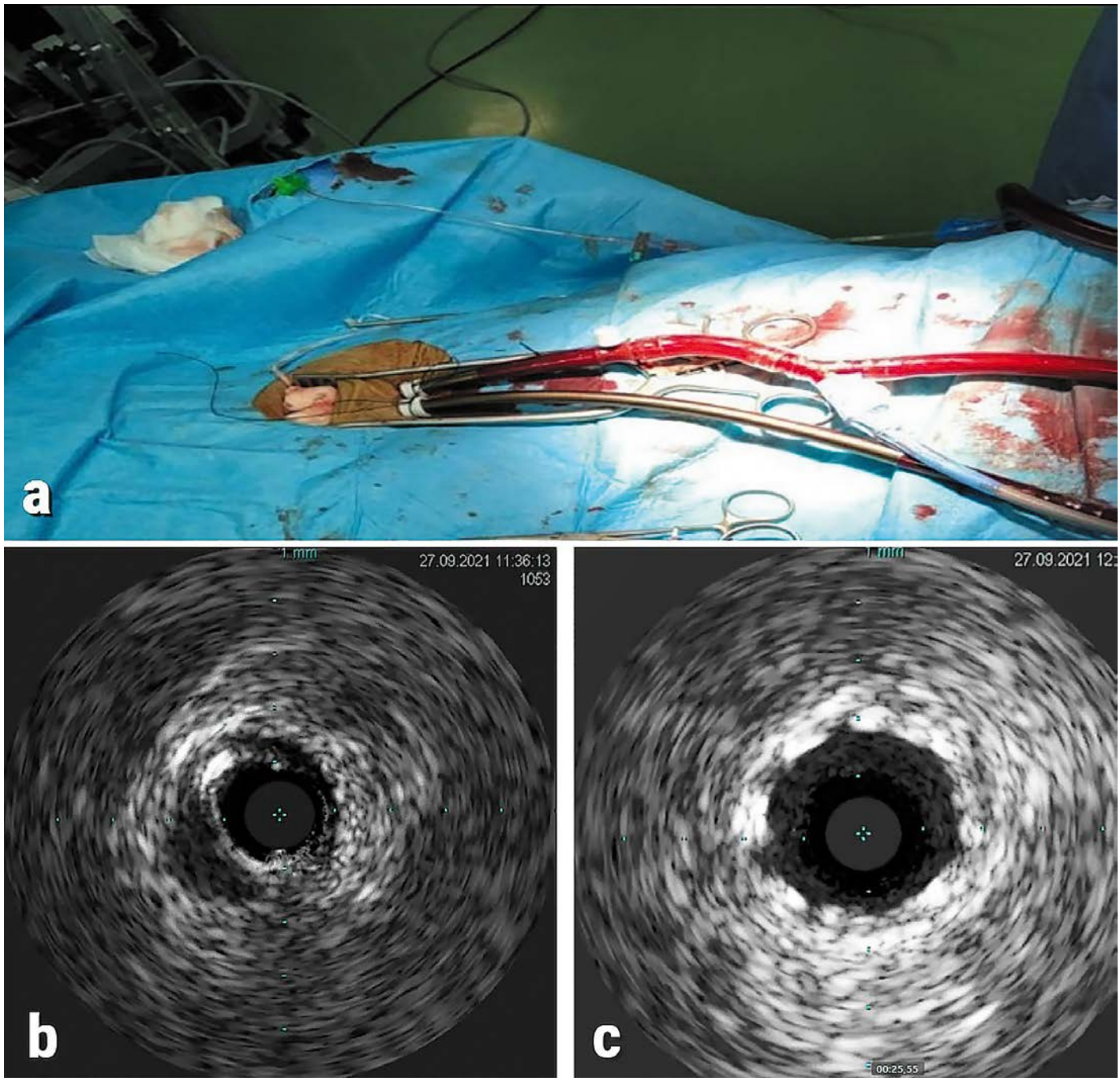
ugh the introducer previously installed in the left femoral artery.

Before performing the percutaneous coronary intervention, the patient received 180 mg of ticagrelor and 300 mg of acetylsalicylic acid through a nasogastric tube and 10,000 units heparin iv. Coronary guidewires Whisper LS and Whisper MS (Abbott, USA) were placed in the distal parts of the left anterior descending (LAD) and circumflex (Cx) coronary arteries. The occluded segment of the LCA was pre-dilated with an Euphora coronary balloon catheter, 2.0 × 15.0 mm (Medtronic, USA), and, within 15 sec, followed by implantation of a Magmaris 3.0–20mm stent (Sirolimus-Eluting Resorbable Coronary Magnesium Scaffold System, Biotronik, Germany), under pressure of 16 atm. Next, post-dilation was performed with an NC Euphora balloon catheter, 3.75x15.0 mm (Medtronic, USA) (Figure 3 c). Coronary angiography showed a good effect of stenting, with blood flow TIMI 3 (Figure 3 d). The result of stenting was further verified by intravascular ultrasound (IVUS) (Volcano Corporation, USA) (Figures 4 b and 4 c). After acute occlusion of the LCA was eliminated by stenting; the diameter of the LCA was 3.7 mm.

After all procedures were completed, the patient was transferred to the Intensive Care Unit. There was an increase in the cardio markerTnI up to 25.3 ng/ml with a decrease in dynamics on the 10th day to 0.24 ng/ml. Also, there was an

Figure 4. a) Installation of the peripheral ECMO through the left femoral artery and vein. b) IVUS before stenting. c. IVUS after stenting



increase in NT-proBNP from 123.3 pg/ml to 4205 pg/ml, with a decrease in dynamics to 455 pg/m on the 9th day after the operation. On the 1st day after the intervention and during ECMO support, ECHO showed akinesis of all apical segments and the middle segments of the anterior-lateral, anterior, and anterior-septal walls of the left ventricular (LV) myocardium with an ejection fraction (EF) of 40%. On the 4th day after stenting, the ECMO was explanted, and the patient was transferred to the Arrhythmology Department due to stable hemodynamics. On the 10th day, the LV EF increased to 49% with akinesis of the middle, apical anterior-septal segments and hypokinesis of the anterior-lateral segments of the LV. Holter ECG monitoring showed no VESs, and the patient was discharged from the hospital with stable vital signs.

After discharge, a cardiologist examined the patient every month. Coronary angiography at 6 mos showed no restenosis. LV EF was 51% with hypokinesis of the middle, apical anterior-septal segments of the LV. Holter ECG monitoring showed no VESs. Dual antithrombotic therapy with acetylsalicylic acid and ticagrelor was continued for 12 mos. Also prescribed were bisoprolol, cordarone, and verospiron.

Discussion

Interventional procedures have a risk of complications, such as dissection, cardiac arrhythmia, and acute thrombosis. Acute occlusion of the LCA is extremely rare and, as a rule, leads to fatal consequences. In practice, stenting of the LCA has been found to be the most successful strategy [4].

The occlusion of the LCA in this case was associated with RFA in the region of the LCA, which caused damage to the endothelium and acute thrombosis. In such cases, implantation of a bioresorbable stent in young patients will avoid the presence of a foreign body in the coronary artery. With the ECMO and the young age of the patient, it was possible to restore coronary blood flow and avoid irreversible damage to the brain and myocardium. To the best of our knowledge, this report describes the first case of LCA stenting after acute LCA occlusion during RFA for PVCs from the left sinus of Valsalva and with ECMO in a young patient.

Conclusions

Special attention should be applied to prevent complications and to careful patient selection for RFA in the left sinus of Valsalva, and care must be taken to avoid injury to the LCA. Timely and correct procedures can result in patient survival even after acute LCA injury and occlusion.

No conflict of interest is reported.

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