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## **Post-infarction revelation of the inflammatory bicuspid aortic cusp perforation to intraventricular septum pseudoaneurysm cavity**

**Short title:** Post-infarction aortic cusp perforation to IVS pseudoaneurysm cavity

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A patient with diagnosed bicuspid aortic valve, mild aortic regurgitation was hospitalized in 2014 with symptoms of chronic heart failure (CHF; New York Heart Association [NYHA], clas II), multiple unexplained ventricular and supraventricular arrhythmias, episodes of supraventricular tachycardia, paroxysmal atrial fibrillation and preserved ejection fraction (EF; 55%). Coronary angiography showed nonsignificant atherosclerosis. In 2015 he was admitted with CHF symptoms (NYHA III) and multiple supraventricular arrhythmias. Echocardiography (ECHO) showed global left ventricular (LV) hypokinesis, reduced EF (40%) and no signs of aortic valve and interventricular septum (IVS) distortion. Until now the cardiac inflammatory process was not established.

Six years later (2021), he was admitted to the hospital with a non-ST-segment elevation myocardial infarction (NSTEMI). Admission ECHO revealed LV enlargement (63 mm), segmental contractility abnormalities (EF, 45%), bicuspid aortic valve with a mild systolic gradient and moderate regurgitation. Additionally ECHO revealed cavity (28 ×18 mm) with diastole filling and systole emptying in the basal part of IVS (Figure 1A). Coronary angiography was postponed until urgent cardiac magnetic resonance (CMR) was performed. CMR confirmed segmental akinesia in the basal segment of the lateral wall and infero-septal segment in the location of the described cavity in the LV outflow tract (Figure 1B, C). The IVS cavity communicated with the lumen of the LV, filled during diastole and emptied partially in systole. Additionally, a perforation in non-coronary cusp communicating with this cavity was revealed. Performed coronary angiography showed critical left main coronary artery (LM) stenosis on bifurcation with left anterior descending artery (LAD) and left circumflex coronary artery ostium along with subtotal stenosis of LAD on bifurcation with large diagonal branch (Figure 1D). Due to advanced coronary artery disease and the bicuspid aortic cusp perforation to cavity in IVS, the patient was qualified to cardiac surgery (Figure 1E, F). Successful aortic valve replacement with mechanical AVR 21 ONX prosthesis, IVS cavity closure and coronary artery bypass grafts LIMA-LAD, SVBG-Diag were performed. Histopathology of aortic leaflet revealed chronic non-typical inflammatory process, without bacterial vegetations.

In a myocardial infarction (MI) patient without an active inflammatory process, ECHO raised the suspicion of an IVS rupture within the ischemic zone with the formation of pseudoaneurysm. Cardiac pseudoaneurysm is a rare complication MI or bacterial endocarditis [1][2]. Further ECHO examinations and CMR raised the suspicion of the inflammatory damage to the aortic leaflet with a reverse jet towards the injured IVS. The non-typical inflammatory process without bacterial vegetations was confirmed in the cardiac surgery and histopathology.

Nevertheless, the patient had not previously been diagnosed with the cardiac inflammatory disease, numerous recurrent arrhythmias could reflect the subclinical inflammatory process. Because coronary angiography proved critical LM bifurcation stenosis with deep ischemia causing NSTEMI, even after surgery, it cannot be ruled out whether an IVS post-inflammatory cavity was contacting LV outflow tract before MI or whether this cavity perforated to LV lumen in the course of post-infarction tissue necrosis.

Imaging is crucial for establishing a diagnosis and guiding appropriate treatment, CMR and tomography are the basis of anatomical characterization and differentiation from other diseases, such as a true LV aneurysm [3–5]. This case presents a situation where pre-coronary angiography ECHO in acute MI influenced the decision process.

## Article information

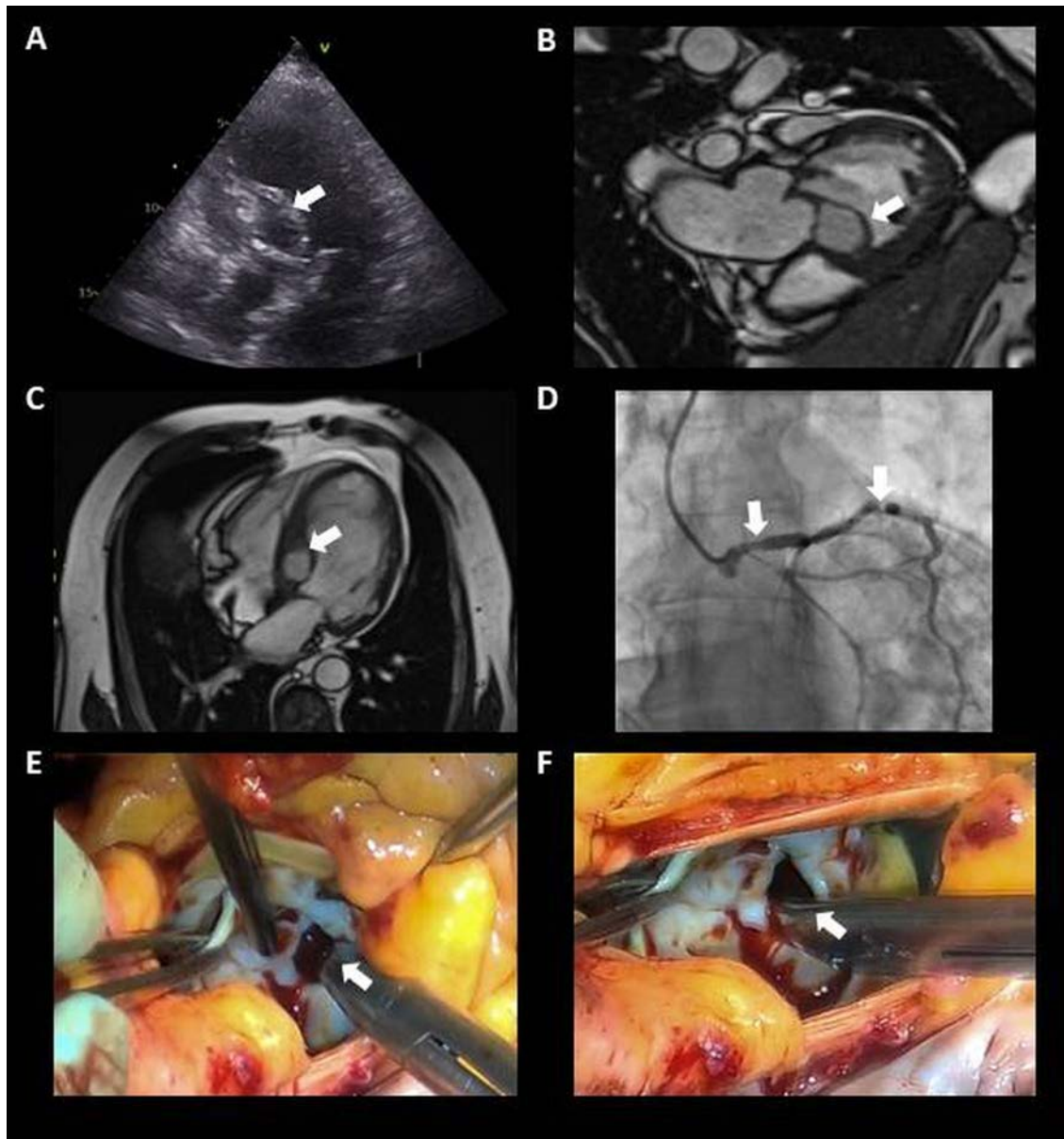
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**Figure 1.** **A.** Transthoracic echocardiography — cavity in the basal part of interventricular septum (the arrow). **B.** Cardiac magnetic resonance (CMR) — cavity in the basal part of interventricular septum (the arrow). **C.** CMR — cavity in the basal part of interventricular septum (the arrow). **D.** Coronary angiography — caudal view of left main coronary artery stenosis on bifurcation with left anterior descending artery and left circumflex coronary artery ostium (Medina 1-1-1) (the arrow); subtotal stenosis of left anterior descending artery on bifurcation with large diagonal branch (Medina 1-1-1) (the arrow). **E.** Intraoperative view of intraventricular septum pseudoaneurysm cavity (the arrow). **F.** Intraoperative view of intraventricular septum pseudoaneurysm cavity (the arrow)

