Definitive diagnosis of ruptured sinus of Valsalva in a patient with ventricular septal defect using cardiac magnetic resonance imaging

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A 48-year-old man with a history of peri-membranous ventricular septal defect (VSD) without aortic complication was admitted for dyspnoea 1 month after an unfortunate treatment with amoxicillin for a suspected acute bronchitis. The auscultation revealed a loud continuous systolo-diastolic murmur and a thrill through the precordium. The blood pressure was 140/60 mmHg, the ECG was normal except for sinus tachycardia at 90 bpm. Chest X-ray showed cardiomegaly and the C-reactive protein was 25 μg/L.

Trans-thoracic echocardiography showed a small peri-membranous VSD, a moderate aortic insufficiency and a high-velocity systolo-diastolic flow (5 m/s) in the pulmonary artery, but the different merging flows which confused Doppler analysis. The patient refused the trans-oesophageal echocardiography (TEE) without general anaesthetic.

Cardiac magnetic resonance (CMR) imaging was performed to confirm the diagnosis of rupture of the sinus of Valsalva despite the absence of sinus dilation and to quantify the aortic regurgitation. Cine images showed a membranous VSD and a rupture of the right coronary sinus into the infundibulum. The different diastolic regurgitation jets were individualized (linear signal voids due to high blood flow velocities)

Figure 1. By using phase-contrast acquisitions through the ascending aorta and the pulmonary artery trunk, the aortic regurgitation fraction was over 50% and little over estimated due to the shunt.

The TEE (Supplementary data online, Figure S2) done at the time of the surgery individualized the VSD and the ruptured Valsalva sinus. Surgical exploration suspected an aortic cusp infection because of the inflammatory aspect of the tissue. There was no vegetation but aortic calcifications. The VSD was closed and the aortic valve replaced by an homograft. We hypothesized that unlike in the classic Laubry–Pezzi syndrome where the Valsalva sinus is damaged by the VSD attracting the cusps in the defect, the rupture of the cusp was probably caused by aortic endocarditis sterilized by the initial antibiotic treatment: excised aortic tissues were negative for bacteria (direct examination, culture, and PCR).

Conclusion
A ruptured sinus of Valsalva may be difficult to diagnose and the aortic regurgitation to quantify with TEE. When different merging flows confuse the Doppler analysis, TEE, and CMR are essential to understand the anatomic lesions and quantify flow patterns. In this particular case, due to high blood flow velocities, the two diastolic jets were qualitatively individualized with linear signal voids by using cine SSFP CMR images, and the diastolic regurgitated flow within the two jets were quantitatively and globally estimated by phase-contrast imaging.

Consent
Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Supplementary data are available at European Heart Journal – Cardiovascular Imaging online.

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