Alcohol septal ablation using myocardial contrast echocardiography on a patient with iodine contrast allergy

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A 76-year-old woman was referred to our hospital for the management of symptomatic and drug-refractory hypertrophic obstructive cardiomyopathy. She remained symptomatic despite the daily medical treatment using 20 mg of carvedilol, 120 mg of verapamil, and 300 mg of disopyramide. Transthoracic echocardiography showed left ventricular outflow tract (LVOT) obstruction with a peak systolic pressure gradient of 64 mmHg at rest and moderate to severe mitral regurgitation caused by systolic anterior motion. The septal wall thickness, left ventricular diastolic/systolic diameters, and $E/e'$ was 18 mm, 38/11 mm, and 27, respectively. We decided to perform alcohol septal ablation. During left coronary angiography (Figure 1A), she went into anaphylactic shock to an iodinated contrast medium. We therefore changed the treatment method and performed alcohol septal ablation using myocardial contrast echocardiography instead of coronary angiography. Cardiac catheterization revealed the maximum LVOT pressure gradient of 66 mmHg. A guidewire was passed into the first septal branch (SB), which was confirmed by intravascular ultrasound imaging (Figure 1B). A 1.5-mm over-the-wire balloon was advanced to the first SB and was inflated. To confirm the target myocardial area in the first SB, myocardial contrast echocardiography was performed by injecting 2.4 mL of Sonazoid® (Daiichi Sankyo, Tokyo, Japan) into the first SB. Transthoracic echocardiography showed the enhancement of the basal septum (Figure 1C). Then, 1 mL of ethanol was injected to the first SB, and a part of the septum highlighted by Sonazoid® was ablated (Figure 1D). After the first ablation, the LVOT pressure gradient decreased to 19 mmHg. In order to consolidate the results of the procedure and possibly improve its long-term results, we decided to perform the second ablation to further decrease the pressure gradient. A guidewire and a 1.5-mm balloon were advanced to the second SB by using intravascular ultrasound imaging (Figure 2A and B). After balloon occlusion, Sonazoid® was injected into the second SB (Figure 2C, green arrows). Subsequently, ethanol was injected into the second SB (Figure 2D, green arrowheads), and the LVOT pressure gradient was decreased to 12 mmHg (Figure 2E) with mild to moderate mitral regurgitation. Iodinated contrast media were not required during the procedure, and the patient was uneventfully discharged. She remains free of symptoms at 5 months after follow-up, and the same doses of preprocedural medications were continued.

In the alcohol septal ablation procedure, coronary angiography using an iodinated contrast medium is required to identify SBs and avoid alcohol injection for left anterior descending artery. In this case, use of an iodinated contrast medium was prohibited in the second procedure. Thus, SBs were identified with an intravascular ultrasound guidance and the target myocardium area was confirmed by using myocardial contrast echocardiography because...
intra-procedural myocardial contrast echocardiography has been shown to be helpful for target vessel selection. Our case indicates that alcohol septal ablation can be performed successfully with combined use of intravascular ultrasound and myocardial contrast echocardiography without iodinated contrast medium in patients with a proven anatomy of the left coronary artery. The current European Society of Cardiology guideline describes the utility of myocardial contrast echocardiography prior to alcohol injection in combination with coronary angiography and transthoracic echocardiography. The complexity of alcohol septal ablation requires a multi-disciplinary approach between imaging team and interventionist given the considerable variation in vessel size, coronary morphology, and supplying territory.

Consent: The author/s confirm that written consent for submission and publication of this case report including image(s) and associated text has been obtained from the patient in line with COPE guidance.

Conflict of interest: none declared.
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**Figure 2** A guidewire and a 1.5-mm balloon were advanced to the second septal branch (A). Intravascular ultrasound imaging was used to confirm the location of the second septal branch (B). After the injection of Sonazoid® into the second septal branch, the part next to the firstly ablated septum was also highlighted (green allow) (C). Septal ablation was performed after the injection of ethanol into the second septal branch (green allow heads) (D). The left ventricular outflow tract pressure gradient improved from 66 mmHg to 12 mmHg (E). SB, septal branch.