Newly developed spontaneous echocardiographic contrast as a potential marker of intracardiac thrombus formation after a transcatheter edge-to-edge mitral valve repair

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Keywords
- Atrial thrombus • Iatrogenic atrial septal defect • Mitral valve • Spontaneous echocardiographic contrast • Transcatheter edge-to-edge repair

Case description

A 76-year-old man with idiopathic dilated cardiomyopathy, severe chronic kidney disease, and permanent atrial fibrillation (AF) presented with congestive heart failure secondary to severe functional mitral regurgitation (MR) and a low left ventricular ejection fraction of 20%. Atrial fibrillation had been managed previously by administering an oral anticoagulant (OAC, warfarin); because he was at a high risk of bleeding, the dose was adjusted to achieve a prothrombin time-international normalized ratio (PT-INR) of 1.6–2.0 (therapeutic range of PT-INR as per Japanese guidelines: 1.6–2.6). Therefore, transcatheter edge-to-edge repair (TEER) of the mitral valve (MV) was performed because the patient was at a high surgical risk. A MitraClip XT (Abbott, IL, USA) was successfully implanted at the A2–P2 segment of the MV, and the MR improved to a mild status (Figure 1A and supplementary material online, Video S1). However, a spontaneous echocardiographic contrast (SEC) and a newly developed sludge in the left atrium (LA) were observed incrementally, even after controlling the activated clotting time within the recommended range of 300–350 s (Figure 1B and supplementary material online, Video S2). The post-operative MV area (2.1 mm²) and the mean transmitral pressure gradient (2.7 mmHg) were acceptable; however, a blunted pulmonary venous flow persisted, and the mean LA pressure increased from 13 mmHg to 18 mmHg. This suggested relative mitral stenosis (MS; see Supplementary material online, Figure S1). Although thrombus formation in the LA was not observed immediately after the procedure, transthoracic echocardiography (TTE) performed 5 days after the TEER confirmed a large thrombus attached to an iatrogenic atrial septal defect (ASD; Figure 1C–D and supplementary material online, Video S3). The patient was initiated on a strengthened anticoagulation therapy with continuous intravenous infusion of unfractionated heparin and subsequent increasing OAC (target therapeutic PT-INR: 2.6–3.0). The thrombus disappeared 1 week later (D). The patient was discharged without any neurological abnormalities.

SEC, observed in cases with LA dysfunction or MS, is a known thrombotic predictor. A newly developed post-TEER SEC suggests an improvement in MR because a reduced MR jet can induce blood-flow stasis; however, the clinical impact of post-TEER SEC remains unclear. In this case, although the post-TEER mean transmural pressure gradient and the MV area did not meet the conventional MS criteria, the increased LA pressure suggested relative iatrogenic MS. Moreover, an injury site caused by a large-bore steering-guiding catheter could become a thrombogenic nidus. To our knowledge, this is the first report to describe a temporary post-TEER SEC in relative...
iatrogenic MS, which may have been associated with a sub-acute thrombus attached to an iatrogenic ASD. A newly developed post-TEER SEC could be a potential marker of intracardiac thrombus formation. Careful management of antithrombotic therapy for preventing thrombogenic events and thorough evaluation of neurological abnormalities should be performed in such settings.

Lead author biography

Hiroshi Tsunamoto received his license to practice medicine at Nippon Medical University, Japan, in 2014. After completing junior residency at Hiratsuka Kyosai Hospital, he is a clinical fellow of cardiovascular medicine at Hyogo Brain and Heart Center, Japan. He specializes in percutaneous coronary intervention and structural heart diseases, including percutaneous mitral valve repair, transcatheter aortic valve replacement.

Supplementary material

Supplementary material is available at European Heart Journal – Case Reports online.

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References

1. Tsutsui H, Ide T, Ito H, Kihara Y, Kinugawa K, Kinugawa S, Makaya M, Murohara T, Node K, Saito Y, Sakata Y. JCS/JHFS 2021 guideline focused update on diagnosis and treatment of acute and chronic heart failure. Circ J 2021; 85:2252–2291.

2. Zhou X, Shi R, Wu G, Zhu Q, Zhou C, Wang L, Xue C, Jiang Y, Cai X, Huang W, Shan P. The prevalence, predictors, and outcomes of spontaneous echocardiographic contrast or left ventricular thrombus in patients with HFrEF. ESC Heart Fail 2021; 8:1284–1294.

3. Shah MA, Dalak FA, Alsamadi F, Shah SH, Qattan MB. Complications following percutaneous mitral valve edge-to-edge repair using mitraclip. JACC Case Rep 2021; 3:370–376.

Figure 1 (A–B) Comparison of transoesophageal echocardiography findings obtained before and after the transcatheter edge-to-edge mitral valve repair: (A) mitral regurgitation and (B) left atrial appendage. Asterisks indicate the implanted clip. Arrows show a newly developed sludge in the left atrial appendage. (C) Transoesophageal echocardiography reveals a newly developed, large, mobile thrombus (arrows) attached to an iatrogenic atrial septal defect. (D) Transthoracic echocardiography focused on the iatrogenic atrial septal defect on post-operative Days 1, 5, and 12. Arrows indicate the thrombus. LA, left atrium; LV, left ventricle; RA, right atrium.