A 64-year-old woman was transferred to National Defense Medical College Hospital after percutaneous coronary intervention (PCI) following acute myocardial infarction (MI) of the right coronary artery (Figure 1). She had rheumatoid arthritis, lupus-like syndrome, and thrombocytopenia (20,000/μl), and had been taking prednisolone 10 mg/day for 1 month. Systolic blood pressure was 70–80 mmHg in the previous hospital, and the patient was diagnosed with right ventricular (RV) infarction based on echocardiography and the presence of hypotension. Onset-to-balloon time for PCI was 8 h in the previous hospital. Coronary flow at TIMI grade 3 was achieved after thrombus aspiration and implantation of a drug-eluting stent to segment 3 of the right coronary artery. Aspirin and clopidogrel had been administered only for 1 day and argatroban for 3 days considering the thrombocytopenia. In addition, noradrenaline, hydrocortisone, and immunoglobulin G had been administered i.v. on the present admission. Neither β-blocker, angiotensin-converting enzyme inhibitor, nor angiotensin receptor blocker was prescribed because of hypotension.

During treatment, shock and heart murmur suddenly appeared at 10 days after the onset of MI. On transthoracic echocardiography, ventricular septal rupture near the apex was suggested (Figure 2A, arrows), whereas 3-D transthoracic echocardiography, recorded on Vivid 7 (GE Healthcare UK, England), more clearly delineated the complication, which involved dissection of the RV inferior wall (Figure 2B, arrows; Movie S1) and a shunt flow through it into the RV cavity (Figure 2C). Furthermore, 3-D color Doppler echocardiography focusing on RV endocardium identified a shunt flow via a 1.8-cm slit (Figure 2D; Movie S2). Therefore, we diagnosed ventricular septal rupture communicating with the RV cavity via RV wall dissection.

Intra-aortic balloon pump was promptly inserted, and emergency surgical repair planned, but the thrombocytopenia did not respond to any treatment including platelet transfusion, and the surgery was therefore delayed due to deteriorating thrombocytopenia (6,000/μl) and renal function. Cardiogenic
Figure 2. (A) Two- and (B–D) 3-D transthoracic echocardiography of right ventricular (RV) wall dissection with ventricular septal rupture. (A,B) Left, parasternal short axis view; Right, subcostal view. (C,D) Color Doppler 3-D echocardiography clearly delineated dissection of the RV inferior wall and (D) a shunt flow into the RV cavity via a 1.8-cm slit (arrow). LV, left ventricle.
Three-dimensional echocardiography is useful to provide additional morphologic information about acute mechanical complications of MI such as rupture of ventricular septum and papillary muscle, especially complicated ventricular septal rupture near the apex. RV wall dissection with ventricular septal rupture is an extremely rare complication after inferior MI, and most cases have been diagnosed in postmortem studies. Transesophageal echocardiography or enhanced computed tomography is an essential adjunct to transthoracic echocardiography for diagnosis. The optimal surgical strategy remains unclear.

In the present case, RV wall dissection with ventricular septal rupture and the entry site of the shunt flow into the RV cavity could be clearly visualized using bedside 3-D transthoracic echocardiography. The dissected cavity of the RV wall often expanded in diastole, and the shunt flow into the RV cavity was also observed even during diastole. It may be that the compliance of the dissected cavity became greater than that of the LV cavity due to thinning of the dissected wall, with unstable hemodynamics of cardiogenic shock and increase in LV end-diastolic pressure. It is possible that ventricular septal rupture initially occurred and extended to RV wall dissection near the apex, and to perforation of the RV cavity. Underlying autoimmune disease in this patient, thrombocytopenia, and inhibition of scar formation by steroid use may trigger this uncommon form of the complication. Three-dimensional transthoracic echocardiography would be a useful diagnostic tool in these circumstances, especially with regard to subsequent emergency operation, or percutaneous transcatheter procedures for the complex complications.

Conflict of Interest

None declared.

References


Supplementary Files

Supplementary File 1

**Movie S1.** Three-dimensional transthoracic echocardiography clearly delineated dissection of right ventricular inferior wall with ventricular septal rupture.

Supplementary File 2

**Movie S2.** Color Doppler 3-D echocardiography focusing on right ventricular endocardium identified a 1.8-cm slit at the entry site of shunt flow during diastole.

Please find supplementary file(s); http://dx.doi.org/10.1253/circj.CJ-14-1246