A 65-year-old man presented with 3 days of severe chest pain with minimal exertion. He described the pain as severe, burning, and substernal in nature, radiating to his back. He also noted feeling short of breath, nauseous, diaphoretic, and dizzy. His other medical conditions included hypertension and tobacco use disorder. His physical examination was notable for tachycardia and a cardiovascular examination without additional heart sounds. Electrocardiography was significant for ST-segment elevation in the inferior leads and left ventricular hypertension. Troponin was elevated at 5.45 ng/mL.

Emergent coronary angiography revealed 100% distal right coronary artery occlusion and 90% stenosis of the mid left anterior descending coronary artery. Four drug-eluting stents were placed in the right coronary artery, extending from the posterior descending artery to the ostium. However, flow was not restored to the posterior descending artery, as it was jailed by a right coronary artery stent.

Two days later, the patient became hemodynamically compromised. TTE revealed a muscular postinfarction ventricular septal defect (PIVSD) that measured 1.57 cm at its narrowest dimension and 3.69 cm at its widest (Video 1, Figures 2 and 3). A trace pericardial effusion was noted to tachycardia and a cardiovascular examination. The patient subsequently developed cardiac tamponade physiology and was diagnosed with a hemopericardium secondary to myocardial leak following contrast-enhanced TTE. A novel transcatheter strategy was used to place a percutaneous ventricular assist device, which was followed by surgery, and the patient survived to discharge.

DISCUSSION

VSR is a rare complication of MI. Previously occurring in 2% of MIs, in the era of coronary revascularization, VSR is now found in 0.2% of cases. This condition frequently results in cardiogenic shock and is associated with high mortality (>40%). PIVSDs have an average diameter of 1.2 cm, and larger defects are associated with worse outcomes. The PIVSD found in the presented case was much greater in size, measured to be 1.57 cm at its narrowest dimension and 3.69 cm at its widest. Considered in isolation from the subsequent hemopericardium and tamponade, it is remarkable that this patient survived with such a large PIVSD.

For patients with PIVSD with shock physiology, emergent intervention is necessary to promote hemodynamic stabilization. Although defect repair is considered the standard of care, friable tissue following MI yields suboptimal outcomes. Studies have found that survival rates nearly double in cases in which repair is delayed ≥7 days to allow adequate tissue healing. These studies do not include patients who underwent implantation of new percutaneous ventricular assistance devices. In a study by Arnaoutakis et al., 65% of patients were instead supported by intra-aortic balloon pump, and an ongoing debate remains regarding outcomes comparing percutaneous ventricular assistance devices with intra-aortic balloon pumps for patients undergoing percutaneous intervention for MI. Implantation of percutaneous ventricular assistance devices for tissue healing in patients with PIVSD has been previously documented only in case...
The presented case further supports the use of this minimally invasive strategy in patients with PIVSD. To our knowledge, the presented case also describes the first use of the novel transcaval access strategy for this purpose.

Because of the patient’s clinical instability and our institution’s experience with percutaneous therapies, our multidisciplinary heart team initially planned to perform a transcatheter procedure for septal repair. The comparison of transcatheter and surgical VSD closure strategies has previously been studied only in pediatric patients with congenital defects, demonstrating significantly lower morbidity in patients who underwent transcatheter repair. To our knowledge, no data exist for the repair of defects that are caused by VSR after MI, a very different study cohort. However, this option became no longer viable with the subsequent discovery of a large hemopericardium resulting in cardiac tamponade physiology that was refractory to percutaneous drainage. The decision was then made to pursue surgical repair.

Uncertainty remains regarding the etiology of the hemopericardium in the presented case. Contrast-enhanced TTE demonstrated echocardiographic contrast bubbles in the pericardial fluid suggesting blood oozing from a leaking myocardium. Surgical drainage yielded frank blood. Contrast-enhanced TTE demonstrated echocardiographic contrast bubbles in the pericardial fluid, thereby raising concern for FWR. In a case series of 96 bloody pericardial effusions, 11% resulted from MI, likely secondary to FWR. FWR has been reported in 1% to 2% of MIs, with exceptionally high rates of mortality. However, in the presented case, operative findings revealed no clear perforation. This suggests that blood may have oozed from a damaged myocardium containing microleaks. Myocardial leak or FWR progression to a large hemopericardium with postinfarction tamponade is uncommon, having been noted in only 0.85% of all MIs. Hemorrhagic postinfarction pericarditis, a rare consequence of myocardial ischemia and anticoagulation, can also be considered, although this would not account for contrast bubbles in the pericardial fluid.

Figure 1 The electrocardiogram from the patient’s initial presentation. ST-segment elevation is notable in the inferior leads.
fluid. A leak from a thinned and necrotic myocardium remains the suspected etiology.

CONCLUSION

Cardiologists should be aware of VSR and FWR as uncommon complications of MI, particularly with late presentations. Imaging should be readily pursued in post-MI patients who become hemodynamically unstable, and echocardiography can quickly diagnose both conditions with minimal risk to the patient. In cases of pericardial effusions, contrast-enhanced TTE may also assist in determining the causative etiology. Best strategies in terms of timing of intervention and type of intervention (surgical vs percutaneous) for PIVSD repair remain uncertain.

SUPPLEMENTARY DATA

Supplementary data related to this article can be found at https://doi.org/10.1016/j.case.2020.10.010.

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