

## IMAGING VIGNETTE

INTERMEDIATE

## CLINICAL VIGNETTE

# Right Ventricular Free Wall Rupture After Myocardial Infarction



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## ABSTRACT

This paper describes the case of a 68-year-old man who presented in cardiac tamponade due to a right ventricular free wall rupture after a recent ST-segment elevation myocardial infarction. After a pericardiocentesis, the ventricular defect resolved spontaneously. The patient was managed medically and avoided surgical intervention. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2021;3:1622-1624) © 2021 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

A 68-year-old man with coronary artery disease, chronic kidney disease, and hypertension was admitted for dyspnea 10 days after percutaneous coronary intervention (PCI) for inferior ST-segment elevation myocardial infarction (STEMI) at another hospital. Drug-eluting stents were placed in the mid-left anterior descending (LAD) and mid-right coronary artery (RCA) for a critical mid-LAD lesion in addition to the culprit lesion, a 99% thrombus of the mid-RCA (**Figures 1A and 1B, Videos 1 and 2**). Distal embolization of the thrombus was noted when engaging the RCA. A transthoracic echocardiogram (TTE) performed on admission to our institution showed the patient had apical and inferior wall akinesis, anteroseptal wall hypokinesis, a left ventricular ejection fraction of 45% to 50%, and no pericardial effusion.

On day 2 of hospitalization, he developed shock and acute renal failure. At the time of decompensation, a physical examination revealed jugular venous distension and distant heart sounds. Rapid laboratory tests showed potassium concentration of 6.8 mmol/L, lactic acid concentration of 4.9 mmol/L, and a creatinine concentration of 4.1 mg/dL (1.8 mg/dL 24 hours prior). Point-of-care TTE showed new moderately sized pericardial effusion with right ventricular (RV) diastolic collapse (**Figure 1C, Video 3**). Blood was completely drained, 400 cc, from a loculated effusion during urgent pericardiocentesis. A pericardial drain was not left in place.

Once stabilized, left heart catheterization confirmed patent LAD and RCA stents and no evidence of coronary perforation. Computed tomography scans with contrast of the chest demonstrated a right mid-ventricular free wall defect (**Figure 1D**). Repeated TTE with microsphere contrast showed a mid-RV free wall defect with active extravasation into the pericardial space (**Figure 1E, Video 4**) suggesting RV free wall rupture (FWR) as a mechanical complication of his recent STEMI.

Tamponade resolved after pericardiocentesis, and follow-up echocardiogram no longer demonstrated contrast extravasation (**Figure 1F, Video 5**). During this time, the patient required continuous renal replacement therapy and serial blood transfusions. Dual-antiplatelet therapy and all anticoagulation were withheld for 5 days to prevent further bleeding. Using a multidisciplinary heart team approach, it was decided that the risks

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The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).

Manuscript received April 28, 2021; revised manuscript received June 4, 2021, accepted June 7, 2021.

of surgical intervention outweighed the benefits as imaging no longer suggested active blood loss into the pericardium and tamponade physiology resolved, and he was recovering from multiorgan failure. He progressed with supportive care and was discharged 10 days later without further complication.

Mechanical complications of acute myocardial infarction (AMI) include FWR, interventricular rupture and papillary muscle rupture. In the era of reperfusion therapies, FWR is estimated to occur in 0.2% of all myocardial infarctions (1). Although it is rare, mortality associated with mechanical complications is high (1).

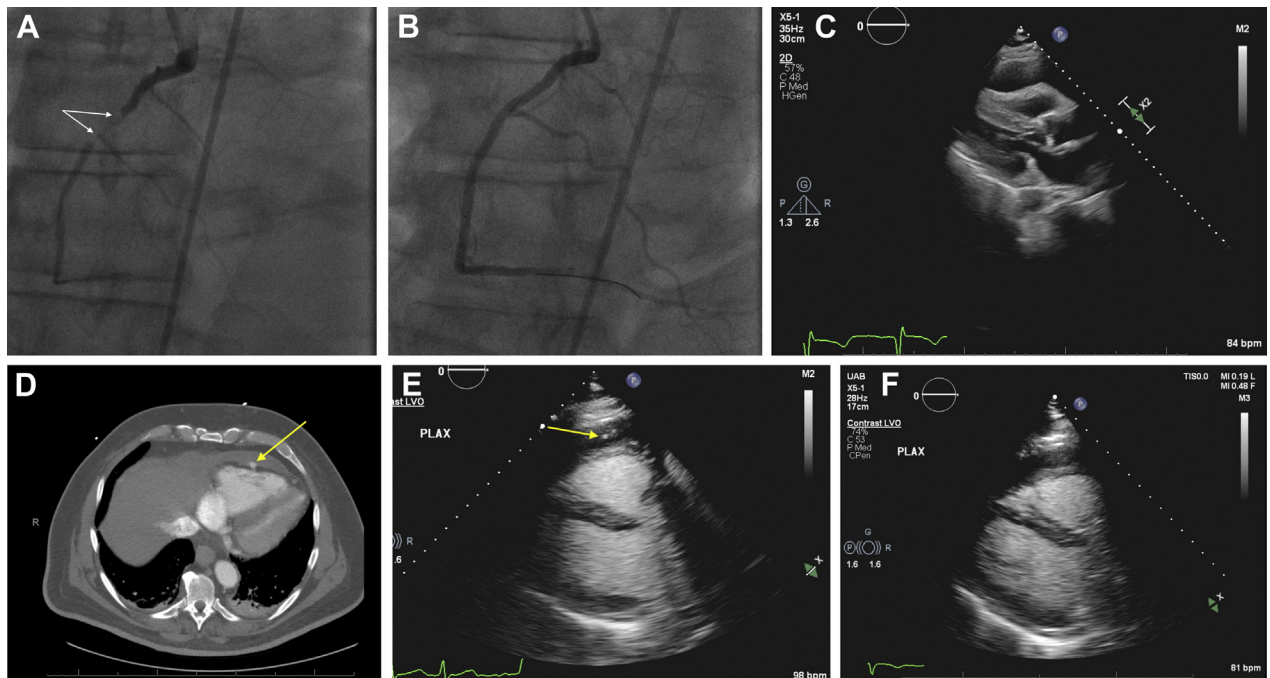
RV FWR is exceedingly rare due to the infrequency of RV transmural infarction (2). In some cases, interventricular rupture resulting from infarction in left coronary distribution causes significantly increased pressure of the RV leading to FWR (2). In this case, RCA involvement and distal embolization most likely compromised RV branches leading to transmural infarction and RV FWR despite being a lower pressure chamber. The authors suspect that the small nature of the rupture while holding antiplatelet and anticoagulation therapy allowed for such quick spontaneous closure. Most other cases reported due to transmural infarction resulted in death (2,3).

FWR can have a catastrophic presentation including tamponade and sudden death. Diagnosis requires a high degree of suspicion in any patient with recent AMI and new-onset hemodynamic or electrical instability. This case emphasizes the importance of point of care ultrasound in the diagnosis of mechanical complications of myocardial infarction.

**ABBREVIATIONS  
 AND ACRONYMS**

- AMI** = acute myocardial infarction
- FWR** = free wall rupture
- LAD** = left anterior descending
- PCI** = percutaneous coronary intervention
- RCA** = right coronary artery
- RV** = right ventricle
- STEMI** = ST-segment elevation myocardial infarction
- TTE** = transthoracic echocardiography

**FIGURE 1** Acute Thrombus in the Mid RCA



**(A)** Acute thrombus in the mid RCA. **(B)** PCI to the mid RCA with restoration of TIMI flow grade 3. **(C)** RV diastolic collapse consistent with tamponade. **(D)** CT with evidence of RV free wall defect. **(E)** Active contrast extravasation seen on PLAX. **(F)** Resolution of free wall defect 2 days post-pericardiocentesis. CT = computed tomography; PCI = percutaneous coronary intervention; PLAX = parasternal long axis; RCA = right coronary artery; RV = right ventricle; TIMI = Thrombolysis In Myocardial Infarction.

## FUNDING SUPPORT AND AUTHOR DISCLOSURES

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The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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**KEY WORDS** echocardiography, myocardial infarction, tamponade

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 **APPENDIX** For supplemental videos, please see the online version of this paper.