

Point-of-Care Ultrasound Diagnosis of Right Ventricular Rupture Post Cardiac Arrest After Thrombolysis in Myocardial Infarction

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Section Editor: Rick A. McPheeters, DO

Submission history: Submitted August 19, 2018; Revision received November 27, 2018; Accepted January 1, 2019

Electronically published January 28, 2019

Full text available through open access at http://escholarship.org/uc/uciem_cpem

DOI: 10.5811/cpcem.2019.1.40664

[Clin Pract Cases Emerg Med. 2019;3(1):85–86.]

CASE PRESENTATION

An 81-year-old male was referred by his general practitioner with a troponin-T of 153 nanograms per liter (ng/L) (reference range <5 ng/L) and chest pain ongoing for 13 hours on arrival. Initial electrocardiogram showed 7-millimeter anterior ST elevation in leads V2-5. The case was discussed with cardiology at the nearest tertiary care center and plans were arranged for the patient's transfer for percutaneous coronary intervention. Thrombolysis was withheld due to a known abdominal aortic aneurysm and a suspicious renal mass under investigation. While awaiting transfer, the patient suffered a ventricular tachycardia arrest, and cardiopulmonary resuscitation (CPR) was commenced. Point-of-care echocardiogram was performed, showing a hypokinetic myocardium. After four rounds of CPR, thrombolysis was given as a last resort. Repeat point-of-care echocardiography demonstrated irrecoverable injury; therefore, CPR was discontinued (Video).

DISCUSSION

Right ventricle (RV) free wall rupture is a dangerous complication of myocardial infarction (MI) with a high mortality rate. Overall, cardiac rupture complicates approximately 5% of cases of acute MI,¹ with left ventricular rupture accounting for the majority. RV rupture is comparatively rare and its identification via echocardiography rarer still. Over 10% of cases of free wall rupture occur in patients who subsequently died from ST-segment elevation myocardial infarction (STEMI).² This case was likely a type I rupture: an abrupt, slit-like tear occurring in acute infarcts of less than 24 hours duration.³ Type II ruptures occur where the infarcted myocardium erodes before rupture and is covered by thrombus. Type III represents the perforation of a previously formed aneurysm.³ Examination and history findings are non-specific, but ultrasound for diagnosing ventricular rupture is greater than or equal to 70% sensitive and 90% specific.⁴

It has previously been shown that thrombolytic therapy is independently associated with increased incidence of cardiac rupture and this risk is elevated with prolonged time to administration of thrombolysis.⁵⁻⁷ Other risk factors include advanced age, female sex, previous cerebrovascular disease, chronic kidney disease, and congestive heart failure.⁸⁻⁹ Our patient fulfilled only one of these risk criteria. This case demonstrates the value of echocardiography in the diagnosis of RV free wall rupture, along with the risks of thrombolysis and the need for further research around RV rupture post-STEMI.

Video. Point-of-care echocardiogram demonstrating right ventricle free wall rupture.

Documented patient informed consent and/or Institutional Review Board approval has been obtained and filed for publication of this case report.

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Conflicts of Interest: By the CPC-EM article submission agreement, all authors are required to disclose all affiliations, funding sources and financial or management relationships that could be perceived as potential sources of bias. The authors disclosed none.

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REFERENCES

1. Depukat R, Chyrchel M, Dudek D. Left ventricular free wall rupture as a mechanical complication in ST-segment elevation acute myocardial infarction. *Kardiol Pol.* 2012;70(12):1309-12.
2. Sugiura T, Nagahama Y, Nakamura S, et al. Left ventricular free wall rupture after reperfusion therapy for acute myocardial infarction. *Am J Cardiol.* 2003;92(3):282-4.
3. Becker AE and van Mantgem JP. Cardiac tamponade. A study of 50 hearts. *Eur J Cardiol.* 1975;3:349-58).
4. Gulalp B, Karagun O, Tekin A et al. Cardiac Rupture. *J Emerg Med.* 2013. 44(1):58-60.
5. Akcay M, Senkaya EB, Bilge M, et al. Rare mechanical complication of myocardial infarction: isolated right ventricle free wall rupture. *Singapore Med J.* 2011;52(1):e7-9.
6. Solodky A, Behar S, Herz I, et al. Comparison of incidence of cardiac rupture among patients with acute myocardial infarction treated by thrombolysis versus percutaneous transluminal coronary angioplasty. *Am J Cardiol.* 2001;87(9):1105-8.
7. Honan MB, Harrell FE Jr., Reimer KA, et al. Cardiac rupture, mortality and timing of thrombolytic therapy: a meta -analysis. *J Am Coll Cardiol.* 1990;16:359-67.
8. Moreyra AE, Huang MS, Wilson AC, et al. Trends in incidence and mortality rates of ventricular septal rupture during acute myocardial infarction. *Am J Cardiol.* 2010;106(8):1095-100
9. Lopez-Sendon J, Gurfinkel EP, Lopez de Sa E, et al. Factors related to heart rupture in acute coronary syndromes in the Global Registry of Acute Coronary Events. *Eur Heart J.* 2010;31(12):1449-56.
10. Menon V, Webb JG, Hillis LD, et al. Outcome and profile of ventricular septal rupture with cardiogenic shock after myocardial infarction: a report from the SHOCK Trial Registry. Should we emergently revascularize occluded coronaries in cardiogenic shock? *J Am Coll Cardiol.* 2000;36(3 Suppl A):1110-16.

CPC-EM Capsule

What do we already know about this clinical entity?

Most literature describing ventricular rupture discusses the left ventricle or the septum. There is minimal literature describing right ventricular free wall rupture.

What is the major impact of the image(s)?

Emergency clinicians may be faced with this rare complication and be able to direct treatment quickly with point-of-care ultrasound images.

How might this improve emergency medicine practice?

The treating group of clinicians felt it may be difficult to interpret a free wall rupture and act appropriately if it was not quickly identified.