

Mechanical Complications of Acute Myocardial Infarction: Review Questions

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QUESTIONS

Choose the single best answer for each question.

- All of the following findings are commonly associated with hemodynamically significant severe right ventricular (RV) myocardial infarction (MI) EXCEPT**
 - Elevated jugular venous pressure
 - Hypotension
 - Kussmaul's sign
 - Pulmonary edema
 - Pulsus paradoxus
- A 64-year-old woman presents to the emergency department with crushing substernal chest pain that lasted for 90 minutes. Physical examination reveals heart rate of 110 bpm, blood pressure of 75/40 mm Hg, respiratory rate of 22 breaths/min, and jugular venous pressure of 12 cm above the right atrium. Lungs are clear to auscultation. Cardiac examination reveals normal S₁ and S₂ and a right-sided S₃ with no evidence of mitral or aortic murmur. A 3-mm ST elevation in leads II, III, and aVF are noted as well as a 1-mm ST elevation in leads V₁ and V₂. What is the most appropriate first step in this patient's management?**
 - Intravenous (IV) nitroglycerin
 - IV dopamine
 - Intra-aortic balloon pump (IABP)
 - Furosemide
 - IV fluid administration
- no apparent distress with a heart rate of 110 bpm, blood pressure of 95/50 mm Hg, jugular venous pressure of 10 cm above right atrium, and bibasilar rales. Extremities are cool with 1+ edema.**
- Which of the following is the best first test to use to evaluate this patient?**
 - Cardiac computed tomography
 - Chest radiograph
 - Right heart catheterization
 - Transesophageal echocardiography
 - Two-dimensional (2-D) echocardiography with Doppler
- The echocardiogram reveals a ventricular septal rupture with left-to-right shunting and no valvular or paravalvular leak. Which of the following interventions has been associated with decreased mortality rates in stable patients with post-MI ventricular septal rupture?**
 - Early surgical closure
 - IABP
 - IV dopamine
 - IV fluid administration
 - IV nitroprusside
- The presence of giant V waves on pulmonary capillary wedge (PCW) tracing in a patient with a new pansystolic murmur after an acute MI is indicative of which of the following diagnoses?**

Questions 3 and 4 refer to the following case study.

A patient presents to the cardiology clinic with a new onset pansystolic murmur after a recent ST elevation anterior MI. Physical examination reveals a woman in

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- (A) Atrial septal defect
- (B) Cardiac tamponade
- (C) Severe mitral regurgitation
- (D) Ventricular free wall rupture
- (E) Ventricular septal rupture

ANSWERS AND EXPLANATIONS

1. **(D) Pulmonary edema.** Approximately 10% of patients with inferior or inferoposterior wall MI suffer a hemodynamically significant RV infarct. The triad of hypotension, jugular venous distension, and absence of dyspnea in the setting of inferior or inferoposterior wall MI is very specific for RV infarction.¹ Common physical findings are the presence of RV S₃, clear lung fields, Kussmaul's sign (inspiratory increase in jugular venous pressure), and occasionally pulsus paradoxus (inspiratory decline in systolic blood pressure > 10 mm Hg). In the absence of left ventricular MI, pulmonary edema is uncommon.
2. **(E) IV fluid administration.** This patient has an inferior MI involving the right ventricle. Fluid administration to increase preload and cardiac output is the critical initial step to stabilize this patient for percutaneous coronary intervention. Patients who undergo immediate reperfusion of RV branches have decreased 30-day mortality and improved RV function.² Right heart catheterization may also be important to prevent volume overload. In general, a central venous pressure of 14 to 16 mm Hg is appropriate. Although IV nitroglycerin is commonly used in patients with acute MI, in this patient it would be contraindicated because it would decrease preload and cause hypotension. Patients with RV infarct frequently require IV inotropic agents (eg, dopamine, dobutamine); however, these agents should be used when volume loading fails. In addition, dobutamine has been shown to be superior to other agents in improving cardiac index and RV ejection fraction.³ An IABP may be useful, but it is not part of the initial management.
3. **(E) 2-D echocardiography with Doppler.** The two most common causes of a pansystolic murmur after an acute MI are ventricular septal or papillary muscle rupture. A number of modalities can be used to differentiate these two conditions; however, 2-D echocardiography with Doppler is the best first test. Right heart catheterization is also helpful in diagnosing a ventricular septal rupture by demonstrating a stepped-up oxygen saturation in the right ventricle and pulmonary artery. A shunt fraction can also be calculated. Chest radiograph and computed

tomography are not very helpful in identifying the cause and mechanism of the pansystolic murmur post-acute MI. Transesophageal echocardiography is an important modality and is commonly performed; however, it should not be the first test.

4. **(A) Early surgical closure.** Early surgical closure is critical for optimal management of post-MI ventricular septal rupture, even if the patient is clinically stable.⁴ IV nitroprusside and IABP are critical components of managing this patient. IABP counterpulsation decreases shunt fraction, improves coronary perfusion, improves blood pressure, and decreases systemic vascular resistance; it is commonly used as a bridge to surgery. IV nitroprusside also leads to decrease systemic vascular resistance; however, a greater decrease in pulmonary vascular resistance may occur, which would actually worsen shunting. In general, inotropic agents should not be used because they increase shunt fraction.
5. **(C) Severe mitral regurgitation.** A new post-MI pansystolic murmur with giant V waves on PCW tracing is almost always consistent with severe mitral regurgitation. Two possible mechanisms in this setting are papillary muscle rupture and ischemic mitral regurgitation. In a clinically deteriorating patient, the presence of a pansystolic murmur and giant V waves on PCW tracing should prompt the clinician to obtain a 2-D echocardiogram, which is the diagnostic test of choice in this setting. Cardiac tamponade and ventricular free wall rupture commonly present with hypotension and equalization of pressures but are unlikely causes of these findings.⁵ Ventricular septal rupture is described above.

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