Postinfarction ventricular septal defect on catheterization table, challenging and unique occurrence at a community-based hospital

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Key Clinical Message
Ventricular septal defect (VSD), one of the major mechanical complications of myocardial infarction, portends a severe threat to life and hence demands a high degree of suspicion, appropriate investigations, and emergent repair, particularly in cases of cardiogenic shock. Although the development of VSD in extensive or anterior infarction is not unexpected, its occurrence during cardiac catheterization frames a unique, challenging experience and creates a learning opportunity. We present a patient who developed postinfarction VSD during cardiac catheterization.

Keywords
Cardiac catheterization, myocardial infarction, ventricular septal defect

An 86-year-old man underwent an emergent cardiac catheterization due to anteroseptal ST-segment elevation myocardial infarction. After stent insertion of the wrap-around left anterior descending artery, the patient became hypotensive and hypoxic requiring pressor support and oxygen supplementation. Left ventriculogram revealed the development of a new ventricular septal defect during cardiac catheterization.

Ventricular septal defect (VSD), one of the major mechanical complications of myocardial infarction (MI), portends a severe threat to life and hence demands a high degree of suspicion, appropriate investigations, and emergent repair, particularly in cases of cardiogenic shock (CS). Although the development of VSD in extensive or anterior infarction is not unexpected, its occurrence during cardiac catheterization (CC) frames a unique, challenging experience and creates a learning opportunity. We present a patient who developed postinfarction VSD (PIVSD) during emergent CC.

An 86-year-old man with a history of hypertension presented to the emergency department (ED) with progressive pressure-like substernal chest pain of six hours. He had no prior cardiac history. Upon arrival, his vitals were stable and physical examination revealed a soft systolic murmur at the cardiac base. He demonstrated no relief with sublingual nitroglycerin and aspirin. His electrocardiogram showed an anteroseptal ST-segment elevation MI in addition to Q-waves in leads V1–V2; troponin was elevated (4 ng/mL, 0.0–0.5). A bedside chest radiograph, performed in the ED, showed no pulmonary congestion. Due to ongoing symptoms, nitroglycerin and heparin infusions were started; a cardiac team alert was called, and the patient was taken to catheterization lab for emergent revascularization. Coronary angiography revealed a 99% stenosis of the midleft anterior descending artery (LAD) which was reversed with a bare-metal stent (Fig. 1A). Moreover, the course of the LAD was lengthy with its extension beyond the apex to the midinferior segment. Other cardiac vessels had nonobstructive lesions, and the ascending aorta was diffusely calcified (porcelain aorta). Soon after successful revascularization, before ventriculography, the patient became tachypnoeic and hypotensive and required pressor for hemodynamic support. After improvement of vitals, left ventriculography was performed, which revealed a large antero-apical PIVSD and tricuspid regurgitation (Fig. 1B). The patient underwent intra-aortic balloon pump placement due to VSD and had an emergency evaluation by cardiothoracic surgery.
He was airlifted to a quaternary referral center for surgical repair. Postoperatively, there was a progressive decline over the next few days, and the patient expired. The patient was brought to the catheterization laboratory emergently for the primary percutaneous coronary intervention of an acute ST-elevation infarction. In retrospect, it was discovered that the patient had been having anginal symptoms for 2–3 days before presentation and likely was suffering from a stuttering infarct; this information was provided by the wife at the bedside after CC. Apparently, the patient had ignored the prior mild nature of symptoms, and therefore, sought no medical attention. Though this collateral data could have been obtained before CC, the door-to-balloon time and unavailability of the family members in the ED at the time of initial assessment were two major limitations. This case highlights an ongoing injury to the septum leading to the development of VSD during revascularization.

Discussion

Although the incidence of PIVSD is almost 0.2% of MI patients, it has been uncommonly reported during CC [1]. Predisposing factors include advanced age, male gender, single-vessel disease, and first or extensive MI. Occlusion of either LAD or right coronary artery, vessels involved with the interventricular septal circulation, can lead to septal infarction in the absence of collaterals, with subsequent rupture and generation of a left-to-right shunt. Patients with wrap-around LAD, which extends beyond the apex, are at higher risk for PIVSD as in our patient. ST-segment elevation or Q-waves in inferior leads in addition to extensive anterior infarction, are high-risk indicators for PIVSD [2]. Features suggestive of acute VSD include hypotension, respiratory distress, and congestive heart failure in addition to exam findings of new crackles, a pansystolic murmur or palpable thrill. Suspected VSD should trigger appropriate testing including transthoracic echocardiogram with color-flow Doppler. Confirmation of shunting with pulmonary artery balloon catheter is also helpful but could be time-consuming. While waiting for definitive treatment or surgical repair, management should focus on the left-to-right shunt and symptom reduction with vasodilators, diuretics, and inotropes in addition to coronary revascularization of the culprit vessel. Although the timing of VSD repair remains controversial, the most appropriate approach is to proceed with surgical repair as soon as possible in settings with CS like our patient.

Consent

Informed consent was obtained from the patient’s son for the publication.

Conflict of Interest

All authors have no conflicts of interests.

Authorship

AW: wrote the preliminary draft of the clinical image. HK: completed the literature search and found the relevant articles for the discussion. MK: played a role in editing the article and make it more concise. HC: involved with the patient care and gave his technical input. SS: edited the final report from the English language perspective, being a native English speaker.
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