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IMAGING VIGNETTE

CLINICAL VIGNETTE

Giant Left Ventricular Aneurysm With Dynamic Right Ventricular Compression and Subsequent End-Stage Heart Failure

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ABSTRACT

We report a case of a patient with a missed anterior myocardial infarction and associated ischemic cardiomyopathy. The patient had a massive true left ventricular aneurysm causing dynamic right ventricular compression, with associated cardiogenic shock, for which a heart transplantation was ultimately performed. (J Am Coll Cardiol Case Rep 2024;29:102345) © 2024 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/).

CASE PRESENTATION

A 50-year-old male patient with prior tobacco use presented with 2 weeks of nausea and worsening chest pain. An electrocardiogram showed normal sinus rhythm with Q waves and ST-segment elevation with T-wave inversions in the precordial leads (**Figure 1A**). Coronary angiography exhibited 100% occlusion of the mid left anterior descending artery (**Figure 1B**). Left ventriculography exhibited a massive left ventricular (LV) aneurysm (Video 1). Given evidence of completed infarction with resultant aneurysmal change, revascularization was deferred. Transthoracic echocardiography revealed severe LV systolic dysfunction and re-demonstrated a large true LV aneurysm with laminar apical thrombus and spontaneous echo contrast. Notably, there was dynamic compression of the right ventricular (RV) outflow tract by the aneurysm (Video 2).

Contrast-enhanced computed tomography and cardiac magnetic resonance imaging further characterized the aneurysm to involve the mid anterior wall to the apex and distal inferior wall, measuring 6.4 × 9.1 cm (**Figure 1C and 1D**, Video 3). Right heart catheterization yielded a cardiac index of 0.9 L/min per square meter by thermodilution, right atrial pressure of 13 mm Hg, RV pressure of 37/13 mm Hg, pulmonary artery pressure of 23/14 mm Hg, and pulmonary capillary wedge pressure of 14 mm Hg. The right atrium:pulmonary capillary wedge pressure ratio of 0.92 and pulmonary artery pulsatility index of 0.69 indicated RV dysfunction (in this instance, secondary to compression of the right ventricle by the LV aneurysm).

A multidisciplinary team considered management options, including surgical exclusion of the aneurysm using the Dor procedure (with or without temporary mechanical support), aneurysm repair with durable LV assist device (LVAD) insertion, and heart transplantation. Given the extent of aneurysmal myocardium, it was believed that aneurysmectomy would yield an LV cavity too small for either intrinsic recovery or durable LVAD. Ultimately, after a period of support with an intra-aortic balloon pump and milrinone, the patient

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ABBREVIATIONS AND ACRONYMS

LV = left ventricular

LVAD = left ventricular assist device

RV = right ventricular

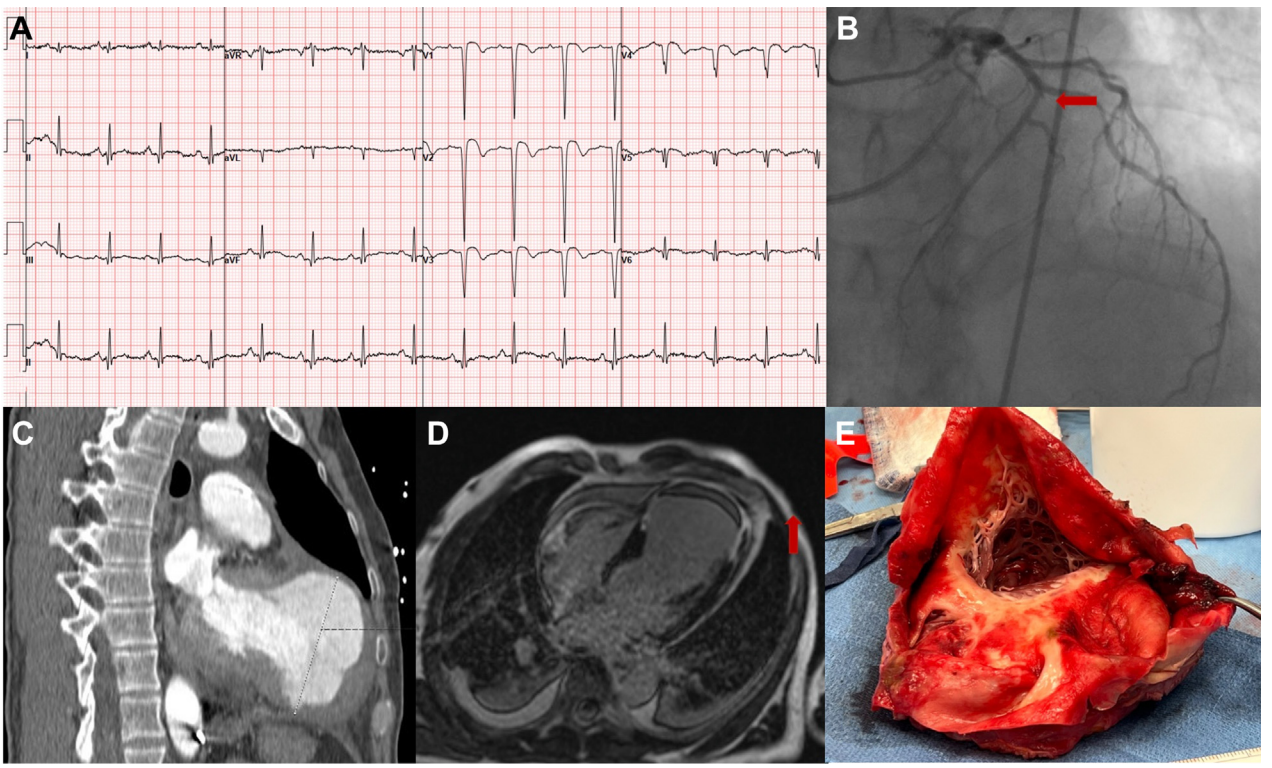
underwent orthotopic heart transplantation (**Figure 1E**, Video 4). His postoperative course was uncomplicated, and at follow-up 9 months later, he has resumed moderate physical activity and employment.

DISCUSSION

LV aneurysms are areas of scarred myocardium that exhibit dyskinesis or akinesis. They occur most commonly after myocardial infarction. Risk factors include delayed or incomplete reperfusion and anterior infarction, both of which were present in this case. True aneurysms are broad based, with intact myocardium, and should be distinguished from LV pseudoaneurysms, which are "narrow-necked" and involve myocardial rupture contained by the pericardium or hematoma.

Management of patients with large LV aneurysm and advanced heart failure involves either myocardial repair and creation of a neo-LV cavity or advanced therapies with durable LVADs or heart transplantation. In cases in which native recovery is unlikely, transplantation is preferred. LVAD implantation is reserved for selected cases given the risks associated with aneurysmal myocardial tissue characteristics and potential embolization of intracardiac thrombus. Several cases of successful implantation with[1,2] or without[3] LV repair have been reported. Herein, we present a unique complication of LV aneurysm in which mass effect on the right ventricle by the aneurysm caused significant RV dysfunction, further compromising cardiac output and ultimately necessitating transplantation. To our knowledge, no similar cases have been described in the literature.

FIGURE 1 Clinical Data



(A) Electrocardiogram showing Q waves and ST-segment elevations in the anterior precordial leads suggestive of left anterior descending artery infarction. (B) Left anterior oblique cranial image from coronary angiography showing total occlusion of the mid left anterior descending artery. (C) Chest computed tomography sagittal image showing a large left ventricular (LV) aneurysm involving the mid anterior, apical, and distal inferior walls. (D) Axial 4-chamber view from cardiac magnetic resonance imaging showing a thrombus within the LV aneurysm (arrow) and transmural late gadolinium enhancement consistent with infarction. (E) Photo of LV aneurysm taken after explant of native heart. Note the trabeculations present in the LV cavity and the contrasting smooth aneurysmal tissue.

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KEY WORDS heart transplantation, left ventricular aneurysm, ventricular interdependence

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