



Ischemic mitral regurgitation combined with massive true ventricular aneurysm

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Abstract: We reported a case of massive ventricular aneurysm due to acute myocardial infarction. Echocardiography, magnetic resonance imaging (MRI) scan indicates that the aneurysm has a huge size and has resulted in ischemic mitral regurgitation. The aneurysm was excised under circulatory arrest, and coronary artery bypass grafting was also performed using saphenous vein. Although the aneurysm was huge and seriously affected cardiac function, the surgical effect was satisfying according to 6-month follow-up.

Keywords: Acute myocardial infarction; ventricular aneurysm; mitral regurgitation

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Case presentation

Ventricular aneurysm is one of the common complications after transmural myocardial infarction, the incidence of which is about 10–35% (1). More than 95% of the true ventricular aneurysm originated from myocardial infarction, 85% of the true ventricular aneurysm was located in the anterolateral apical region, a few were located in the lateral wall, and only 5–10% were located in the posterior wall near the bottom of the apical base (2). Posterior inferior true ventricular aneurysm with mitral regurgitation, often secondary to papillary muscle ischemia, can lead to fatal heart failure (3).

A 47-year-old man was admitted due to a 2-month history of chest tightness, and 20 kg of weight loss. Coronary angiography revealed 90% stenosis of the right coronary, occlusion of the circumflex artery. Electrocardiogram (ECG) showed a left bundle branch block, T-wave inversions in lead V4 to V6, and a heart rate of 88 beats/min. Ultrasound cardiograph (UCG) revealed aneurysms ($120 \times 110 \times 100 \text{ mm}^3$) in the inferior-posterior-lateral wall of the left ventricle and thrombus (*Figure 1A*); the area of the neck of the aneurysm was $60 \times 70 \text{ mm}^3$; the aneurysm volume was 640 mL; the aneurysm wall thickness was 3 mm; the left ventricular end diastolic diameter (LVEDD) was 146 mm;

the left ventricular ejection fraction (LVEF) was 30%; and the area of mitral regurgitation was 7.0 cm^2 . The neck of aneurysm was repaired using a patch (*Figure 1B*). Cardiac magnetic resonance imaging (MRI) (*Figure 2*) showed that the aneurysm diameter was 96 mm and that the size of the aneurysm was $126 \times 96 \text{ mm}^2$. PET-CT showed that the LVEDV, left ventricular end systolic diameter (LVSDV), and LVEF was 234 mL, 165 mL, and 30%, respectively. The range of transmural myocardial infarction accounted for approximately 48% of the left ventricular area.

Coronary artery bypass grafting (AO-SVG-RCA, PI 1.2, flow 58 mL/min), mitral valve replacement (AP 26#), and left ventriculoplasty were performed with extracorporeal circulation. The key to the recovery of cardiac function is the suitable size of the patch for ventricular plasty. Therefore, a model made from a glove filled with saline was used to mark the suture line for the proposed repair area (*Figures 3-5*). The patient was extubated on postoperative day 8, and discharged on postoperative day 18. UCG before discharge showed LVEDD was 57 mm and LVEF was 44%, the area of the space between the pericardial patch and the residual aneurysm wall was $55 \times 34 \text{ mm}^2$.

At the 6-month follow-up visit, the patient had gained 10 kg. UCG showed LVEF and LVEDD of 47% and

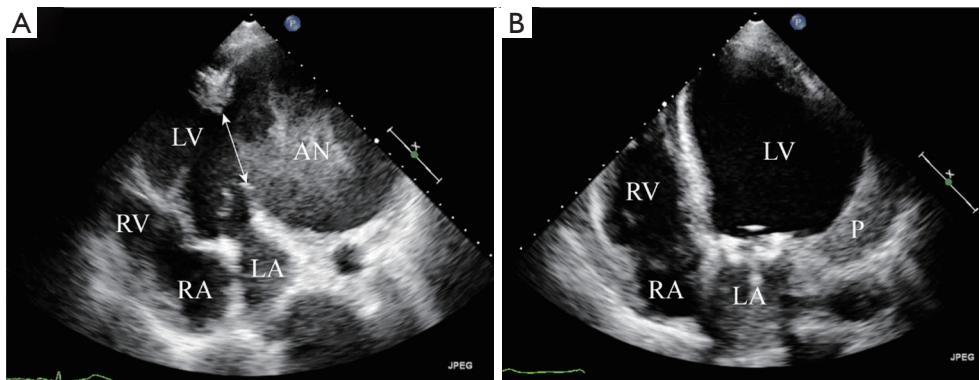


Figure 1 Echocardiography: the left panel shows the aneurysm before surgery. Arrow incating the neck of aneurysm. The right panel shows the aneurysm 6 months after surgery. RA, right atrium; RV, right ventricle; LA, left atrium; LV, left ventricle; AN, aneurysm; P, the patch used for ventricle reconstruction.

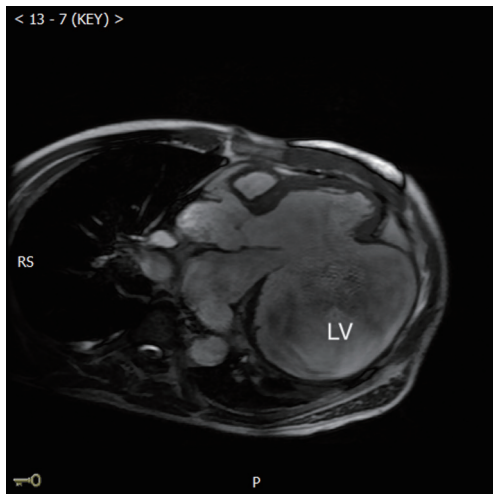


Figure 2 Preoperative MRI: illustrates the ratio of the aneurysm in left ventricle. LV, left ventricle; MRI, magnetic resonance imaging.

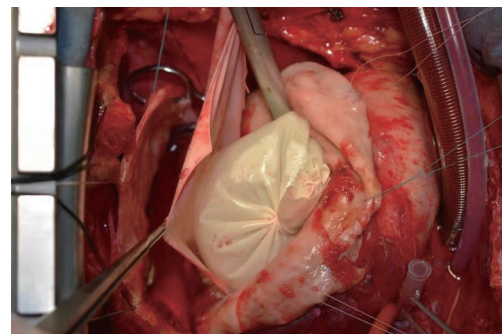


Figure 4 Depiction of the glove used to measure the suitable size of ventricle.

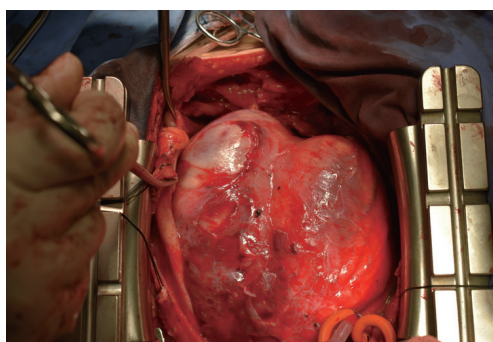


Figure 3 Illustration of the massive ventricular aneurysm during surgery.

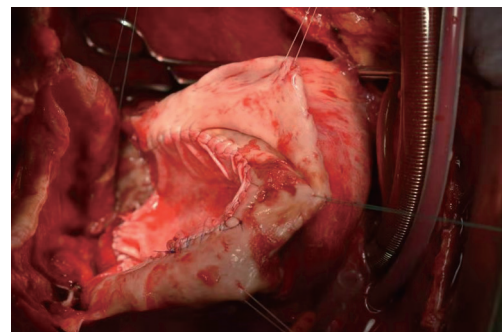


Figure 5 The patch after ventricular plasty.

62 mm; the diameter of the residual false lumen was 22 mm, and a thrombus was noted. MRI showed LVEDV, LVSDV, and cardiac output of 175 mL, 137 mL, and 2.93 L/min, respectively. Coronary CTA showed a patency of the vein graft.

Discussion

The key to the recovery of cardiac function after surgery is the size of the patch (4). Therefore, a model made from a glove filled with normal saline was used to mark the suture line for the proposed repair area. The disadvantages of this method are as follows. (I) The LVEDV in this patient was still higher than normal after surgery, possibly due to the custom model, which did not fit the left ventricle due to the irregular left ventricular chamber, causing the position of the proposed suture line to be higher than the ideal position. Therefore, the patch should be sutured to a site lower than the proposed suture line. (II) The patch should be designed to strengthen the aneurysm wall with the interrupted suture, which may reduce the effect of the paradoxical movement of the free wall on left ventricular systolic function and thereby improve cardiac function.

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Footnote

Conflicts of Interest: Both authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/jxym.2019.10.01>). The authors have no conflicts of interest to declare.

Ethical statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures

performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this Case report and any accompanying images.

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