Left Ventricle Pseudoaneurysm-Recurrence following Surgical Repair

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ABSTRACT
Left ventricular (LV) pseudoaneurysm is a rare complication following free wall rupture post transmural myocardial infarction or left ventricular surgery. A lot of imaging modalities like echocardiography, computerised tomography and cardiac magnetic resonance imaging are available to diagnose it. Echocardiography plays a significant role in delineating the cavity, orifice and impact on the surrounding structures. We present a case of LV pseudoaneurysm recurrence following surgical repair.

Keywords: Echocardiography, left ventricle, pseudoaneurysm

INTRODUCTION
Left ventricular (LV) pseudoaneurysm is a rare complication that mainly occurs as a result of free wall rupture post transmural myocardial infarction or LV surgery.[1,2] Cardiac rupture is due to loss of myocardial integrity post wall stress related to LV pressure and radius.[3,4] A number of noninvasive imaging modalities are available to delineate the pseudoaneurysm location, orifice geometry, and anatomical relationship with the surrounding location. These include echocardiography (two- and three-dimensional), computerized tomography (CT), and cardiac magnetic resonance imaging (CMRI).[5] We present here a case of recurrent LV pseudoaneurysm repair.

CASE REPORT
A 45-year-old male, known case of type 2 diabetes mellitus, presented with dyspnea on exertion New York Heart Association class III and generalized weakness for 6 months. He had a history of coronary artery bypass graft (CABG) surgery and repair of LV pseudoaneurysm following myocardial infarction in 2017.

His general examination was within normal limits. The blood investigations were also within normal limits. Coronary angiography was performed in view of acute coronary syndrome found patent graft to left anterior descending artery. Transthoracic echocardiography findings were inconclusive; thus, transesophageal echocardiography (TEE) was performed. TEE revealed pseudoaneurysm of basal inferior and inferolateral wall of LV with cavity measuring around 5.65 cm × 5.94 cm along with a free-floating patch of previous surgery [Videos 1 and 2]. Moreover, the cavity was bilobed with dense spontaneous echo contrast (SEC) and soft clot in one of the lobes. There was mild mitral regurgitation, normal pulmonary artery systolic pressures and LV ejection fraction was.

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around 40%. Three-dimensional (3D) echocardiography further delineated the cavity and its communication with LV [Videos 3 and 4]. NCCT chest further confirmed the finding of TEE. Electrocardiography (ECG) showed T-wave inversion in inferolateral leads. Chest radiograph showed the sternal wires of previous surgery and oval bulge on left heart border. He was planned for redo LV pseudoaneurysm repair.

Informed consent was taken for the redo surgery. Adequate blood and blood products were arranged for the surgery. Preoperative examination and airway was within normal limits.

On the night before surgery patient was premedicated with pantoprazole 40 mg and alprazolam 0.25 mg per oral. On arrival in operating room standard monitors were attached and adequate venous access and arterial cannulation was done under local anesthesia. In view of redo surgery defibrillator pads were attached and cell salvage device was also used. Internal jugular vein cannulation was done for central venous pressure (CVP) and pulmonary artery pressure (PAP) monitoring. General anesthesia was induced with standard medications and mechanical ventilation was started.

Intraoperative monitoring was done with ECG, arterial blood pressure, CVP, PAP, pulse oximetry, urine output, temperature, activated coagulation time (ACT), arterial blood gases and end tidal carbon dioxide. Intraoperative TEE monitoring confirmed the preoperative findings.

Anticoagulation was done with heparin sulfate 4 mg/kg to achieve ACT of more than 480 seconds. Standard arterial and venous cannulations were done for cardiopulmonary bypass (CPB). After initiating CPB moderate hypothermia was achieved and the pseudoaneurysm cavity was excised from LV, clots were removed [Figure 1] and inferobasal wall was closed with a dacron patch. Total CPB time was around 135 min and aortic cross-clamp time was 115 min. The weaning from the CPB was uneventful with mild inotropic support. Post CPB TEE revealed adequacy on the repair with no residual cavity and without deterioration of LV function [Video 5]. Blood and blood product requirement was also not significant.

The patient was shifted to the cardiac surgical ICU with stable hemodynamic. Trachea was extubated after 8 h of mechanical ventilation. The postoperative period was uneventful with ICU stay of 2 days and hospital stay of 7 days. He was discharged state on 7th postoperative day and on a regular follow-up.

**DISCUSSION**

True aneurysm of LV is an area of thinned dyskinetic myocardium and involves the full thickness of the wall, whereas a pseudoaneurysm of LV is due to rupture of the ventricular free wall contained by the overlying adherent pericardium or scar tissue.[6] Moreover, LV pseudoaneurysm is uncommon after transmural MI.[7] Signs and Symptoms may vary from patient to patient ranging from chest pain, dyspnea, and/or hypotension. One may find pericardial friction rub, a new to‑and‑fro murmur, decreased heart sounds, elevated filling pressures in the heart chambers, sinus bradycardia or junctional rhythm.[8,9] Imaging particularly echocardiography (TTE and TEE) is diagnostic modality with TEE considered superior to TTE in the evaluation of pseudoaneurysms. Acquiring optimal precordial images on TTE can be limited by mechanical ventilation, obesity, suboptimal positioning, and/or lines and tubes. TEE may tide over these technical limitations.[10,11]

Moreover, TEE has an advantage in intraoperative setting during surgical repair during pre and post CPB period particularly with regard to LV function assessment.[12]
TEE also helps in detection of acute RV failure in the perioperative period.[13]

Both 2D and 3D echocardiography are helpful. However, 3D has an advantage as it provides better delineation of the size and shape of the rupture site, to assess the longitudinal and transverse dimensions, circumference, and area of the rupture site. In addition, it allows for visualization of the mitral annulus and papillary muscles, which can guide surgical management by assessing severity and/or improvement, possibly precluding the need for mitral valve repair or replacement.[14] We have also used 3D echocardiography in the present case. Other modalities like CT scan and CMR have limited utility in the perioperative setting.

In conclusion, intraoperative TEE (2D and 3D) is an important tool to confirm the diagnosis of pseudoaneurysm and to evaluate cardiac function before, during, and after surgery. Moreover, it can also be used to diagnose RV failure and guide surgical management in the perioperative period.

**Declaration of patient consent**
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**
There are no conflicts of interest.

**REFERENCES**

1. Dachman AH, Spindola-Franco H, Solomon N. Left ventricular pseudoaneurysm: Its recognition and significance. JAMA 1981;246:1951-3.
2. March KL, Sawada SG, Tarver RD, Kesler KA, Armstrong WF. Current concepts of left ventricular pseudoaneurysm: Pathophysiology, therapy, and diagnostic imaging methods. Clin Cardiol 1989;12:531-40.
3. Frances C, Romero A, Grady D. Left ventricular pseudoaneurysm. J Am Coll Cardiol 1998;32:557-61.
4. Pretre R, Linka A, Jenni R, Turina MI. Surgical treatment of acquired left ventricular pseudoaneurysms. Ann Thorac Surg 2000;70:553-7.
5. Brown SL, Gropler RJ, Harris KM. Distinguishing left ventricular aneurysm from pseudoaneurysm. A review of the literature. Chest 1997;111:1403-9.
6. Higgins CB, Lipton MJ, Johnson AD, Peterson KL, Vieweg WV. False aneurysms of the left ventricle. Identification of distinctive clinical, radiographic, and angiographic features. Radiology 1978;127:21-7.
7. Si D, Shi K, Gao D, Yang P. Ruptured left ventricular pseudoaneurysm in the mediastinum following acute myocardial infarction: A case report. Eur J Med Res 2013;18:2.
8. Gueron M, Wanderman KL, Hirsch M, Borman J. Pseudoaneurysm of the left ventricle after myocardial infarction: A curable form of myocardial rupture. J Thorac Cardiovasc Surg 1975;69:736-42.
9. Balakumaran K, Verbaan CJ, Essed CE, Nauta J, Bos E, Haalebos MM, et al. Ventricular free wall rupture: Sudden, subacute, slow, and sealed varieties. Eur Heart J 1984;5:282-8.
10. Brown SL, Gropler RJ, Harris KM. Distinguishing left ventricular aneurysm from pseudoaneurysm. A review of the literature. Chest 1997;111:1403-9.
11. Chirillo F, Cavarzerani A, Ius P, Totis O, Bruni A, Valfré C, et al. Role of transesophageal, transesophageal, and transgastric two-dimensional and color Doppler echocardiography in the evaluation of mechanical complications of acute myocardial infarction. Am J Cardiol 1995;76:833-6.
12. Zoffoli G, Mangino D, Venturini A, Terrini A, Asta A, Zanchettin C, et al. Diagnosing left ventricular aneurysm from pseudo-aneurysm: A case report and a review in literature. J Cardiothorac Surg 2009;4:11.
13. Haddad F, Couture P, Tousignant C, Denault AY. The right ventricle in cardiac surgery, a perioperative perspective: II. Pathophysiology, clinical importance, and management. Anesth Analg 2009;108:422-33.
14. Nekkanti R, Nanda NC, Zogbihi GJ, Mukhtar O, McGiffin DC. Transesophageal two- and three-dimensional echocardiographic diagnosis of combined left ventricular pseudoaneurysm and ventricular septal rupture. Echocardiography 2002;19:345-9.