

Left Atrium Dissection: A Rare Cardiac Surgery Complication

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LEF T ATRIAL DISSECTION is a rare complication of cardiac surgeries and usually is associated with mitral valve procedures. Typically, a false chamber is created through a tear of the mitral valve annulus extending into the left atrial wall. Transesophageal echocardiography (TEE) is used for diagnosis. The authors present a case of left atrial dissection that occurred after an ascending and transverse aortic arch aneurysm repair that was managed successfully conservatively.

CASE PRESENTATION*

An 82-year-old female with a medical history significant for poorly controlled hypertension and diastolic heart failure presented for repair of an ascending aortic aneurysm and proximal aortic arch aneurysm.

Anesthesia was induced intravenously with midazolam, 3 mg, fentanyl, 100 µg, propofol, 50 mg, and rocuronium, 50 mg. A right radial 20-gauge arterial catheter was placed immediately after induction, and her trachea was intubated atraumatically with an 8.0 endotracheal tube. Inhaled sevoflurane was used for maintenance of anesthesia. A 9-F central venous catheter was placed under direct ultrasound guidance in the right internal jugular vein without any complications, and a pulmonary artery catheter was floated uneventfully. Cerebral oximetry using FORE-SIGHT sensors (CAS Medical Systems Inc, Branford, CT) was monitored throughout the case.

Postinduction TEE showed a 65-mm isolated aneurysm of the ascending aorta and moderate lipomatous hypertrophy of the interatrial septum (Fig. 1).

After median sternotomy, standard arterial cannulation was performed using the ascending aorta. Double venous cannulation was performed to allow for retrograde cerebral perfusion. A ventricular vent was inserted into the left ventricle. Of note, this was repositioned into the left atrium and into the left ventricle after an initial failed attempt. After initiation of cardiopulmonary bypass, systemic cooling was undertaken. Circulatory arrest was started after the nasopharyngeal temperature reached 20°C. The aneurysm was resected and the 28-mm polyester graft was sutured to the middle transverse arch. After completion of this anastomosis, antegrade systemic flow was reestablished and warming was begun. The total circulatory arrest time was 11 minutes. The proximal aorta was examined and the remainder of the ascending aorta was resected to the sinotubular junction. The aortic valve was found to be normal

in function and appearance, and the decision was made to leave it in place. The proximal anastomosis then was completed.

The patient was started on a low-dose milrinone infusion due to the combination of her medical history, the length of the cardiopulmonary bypass, and the addition of the circulatory arrest period. The anesthesia team considered the addition of a low-dose epinephrine infusion but decided to defer it until assessment of the patient's ventricular function at the end of cardiopulmonary bypass.

The precardiopulmonary bypass separation TEE revealed normal postoperative findings for the repaired ascending aorta, normal aortic valve function, a normally appearing and functioning mitral valve, and a small fluid-filled chamber in the posterior wall of the left atrium, consistent with left atrial wall dissection (Fig 2).

Left ventricular contractility was assessed as being marginally decreased compared with the preoperative findings. The milrinone infusion was continued, but addition of any other inotropic support was considered to be unnecessary. Separation from cardiopulmonary bypass was uneventful and was performed only with inotropic support with milrinone at 0.5 µg/kg/min.

After cardiopulmonary bypass, a comprehensive TEE examination revealed an even larger posterior left atrial wall separation, with collapse of the dissection chamber and the atrial contraction at end-diastole (Fig 3).

Both ventricles showed preserved contractility, and the right ventricle appeared slightly distended, consistent with mild volume overload. The midesophageal 4-chamber TEE view showed systolic expansion of the left atrial dissection false chamber, virtually demonstrating the presence of a

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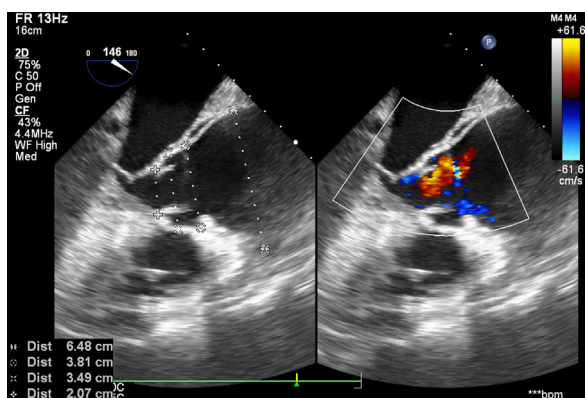


Fig. 1. Midesophageal long-axis aortic valve view showing the ascending aortic aneurysm.

communication between the left ventricle and left atrium (Video clip 1). Three-dimensional TEE imaging confirmed the finding of left atrial dissection (Video clip 2). Furthermore, color Doppler detected no communication of the left atrial dissection false chamber with the left ventricle.

Mitral and pulmonary vein inflow patterns on pulsed-wave Doppler were normal. Left atrial pressure, estimated from measurements performed with the pulmonary artery catheter, was mildly increased.

Visual surgical exploration of the left atrial posterior wall identified the presence of an intramural hematoma without evidence of external communication in the pericardial sac, consistent with the TEE findings of left atrial dissection (Video clip 3).

As demonstrated on TEE monitoring, the patient remained hemodynamically stable with slow administration of fluids and unchanged inotropic support with milrinone. After consultation with the cardiology and cardiac surgery teams, the authors decided to wait 30 minutes and reevaluate. After further intraoperative TEE assessment, it was determined that the left atrial dissection chamber was not expanding, and the surgical team elected conservative management. The patient was transported in stable condition to the surgical cardiovascular intensive care unit. The patient's airway was extubated the following morning and she was discharged home within 6 days. The postoperative hospital stay was significant only for a

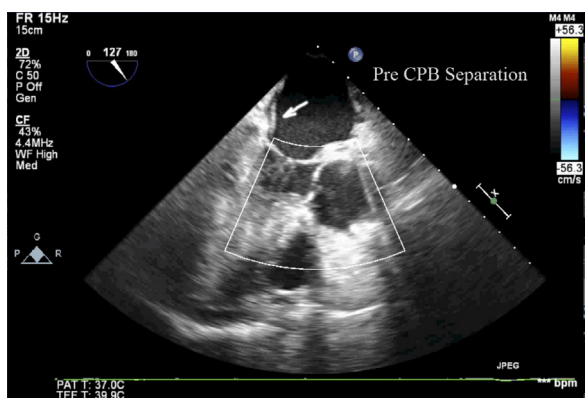


Fig. 2. Midesophageal aortic valve long-axis view showing a slight separation in the posterior wall of the left atrium.

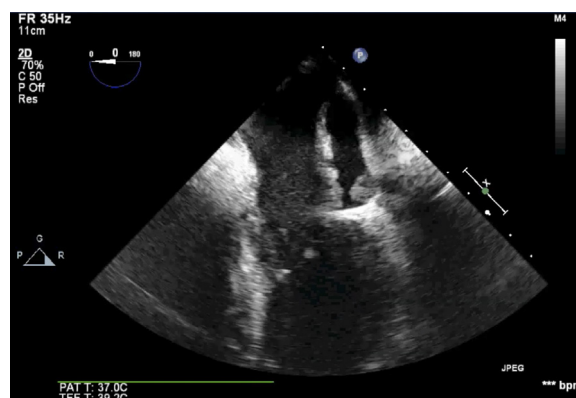


Fig. 3. Midesophageal 4-chamber view showing atrial systolic expansion of the left atrial false chamber.

hemodynamically stable episode of atrial fibrillation managed with amiodarone. Subsequent transthoracic echocardiographic examinations showed decreasing size of the left atrial dissection false chamber with no significant hemodynamic effects.

Fifteen months postsurgery, the patient returned to her preoperative functional level, was still being followed up by her cardiologist, and had experienced no other postoperative complications.

DISCUSSION

Left atrial dissection is a rare complication of cardiac surgery, with an acute/subacute clinical course, and is most commonly associated with mitral valve surgery. There are only a limited number of cases described in the literature. A false chamber usually is created during mitral valve surgery through a tear in the mitral valve annulus that extends into the left atrium walls, effectively creating a left ventricle–left atrium fistula. Other cases of left atrial dissection have been described during surgical aortic valve replacement, mitral valve replacement or repair, left ventricle aneurysm repair, coronary artery bypass grafting, and cardiac masses excisions. Nonsurgical causes previously described include myocardial infarction, percutaneous coronary interventions, radiofrequency ablation, and blunt cardiac trauma. The overall mortality reported in the literature is 13.8%.¹

The TEE images are pathognomonic. Occasionally, left atrial dissection encompasses the creation of a dramatically large, high-pressure, false chamber, which results in left atrial compression and collapse, necessitating a second cardiopulmonary bypass period to repair the left atrial wall.² Cases in which the left atrial dissection interferes with the left atrial emptying/left ventricle filling, creating hemodynamic instability, hypotension, increased pulmonary artery pressures, and right ventricle strain secondary to volume and pressure overload also have been described. TEE is the diagnostic procedure of choice for the diagnosis of left atrial dissection.

The etiology of the left atrial dissection in the case presented here was unclear. There was no manipulation of the left atrium, except for placement of a left ventricular vent through the right upper pulmonary vein. Although not confirmed, it is possible that the initial insertion of the ventricular vent created a small tear in the left atrial endocardium and the mitral

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