Spontaneous Left Atrial Dissection Due to Mitral Regurgitation

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Central Message

Left atrial dissection, which is defined as the forced separation of layers of the LA wall by blood, is rare. We report a spontaneous case of LA dissection caused by mitral regurgitation.

Central Picture Legend

TEE indicates LA dissection due to mitral regurgitation.

Glossary of Abbreviations

LA: left atrial, left atrium
LAD: left atrial diameter
MR: mitral regurgitation
MV: mitral valve
RVSP: right ventricular systolic pressure
LA dissection is rare and is usually observed as a complication of mitral valve (MV) surgery or other cardiac procedures (1). Incidence is 0.16% associated with MV surgeries (0.84% associated with valve replacements) and 0.02% associated with isolated coronary artery bypass grafting (1,2). Noncardiac surgical etiologies have included myocardial infarction, percutaneous coronary intervention, radiofrequency ablation, and blunt cardiac trauma (3).

**CLINICAL SUMMARY**

An 81-year-old woman presented to another hospital with a 2-day history of progressive exertional dyspnea. She was initially diagnosed with heart failure due to severe mitral regurgitation (MR). Initial echocardiography indicated a left atrial diameter (LAD) of 46 mm and an estimated right ventricular systolic pressure (RVSP) of 70 mmHg. She underwent diuretic treatment for heart failure. She was admitted to our hospital for surgery 3 months later. Her medical history included autoimmune hepatitis diagnosis at 58 years of age and Sjögren’s syndrome diagnosis at 64 years of age. She had received inpatient steroid treatment for autoimmune hepatitis for one month at 58 years of age but had not required subsequent steroid therapy due to inactive autoimmune hepatitis. She had previous treatment for severe dental cavities due to Sjögren’s syndrome-related dry mouth. She had no history of cardiac surgery or chest trauma. On physical examination, a grade IV/VI systolic murmur was audible over the cardiac apex. Abdominal and neurological examinations were unremarkable. Laboratory tests showed the following: rheumatoid factor, 18 IU/mL (normal, <15 IU/mL); immunoglobulin G, 2200 mg/dL (normal, <1700 mg/dL); antinuclear antibody, 1:1280 (normal, <1:40); and brain natriuretic peptide, 41.6 pg/mL (normal, < 18.4 pg/mL). Transthoracic echocardiography showed severe MR due to posterior mitral leaflet prolapse of a central scallop secondary to chordae rupture (Figure 1A). The LAD was 43 mm, the estimated RVSP was 36 mmHg, and the maximum velocity of MR was 5.22 m/s. Transesophageal echocardiography revealed
prolapse in the P2 segment with flail and a left atrial dissection cavity extending from the mitral anterior annulus along the left atrial (LA) wall and color flow Doppler imaging showed the MR jet leaking into the cavity (Figure 1B), which was confirmed on three-dimensional transesophageal echocardiography (Figure 1C) and cardiac computed tomography (Figures 1D, 1E). Written informed consent was obtained from the patient (IRB# 2022-149(114097), September 2022). The patient underwent MV repair with 2 CV4 and 2 CV5 Gore-Tex polytetrafluoroethylene neochords (W. L. Gore & Associates Inc, Flagstaff, AZ, USA) and 32 mm ring annuloplasty, and tricuspid valve repair with 32 mm ring annuloplasty. During surgery, it was observed that the dissection of the LA wall without hematoma extended from the anterior annulus of the MV to the LA roof. The torn atrial tissue was not friable. The mitral annulus was normal and standard repair techniques resulted in a competent valve. The ring was placed on the LA dissection flap at the anterior part of the annulus and the LA dissection was closed with 2-0 Nespolen sutures through the edge of the LA dissection flap (Video 1).

Postoperative transthoracic echocardiography and cardiac computed tomography revealed repair of the LA dissection cavity and flap as well as a competent MV with negligible regurgitation (Figures 2A–2C). The postoperative period was without incident. Follow-up computed tomography angiogram performed 6 months after surgery showed no findings of recurrence of LA dissection (Figures 2D, 2E).

**DISCUSSION**

Spontaneous LA dissection without any preceding intracardiac manipulation is exceedingly rare and is generally attributed to underlying pathology involving severe mitral annular calcification and infectious endocarditis (4,5). Infection and necrosis of a heavily calcified posterior mitral annulus are possible contributors to the formation of a dissection (4). Nevertheless, our patient had did not have such underlying causes and no history of cardiac
procedures. In the present case, initial echocardiography indicated a nondilated LA and a markedly high estimated RVSP. The symptom onset and the initial echocardiographic findings indicated the development of MR as an acute event secondary to chordal rupture. LA dissection was not observed in the initial echocardiography; therefore, the time of its onset was unclear, and the development of acute MR was considered to contribute to the development of LA dissection.

The treatment of patients with LA dissection is determined by their clinical presentation (3). Although patients with hemodynamic instability require immediate surgical intervention, stable patients can be treated conservatively. Different surgical techniques were reported, including entry closure with obliterating the false lumen, and unroofing of the false lumen after removing the hematoma (1,2,5). When the atrial wall tissue and mitral annulus are friable, concomitant use of strong surgical adhesive and a bovine pericardial or synthetic patch may be useful for entry closure by obliterating the false lumen (1). In patients with LA dissection secondary to infective endocarditis, unroofing of LA dissection is also useful to prevent a closed cavity from becoming infected (5). Alongside MV repair in our patient, we simultaneously closed the LA dissection cavity to secure the entrance point of the flap with simple sutures between the mitral annulus and ring because the dissection flap and mitral annulus were not friable.

In our case, due to the force of the MR jet caused by the extensive posterior MV leaflet prolapse and subsequent substantial systolic flow into the false lumen, the LA wall was likely susceptible to dissection. We report a rare case of LA dissection due to MR that was treatable with simple suturing for simultaneous MV repair.
REFERENCES


FIGURE LEGENDS

Figure 1. Preoperative echocardiographic image and computed tomography angiogram of left atrial dissection

A, B: Transthoracic (A) and transesophageal (B) echocardiograms demonstrate the left atrial dissection flap (blue arrow) and mitral regurgitation (red arrow) and show the blood flow into the left atrial false lumen. C: Three-dimensional transesophageal echocardiogram shows the posterior mitral leaflet prolapse (red arrow), the entry site of the left atrial dissection (blue arrow), and severe mitral regurgitation jet. D, E: Single-axial image from a preoperative computed tomography angiogram shows the left atrial dissection flap (blue arrow).

Figure 2. Postoperative echocardiographic image and computed tomography angiogram of left atrial dissection

A: Postoperative transthoracic echocardiogram shows the left atrial dissection cavity repair and resolution of mitral regurgitation. B, C: Single-axial image from a postoperative computed tomography angiogram shows the repair of the left atrial dissection flap. D, E: Follow-up computed tomography angiogram performed 6 months after surgery showed no findings of recurrence of LA dissection.

VIDEO LEGEND

Video 1. The left atrial dissection cavity was closed, and mitral valve repair was performed.
FIGURES

Figure 1A

Figure 1B
Figure 1C

Figure 1D
Figure 1E
Figure 2A

Figure 2B
Figure 2C

Figure 2D
Figure 2E