

CASE REPORT

Native mitral valve staphylococcus endocarditis with a very unusual complication: Ruptured posterior mitral valve leaflet aneurysm

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Abstract

Infective endocarditis (IE) is a life-threatening disease associated with in-hospital mortality of nearly one in five cases. IE can destroy valvular tissue, which may rarely progress to aneurysm formation, most commonly at the anterior leaflet in instances of mitral valve involvement. We present a remarkable case of a patient with IE and a rare complication of a ruptured aneurysm of the posterior leaflet of the mitral valve. Two- and Three-dimensional transesophageal echocardiography, intra-operative videography, and histopathologic analysis revealed disruption at this unusual location—at the junction of the P2 and P3 scallops, surrounded by an annular abscess.

KEYWORDS

aneurysm, endocarditis, mitral valve, posterior leaflet

1 | CASE REPORT

A 57-year-old woman with end-stage renal disease presented to the emergency department (ED) with a dislodged subclavian vein Medcomp Split Cath III (Medcomp, Harleysville, PA, USA) dialysis catheter. The catheter was exchanged without complications. Six days later, she returned to the ED after suffering a mechanical fall, where she was noted to be febrile to 38.3°C. Blood cultures grew methicillin-sensitive *Staphylococcus aureus* (MSSA), and her replacement catheter was removed. The catheter tip was cultured and also grew MSSA. She was started on broad-spectrum antibiotics. Transthoracic echocardiogram (TTE) revealed normal biventricular systolic function and no evi-

dence of endocarditis. Following clearance of bacteremia, a third Medcomp Split Cath III was placed, and the patient was discharged on a 4-week course of cefazolin.

Three weeks later, the patient re-presented to the ED with symptoms of new-onset decompensated heart failure in the presence of preserved left ventricular systolic function. A new systolic murmur was noted. An electrocardiogram revealed normal sinus rhythm. Her inflammatory markers were markedly elevated with an erythrocyte sedimentation rate of 99 mm/hour (normal 0–20 mm/hr) and C-reactive protein of 117 mg/L (normal 0–5 mg/L). The patient was admitted to the cardiac critical care unit.

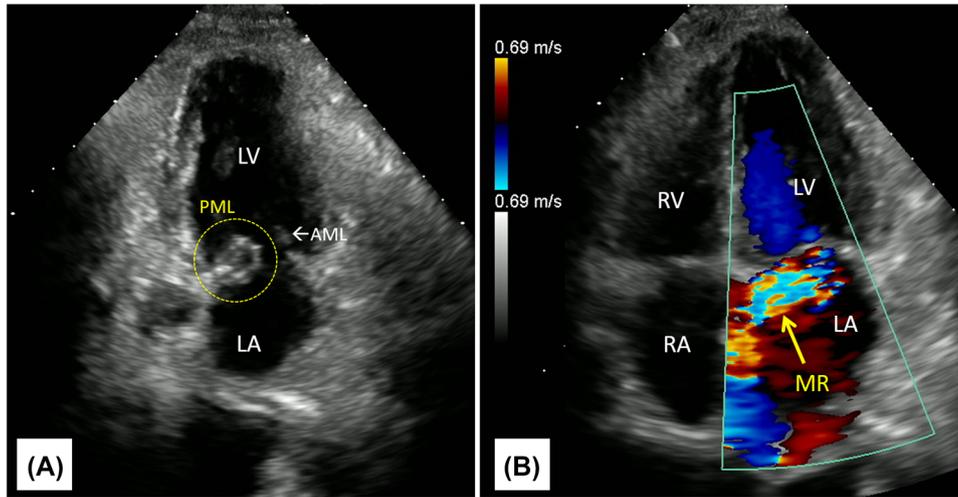
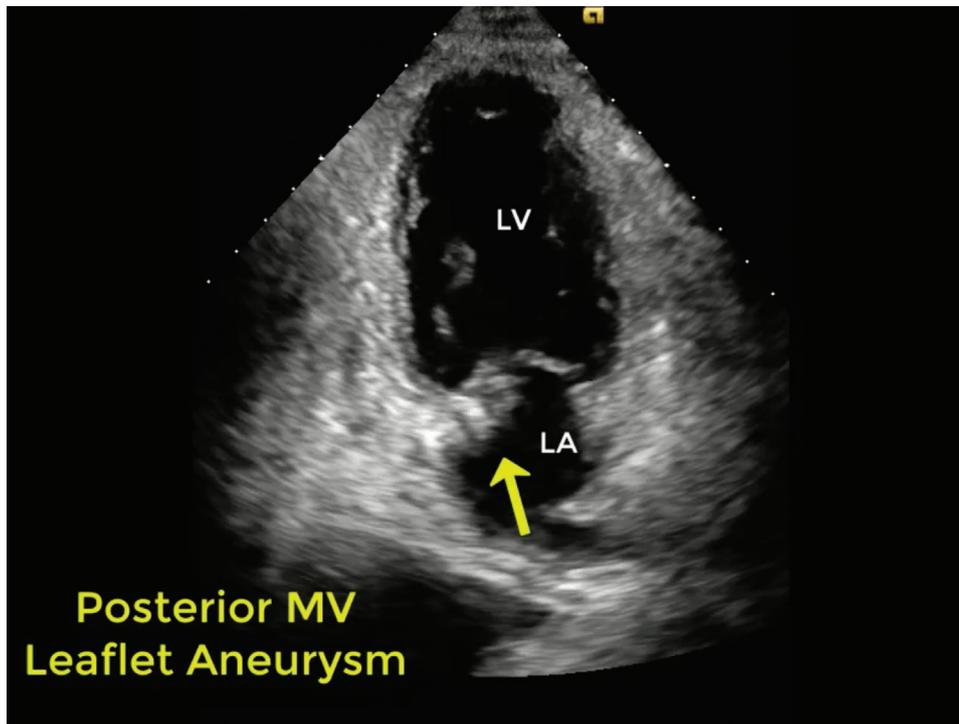


FIGURE 1 Transthoracic echocardiogram. TTE demonstrates a posterior mitral leaflet (PML) aneurysm in the apical two-chamber view (Panel A) resulting in severe eccentric, anteriorly directed mitral regurgitation (MR) seen in apical four-chamber view (Panel B). AML, anterior mitral leaflet; LA, left atrium; LV, left ventricle; RA, right atrium; RV, right ventricle. Video 1 corresponds to this figure



VIDEO 1 TTE demonstrates a posterior mitral leaflet (PML) aneurysm in the apical two-chamber view resulting in severe eccentric, anteriorly directed mitral regurgitation seen in apical four-chamber view. LA, left atrium; LV, left ventricle; RA, right atrium; RV, right ventricle. Figure 1 corresponds to this figure.

Repeat TTE imaging revealed severe mitral regurgitation and a 1.5 cm × .9 cm mobile echo-density attached to the posterior mitral annulus suggestive of a vegetation (Figure 1 and Video 1). Subsequent 2D transesophageal echocardiogram (TEE) demonstrated a very unusual finding: ruptured aneurysm at the junction of the middle (P2) and medial (P3) scallops of the posterior mitral valve leaflet resulting in

a severe, anteriorly directed mitral regurgitant jet through the perforated mitral leaflet aneurysm (Figure 2 and Video 2). The aneurysm and the mitral regurgitant jet were further visualized by 3D TEE (Figure 3 and Video 3). The aortic valve was normal with no aortic regurgitation, valve vegetations, or root abscesses. Left ventricular ejection fraction remained normal (65%) and the rest of TEE was unremarkable.

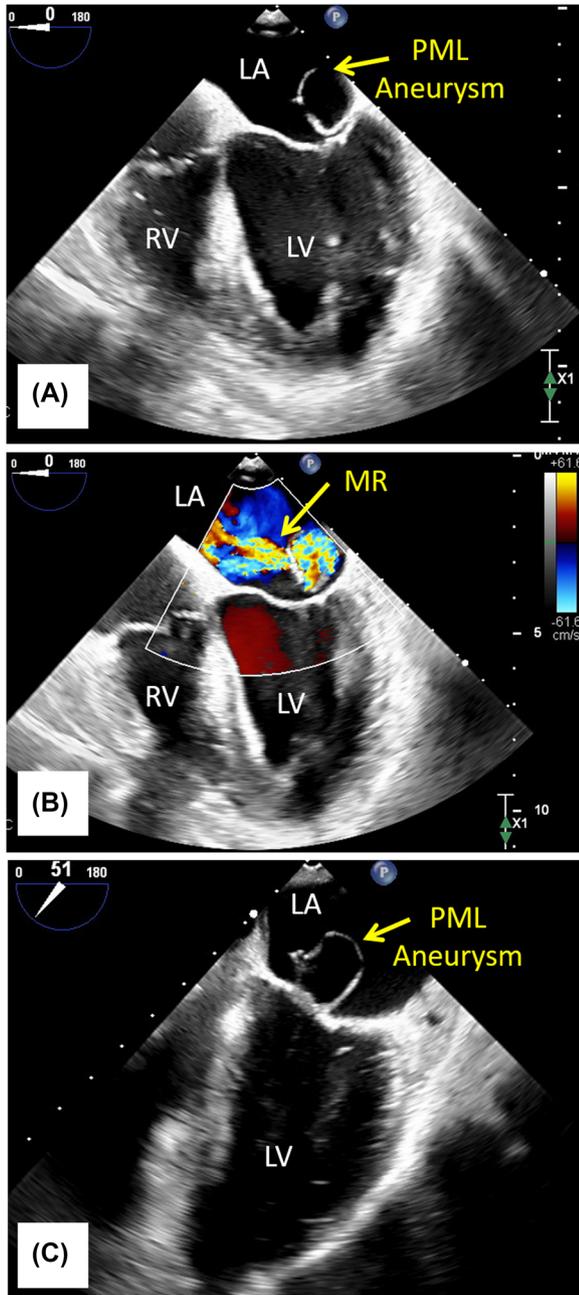


FIGURE 2 2D Transesophageal echocardiogram. A posterior mitral leaflet (PML) aneurysm is visualized in the midesophageal four-chamber view (Panel A) resulting in severe mitral regurgitation (MR) through the aneurysm perforation (Panel B). The posterior location of the aneurysm is visualized in the midesophageal bicommissural view (Panel C). LA, left atrium; LV, left ventricle; RA, right atrium; RV, right ventricle. Video 2 corresponds to this figure

The patient was then taken to the operating room for robotic MV repair consisting of debridement of a large vegetation and abscess at the hinge of P3, quadrangular excision suture of part of P3 with annular plication, and annuloplasty with a 28-mm CG Future band (Medtronic, Dublin, Ireland). The original mitral valve pathology and subsequent surgical repair are demonstrated in Figure 4 and Video 4). Histopathology of the excised leaflet confirmed infective endocarditis (IE) (Fig-

ure 5). On a follow-up 3 months later, she was doing well and repeated TTE demonstrates only trace mitral regurgitation.

2 | DISCUSSION

Infective endocarditis is associated with a 1-year survival rate of less than 60%.¹ A rare sequelae of IE is the formation of an aneurysm at the mitral valve due destruction of endocardial tissue. When MV aneurysms occur, concurrent new aortic regurgitation is usually present, and the aneurysm is located at the anterior leaflet of the MV. We present the case of a patient with IE due to MSSA that was complicated by a ruptured aneurysm of the posterior MV leaflet and no aortic valve (AV) involvement. In our patient, the posterior mitral leaflet aneurysm was located at the hinge of P2 and P3 scallops and surrounded by an annular abscess.

In general, mitral valve IE most frequently first impacts the free margin of a valve leaflet, where vegetations usually attach, and then invades the leaflet's body.² However, in cases of a typical MV perforation, destruction of the valve leaflet appears to start within the body of the anterior mitral leaflet, suggesting a unique pathogenesis.² Multiple reports of anterior mitral leaflet aneurysm rupture demonstrate an association with aortic valve (AV) endocarditis. A regurgitant jet from the AV can strike the ventricular side of the anterior MV leaflet, thereby creating a secondary site of infection that progresses to aneurysm.^{2,3} Alternatively, the anterior mitral leaflet involvement may result from direct extension of aortic endocarditis through the mitral-aortic inter-valvular fibrosa, a region comprised of relatively poorly vascularized tissue, making it prone to both injury and infection.⁴ To our knowledge, all prior case reports of IE resulting in MV aneurysm involve the anterior leaflet and/or have concomitant aortic regurgitation.⁵ In our case, the MV aneurysm was in the body of the posterior leaflet. The AV was also echocardiographically normal, without signs of destruction from IE. The exact underlying pathophysiology in our patient remains unknown.

Our patient's original TTE was interpreted as demonstrating a large MV vegetation accompanied by severe MV at along the leaflet coaptation line rather than through leaflet perforation. However, three-dimensional (3-D) TEE clarified the presence of a ruptured MV aneurysm with regurgitation through the perforated leaflet. TEE is crucial for the detection of valve perforations and aneurysms. In general, a MV aneurysms appear as a bulge in the leaflet that protrudes in the left atrium (LA) with systolic expansion and diastolic collapse on 2-D echocardiograms.⁶ In a study of patients found to have a MV perforation by TEE, TTE had diagnostic yield of only 30%.² Half of the patients in this study were detected by TEE to have ruptured MV aneurysms, while TTE only detected 20% of the MV aneurysms.² The most recent guidelines from the European Society of Cardiology recommend two-dimensional (2-D) TEE with pulsed, continuous, and color Doppler to fully assess for pathology and quantify hemodynamic changes from IE.⁶ Since TTE is known to be less sensitive than TEE in the detection of left-sided endocarditis with (TTE 40–75% vs. TEE 85–95%), TEE is recommended even in the setting of a negative TTE.^{6,7} Studies

VIDEO 2 A posterior mitral leaflet aneurysm is visualized in the midesophageal four-chamber view resulting in severe mitral regurgitation (MR) through the aneurysm perforation. The posterior location of the aneurysm is visualized in the midesophageal bicommissural view. LA, left atrium; LV, left ventricle; RA, right atrium; RV, right ventricle. Figure 2 corresponds to this figure.

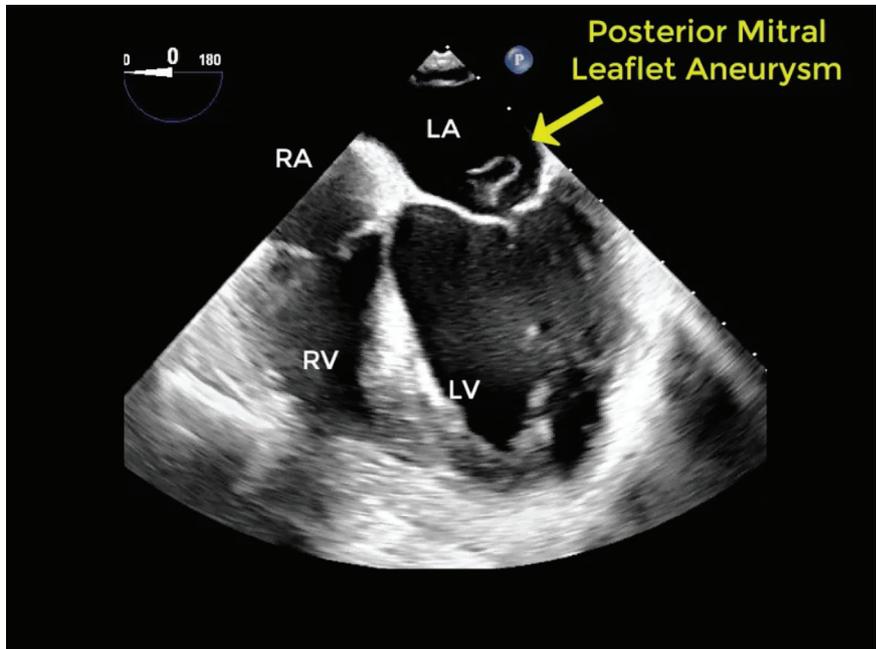
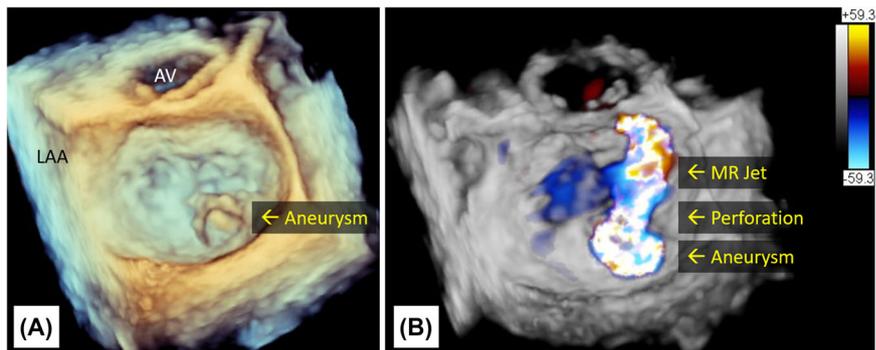
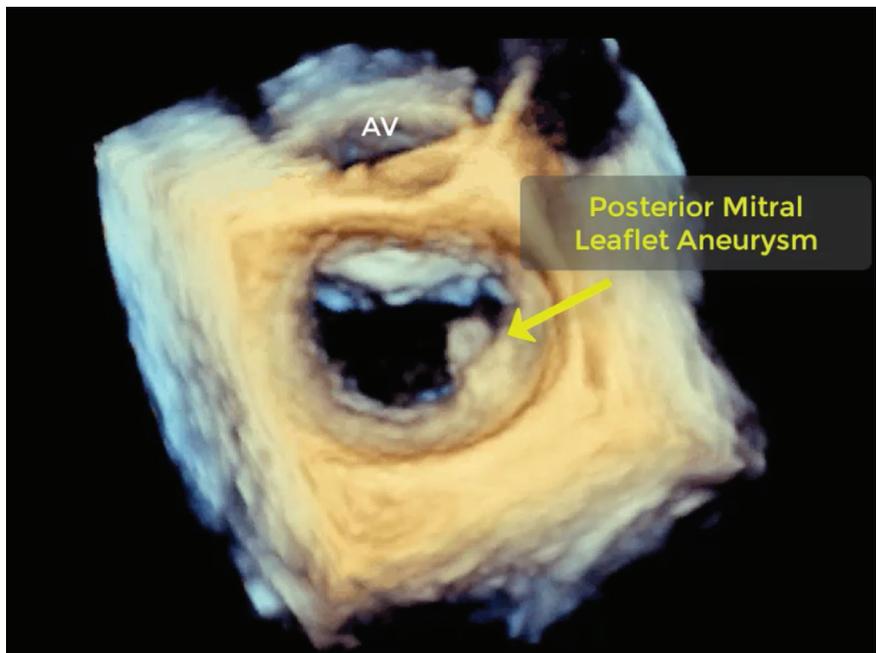


FIGURE 3 3D Transesophageal echocardiogram. The so-called surgical view of the mitral valve demonstrates posterior mitral leaflet aneurysm of P2 and P3 scallops (Panel A) resulting in severe eccentric mitral regurgitation (MR) through aneurysm perforation (Panel B). AV, aortic valve; LAA, left atrial appendage. Video 3 corresponds to this figure



VIDEO 3 The so-called surgical view of the mitral valve demonstrates posterior mitral leaflet aneurysm of P2 and P3 scallops resulting in severe eccentric mitral regurgitation (MR) through aneurysm perforation. AV, aortic valve. Figure 3 corresponds to this figure.



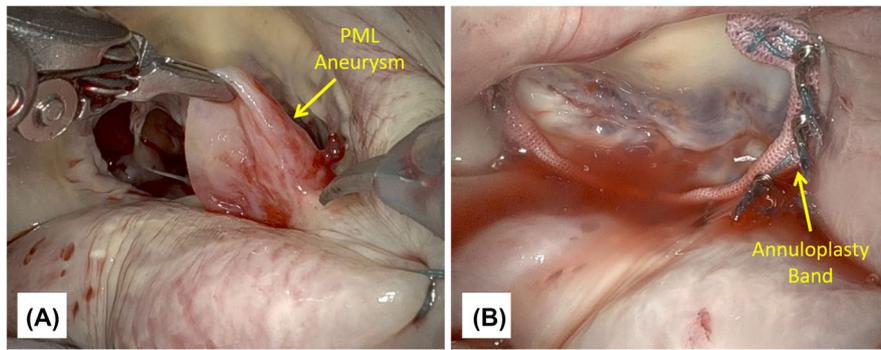
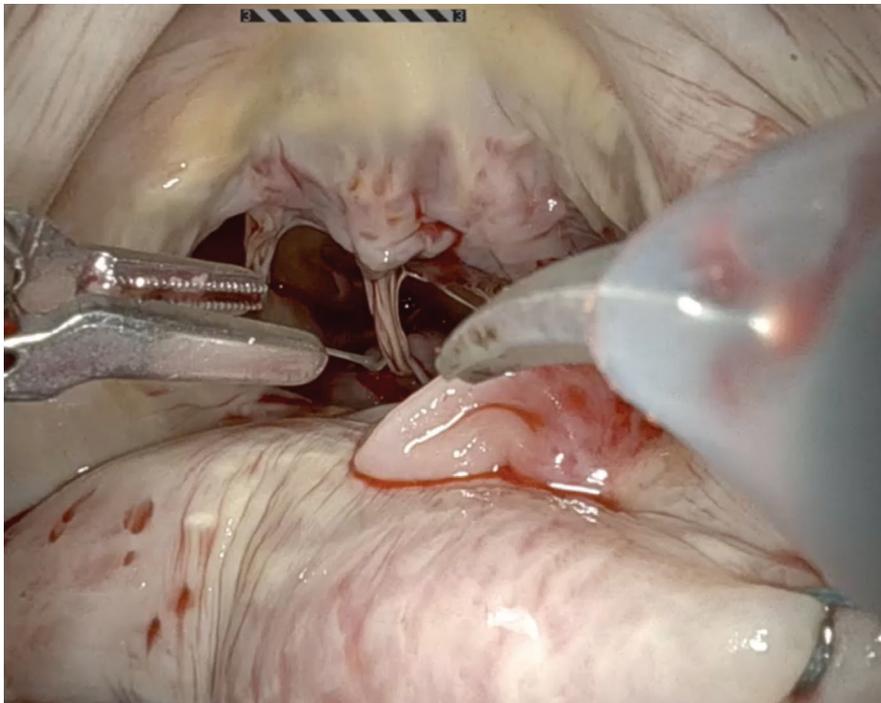


FIGURE 4 Intra-operative imaging. Panel A demonstrates the large posterior mitral leaflet (PML) aneurysm immediately prior to surgical excision. Panel B shows completed mitral valve repair including an annuloplasty band. Video 4 corresponds to this figure



VIDEO 4 Intra-operative movie demonstrates the large posterior mitral leaflet aneurysm immediately prior to surgical excision followed by completed mitral valve repair including an annuloplasty band. Figure 4 corresponds to this figure.

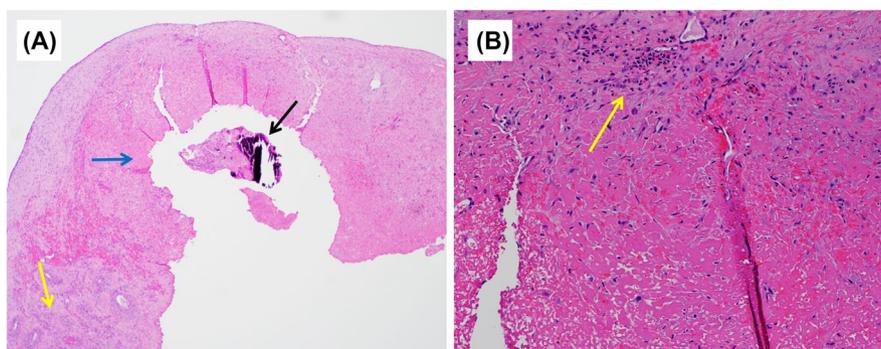


FIGURE 5 Histopathology. Panel A - Mitral valve with granulation tissue (yellow arrow), fibrin (blue arrow) and calcification (black arrow); hematoxylin & eosin; 4X magnification. Panel B - Mitral valve with fibrin and focal acute and chronic inflammation (yellow arrow); hematoxylin & eosin; 20X magnification

have demonstrated an incremental value of 3-D TEE in diagnosing MV perforation.^{8–11}

3 | CONCLUSION

Mitral valve aneurysms usually occur at the anterior leaflet and are associated with concurrent aortic regurgitation. In this case of IE due to MSSA, a ruptured aneurysm developed at the rare site of the posterior MV leaflet, and there was no aortic valve (AV) involvement. This case highlights the importance of utilizing multiple echocardiographic modalities when assessing MV morphology and pathology.

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