

CASE REPORT

INTERMEDIATE

HEART CARE TEAM/MULTIDISCIPLINARY TEAM LIVE

Early Mitral Valve Repair Failure in the Setting of Endocarditis

When to Reoperate?



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ABSTRACT

Surgery is recommended for endocarditis complicated by annular abscess or destruction of the native valve. Guidelines also recommend valvular repair over replacement for endocarditis when feasible. Guidance on management of early repair failure is not well described. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2021;3:707-11)
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A 41-year-old man with a history of lupus was found to have microscopic hematuria. Investigation led to the diagnosis of stage IV lupus nephritis. He underwent induction therapy with 3 days of intravenous solumedrol followed by a high-dose steroid taper and initiation of mycophenolate. His course was complicated by bacterial meningitis, which was treated with antibiotic therapy. A month later he developed streptococcal mitral bacterial endocarditis. Echocardiography was notable for a large abscess cavity adjacent to the right coronary cusp of the aortic valve, severe aortic insufficiency,

and a large anterior leaflet mitral valve (MV) vegetation with evidence of perforation and severe mitral regurgitation (MR).

QUESTION 1. WHAT WOULD BE THE GUIDELINE RECOMMENDATIONS FOR MANAGEMENT OF ENDOCARDITIS WITH THIS PRESENTATION?

Answer 1. Surgery is recommended for endocarditis complicated by annular abscess or destruction of the native valve. Guidelines also recommend valvular repair over replacement for endocarditis when feasible (1). Our patient was referred for surgery. The initial surgery occurred outside of the United States and started with an attempt at repair of both the aortic and MVs. An initial attempt at aortic valve debridement was completed in addition to MV debridement with excision of the anterior leaflet vegetation. The anterior leaflet defect was repaired with autologous pericardial patch and the posterior annulus was stabilized with a running suture

LEARNING OBJECTIVES

- To outline a potential management strategy for patient with early surgical valve repair failure.
- Re-repair of the MV is feasible in patients where the primary repair failed due to technical factors.

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**ABBREVIATIONS
AND ACRONYMS****LV** = left ventricle**MR** = mitral regurgitation**MRI** = magnetic resonance
imaging**MV** = mitral valve

annuloplasty. Initial intraoperative transesophageal echocardiogram revealed persistent severe aortic insufficiency, and the decision was made to proceed with a Ross procedure. This involved removal of the infected native aortic valve and root, transpositioning the native pulmonary valve and artery into the aortic position and placement of a valved homograft in the pulmonary artery position. Repeat intraoperative transesophageal echocardiography revealed persistent moderate MV regurgitation. Ultimately, due to the prolonged and additional cross-clamp time, the decision was made to accept the MR with the understanding a second surgery may be necessary. The patient recovered from his initial surgery and was transferred back to the United States as an outpatient for continued care approximately 6 weeks from the original surgery date.

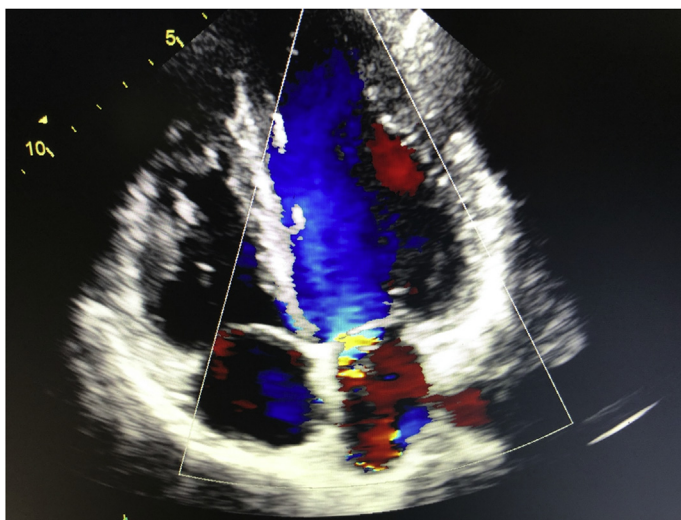
**QUESTION 2. UPON ARRIVAL TO YOUR
INSTITUTION WHAT ADDITIONAL
DIAGNOSTIC STUDIES WOULD YOU OBTAIN?**

Answer 2. Because we knew the patient's initial MV repair was unsuccessful and he was reported to have at least moderate MR, we opted to repeat transthoracic and transesophageal echocardiograms at our institution. These studies were notable for normal

left ventricle (LV) size and systolic function with an LV ejection fraction of 60% to 65% in addition to confirmation of residual perforation of the anterior leaflet of the MV resulting in severe MR (Figures 1 and 2, Videos 1 to 4). Chest x-ray was unremarkable other than evidence of prior sternotomy and a peripherally inserted catheter, which was being used for antibiotic therapy (Figure 3). Electrocardiogram showed normal sinus rhythm, left ventricular hypertrophy, and early repolarization pattern (Figure 4). Coronary computed tomography also was performed for surgical planning and revealed difficult but not prohibitive retrosternal anatomy, no significant coronary artery disease, and redemonstration of the perforated anterior MV leaflet (Figure 5). Cardiac magnetic resonance imaging (MRI) would be another diagnostic consideration. The potential benefit of a cardiac MRI would be another assessment of LV systolic function and quantification of the MR. It was thought that the echo quality obtained at the patient's presentation at our institution was sufficient and cardiac MRI was not pursued during his initial assessment.

**QUESTION 3. WHAT WOULD BE YOUR NEXT
STEP IN MANAGEMENT FOR THIS PATIENT?**

Answer 3. Literature describing long-term outcomes of recurrent MR following a failed MV repair done for degenerative MV disease found recurrent MR was associated with increased risk of late mortality (2). Prior to returning to the United States, our patient was hypertensive with evidence of mild heart failure. He was started on carvedilol, Entresto (Novartis AG, Basel, Switzerland) (sacubitril/valsartan), spironolactone, and furosemide with resolution of his symptoms and normalization of his volume status. He was asymptomatic and off diuretic therapy when he reached our medical center. Due to the poor long-term outcomes of severe MV regurgitation, however, repeat cardiac surgery seemed prudent to avoid the consequences of severe regurgitant valvular disease. His case was presented to our Heart Team where he was classified as asymptomatic severe MR without evidence of LV dysfunction. The group acknowledged his lack of symptoms may have been related to his post-operative state and, therefore, limited exertional capacity. Given he was now several weeks out from his initial surgery and still on steroids for suppression of his lupus nephritis, the group recommended a short convalescent period to allow for partial rehabilitation and sternal wound healing before addressing the residual MR. This also allowed for further work-up and investigation into his new

FIGURE 1 Transthoracic Echocardiography 4-Chamber View

Transthoracic echocardiography 4-chamber view with color Doppler showing mitral regurgitation at the site of perforation in the anterior leaflet of the mitral valve.

rheumatologic diagnoses. Initial planning included a recovery time of 3 months prior to returning to the operating room as long as the patient and left ventricular function remained stable. He was seen every 2 to 4 weeks to monitor for signs of worsening heart failure. He remained clinically stable and was able to participate in physical therapy without limitation. The patient underwent short-interval imaging with a cardiac MRI 3 months after surgery, which was notable for dilation of the LV, moderate-to-severe MR, and mildly depressed LV systolic function (left ventricular ejection fraction of 52%). At that point the patient was referred for repeat surgery.

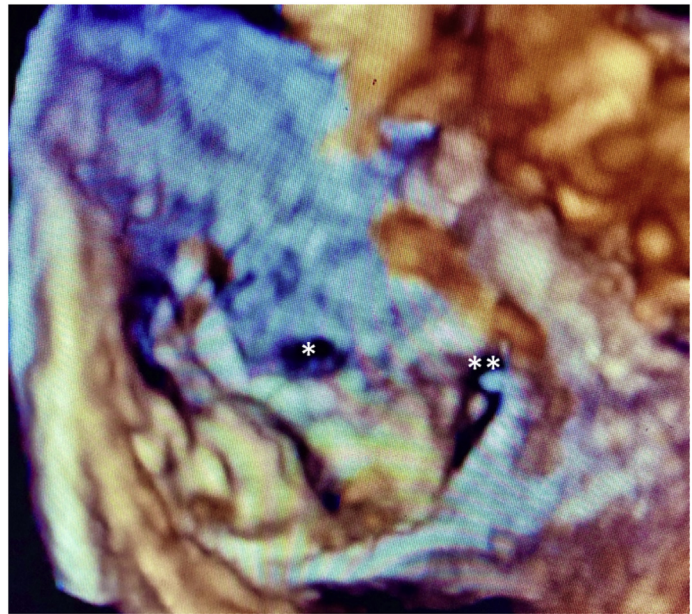
QUESTION 4. SHOULD THIS PATIENT GET A MV REPLACEMENT OR A SECOND MV REPAIR?

Answer 4. MV repair has been reported to have improved preservation of LV systolic function, lower incidence of thromboembolism, hemorrhage, and endocarditis, and improved survival (3,4). Repair even in the setting of endocarditis has yielded good results out to 5 years. In a nationwide cohort study that included more than 400 patients who underwent MV repair in the setting of endocarditis, repair versus replacement yielded lower perioperative complications as well as lower rates of in-hospital and late mortality (5). Likewise, MV re-repair also has been described with good long-term results. This seems to be especially true if the reason for initial repair failure was due to technique, in which case durability of re-repair can be >90% at 10 years (4). The complexity of our patient's valvular involvement led to prolonged surgical times negating the ability to achieve an adequate repair at the time of his initial surgery. As such, both MV replacement and MV re-repair were discussed with the patient with the understanding that the final decision would be based on the operative findings. Our operative plan was for MV repair.

QUESTION 5. WHAT IS THE OPTIMAL TIMING FOR MV RE-REPAIR?

Answer 5. Literature discussing timing of reoperations for failed MV repairs is limited (3,4,6). The median time between the initial operation and repeat cardiac surgery in most reported cases was years. Small subgroups of patients who underwent early repeat surgery ranging anywhere from within the first 30 days of the initial operation to 3 months are included in recent literature, but the factors that prompted early repeat surgery are not well described. The most frequent indication for repeat

FIGURE 2 3-Dimensional Surgeon's View

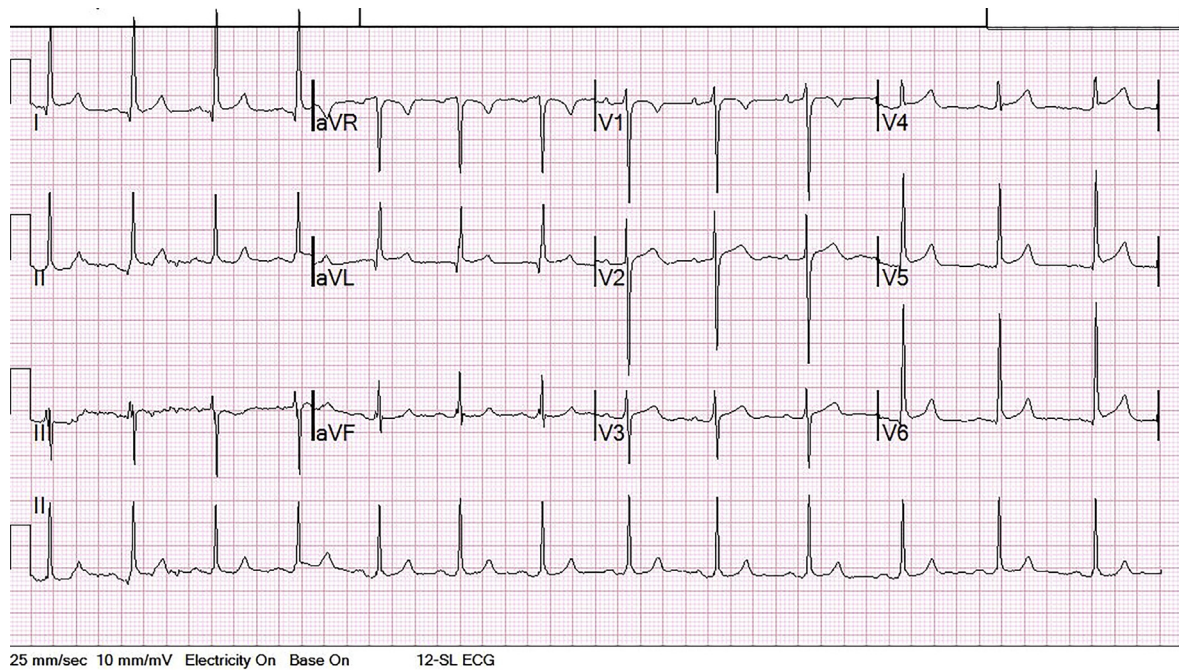


3-dimensional surgeon's view of the mitral valve showing anterior leaflet perforation and suture annuloplasty dehiscence.

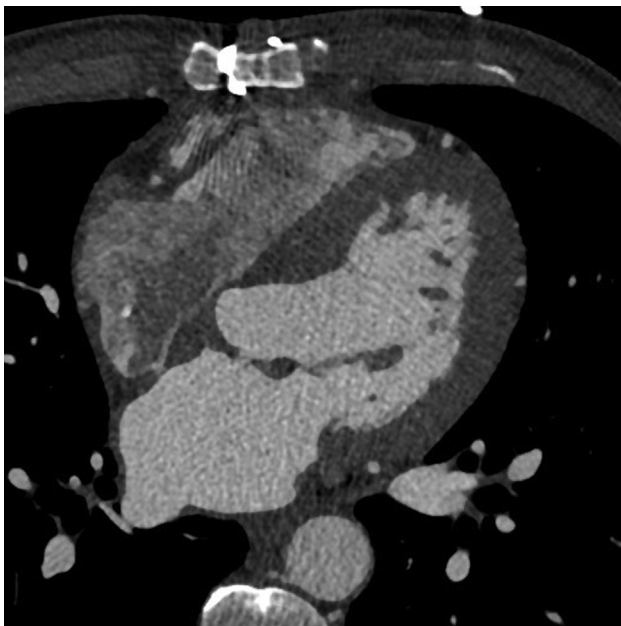
FIGURE 3 Chest X-Ray



Chest x-ray showing no acute cardiopulmonary findings, evidence of prior sternotomy, and peripherally inserted central catheter.

FIGURE 4 Electrocardiogram

Electrocardiogram showing normal sinus rhythm, left ventricular hypertrophy, and early repolarization pattern.

FIGURE 5 Axial Cardiac Computed Tomography Image

Axial cardiac computed tomography image showing a thickened anterior leaflet of the mitral valve with a central perforation and noncalcified plaque of the right coronary artery causing minimal luminal stenosis.

surgery was recurrent MR and the majority of patients were symptomatic with at least New York Heart Association functional class II symptoms. There was a subgroup of 9 patients whose treatment was entirely at a single institution who needed repeat surgery due to technical failure of the initial repair. Mean delay between initial repair and repeat surgery was 5 months in that subgroup (6). Although authors have concluded that intervention for failed MV repair should not be delayed, they made no formal recommendation on how soon to pursue reintervention once initial repair failure has been identified (3,6).

There was an unintentional delay in reintervention for our case secondary to patient-driven factors and social issues. Ultimately our patient agreed to redo sternotomy 6 months after his initial surgery. Surgical findings were notable for a large perforation of the anterior leaflet of the MV that appeared to incorporate the majority of the previous pericardial patch (Figure 6). The remaining leaflet tissue surrounding the perforation was fibrotic and rigid, allowing the defect to be primarily repaired using interrupted sutures. The prior suture annuloplasty was completely dehisced. The suture was removed and replaced with a 32-mm Medtronic Simulus

semirigid annuloplasty (Medtronic, Dublin, Ireland) band (model 800SC). Intraoperative transesophageal echocardiography showed no residual MR and redemonstration of competent aortic and pulmonic valves.

Post-operative echocardiography performed after 7 months showed a LV ejection fraction of 49% by 3-dimensional volume, trivial MR, and no mitral stenosis. The patient recovered without further event and completed cardiac rehabilitation.

QUESTION 6. SHOULD THE PATIENT HAVE UNDERGONE REPEAT CARDIAC SURGERY SOONER?

Answer 6. We present a unique case of endocarditis in an immunosuppressed individual where the initial valve repair attempt was not successful. The need for short-interval repeat cardiothoracic surgery is uncommon and the optimal timing for reoperation in stable patients is unknown. Our goal in presenting this case is to outline our approach to the medical management and surveillance to bridge our patient to repeat surgery. In our case even a short delay (6 months) between the initial and repeat surgery resulted in mildly decreased LV systolic function. Should significant recurrent MR be discovered after MV repair, we would recommend minimizing delays to reoperation even in the setting of clinical stability.

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FIGURE 6 Intraoperative Findings



Intraoperative findings confirming a large perforation in the anterior leaflet of the mitral valve.

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APPENDIX For supplemental videos, please see the online version of this paper.



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