



# Percutaneous Aspiration (AngioVac) of a Mitral Valve Vegetation followed by a Transcatheter Mitral Valve-in-Valve Intervention

## CASE REPORT

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## ABSTRACT

The AngioVac transcatheter aspiration system (Angiodynamics) is used to percutaneously extract thrombi as well as vegetations typically growing from the right heart. We report a case of a failed mitral stented bioprosthesis due to a large vegetation that was treated successfully with AngioVac evacuation through a transeptal puncture followed by valve-in-valve intervention in the same setting.

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## BACKGROUND

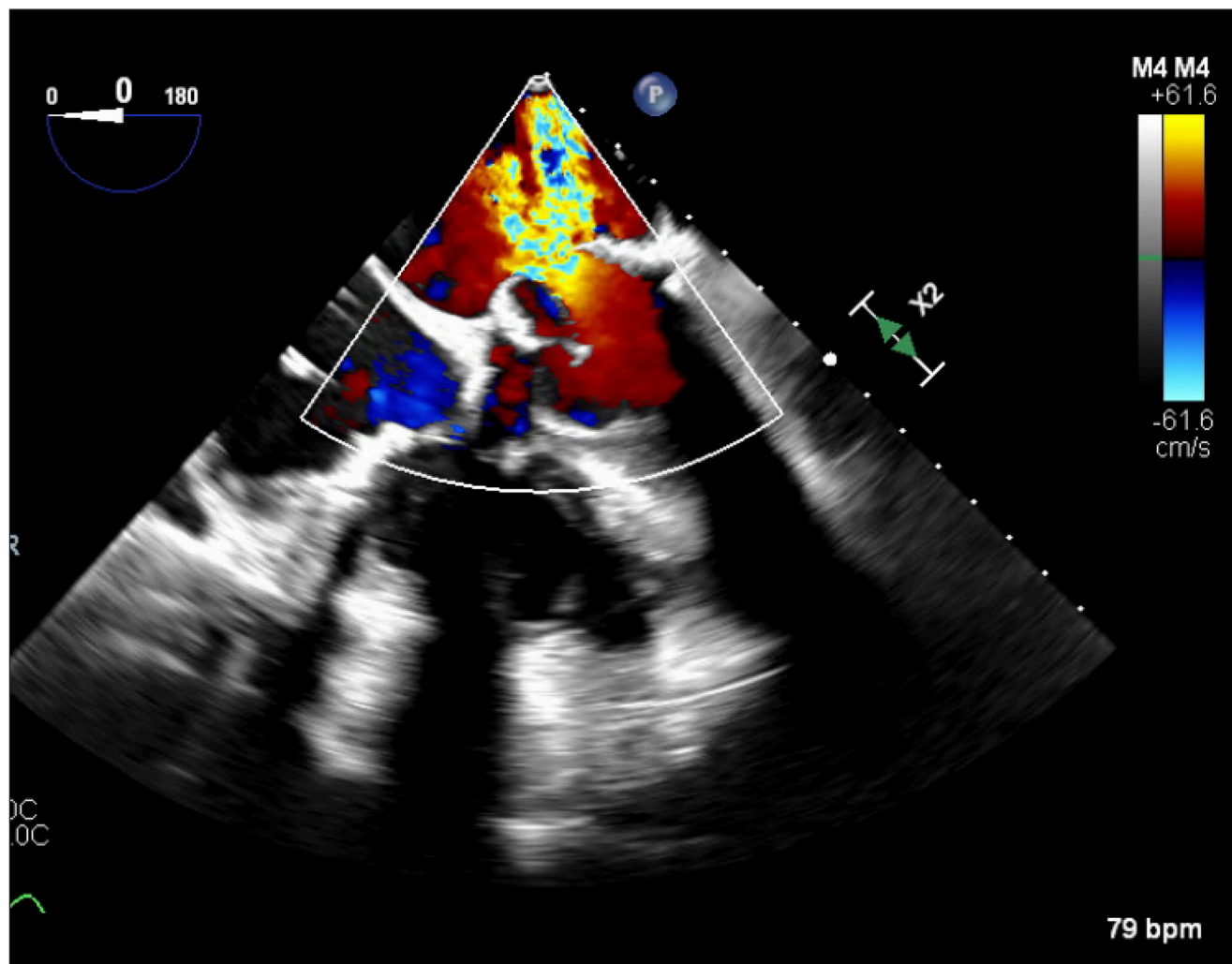
There are more than 20,000 mitral valve replacements performed annually in the United States.<sup>1</sup> Most of these replacements are bioprosthetic valves, which have limited durability.<sup>2</sup> Repeat operation on failed bioprosthetic mitral valves results in increased morbidity and mortality.<sup>3</sup> Transcatheter mitral valve-in-valve (MVIV) replacements using a transseptal (TS) approach have been increasing in popularity and are associated with high technical success and a low complication rate.<sup>4</sup>

In patients with high surgical risk, a minimally invasive technique that employs the AngioVac transcatheter aspiration system (Angiodynamics) is increasingly being used to debulk right-sided valve vegetations, thrombi, or tumors, with the goal of reducing the bacterial or embolic burden to temporize the acute illness.<sup>5-7</sup> The AngioVac system is based on an extracorporeal circuit in a veno-venous configuration, and the system is rarely used in the left heart.<sup>8</sup> We describe

the novel use of simultaneous AngioVac evacuation and transcatheter MVIV in the same procedure.

## CASE PRESENTATION

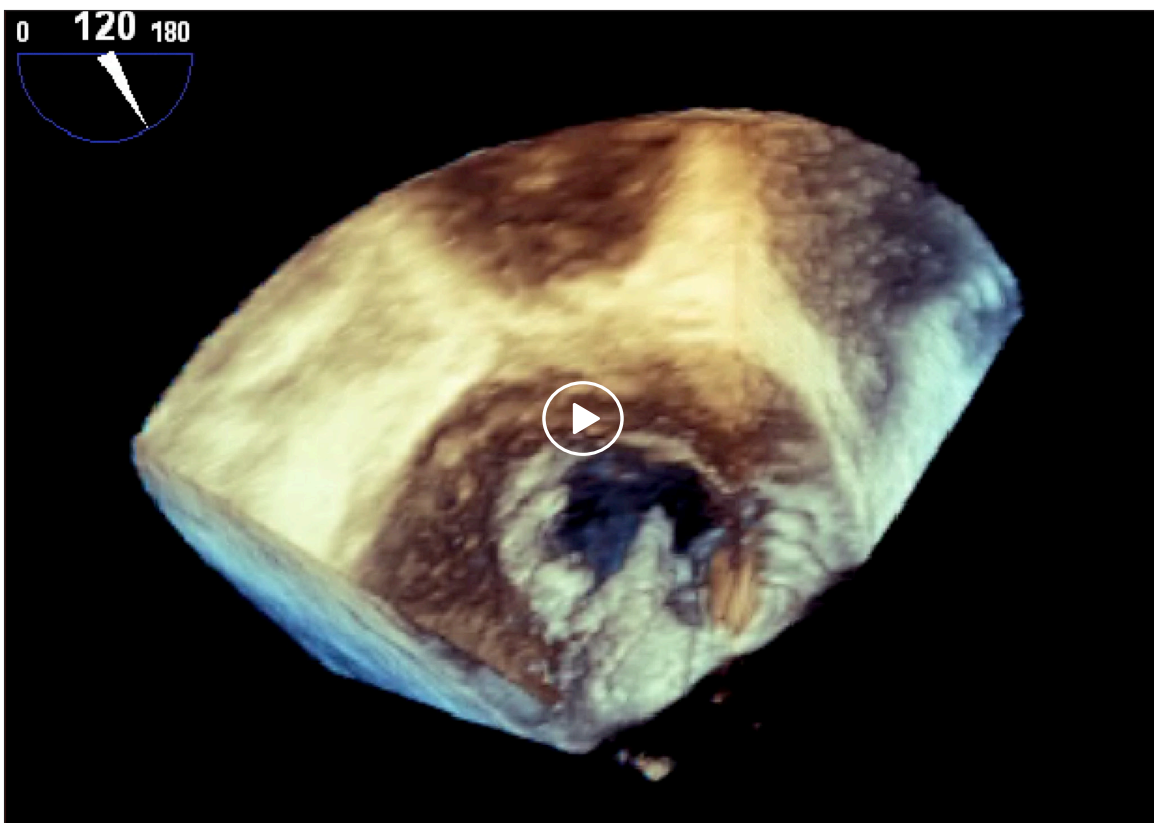
A 49-year-old female with a history of end-stage renal disease (ESRD) presented with new onset congestive heart failure 12 months after undergoing mitral (29 mm St Jude Epic) and aortic valve replacements for calcific valve disease. Transthoracic echocardiogram (TTE) showed focally thickened mitral prosthetic leaflets with increased transmitral flow (mean gradient of 12 mm Hg at a heart rate of 74 beats per minute with a pressure half time of 96 msec). Transesophageal echocardiogram (TEE) showed a large oscillating echodensity suggestive of a vegetation; it attached to the prosthetic mitral valve ring that crossed the valve plane (Figure 1, Videos 1 A, 1 B). She had severe mitral regurgitation with a vena contracta of 0.9 cm (Figure 2).



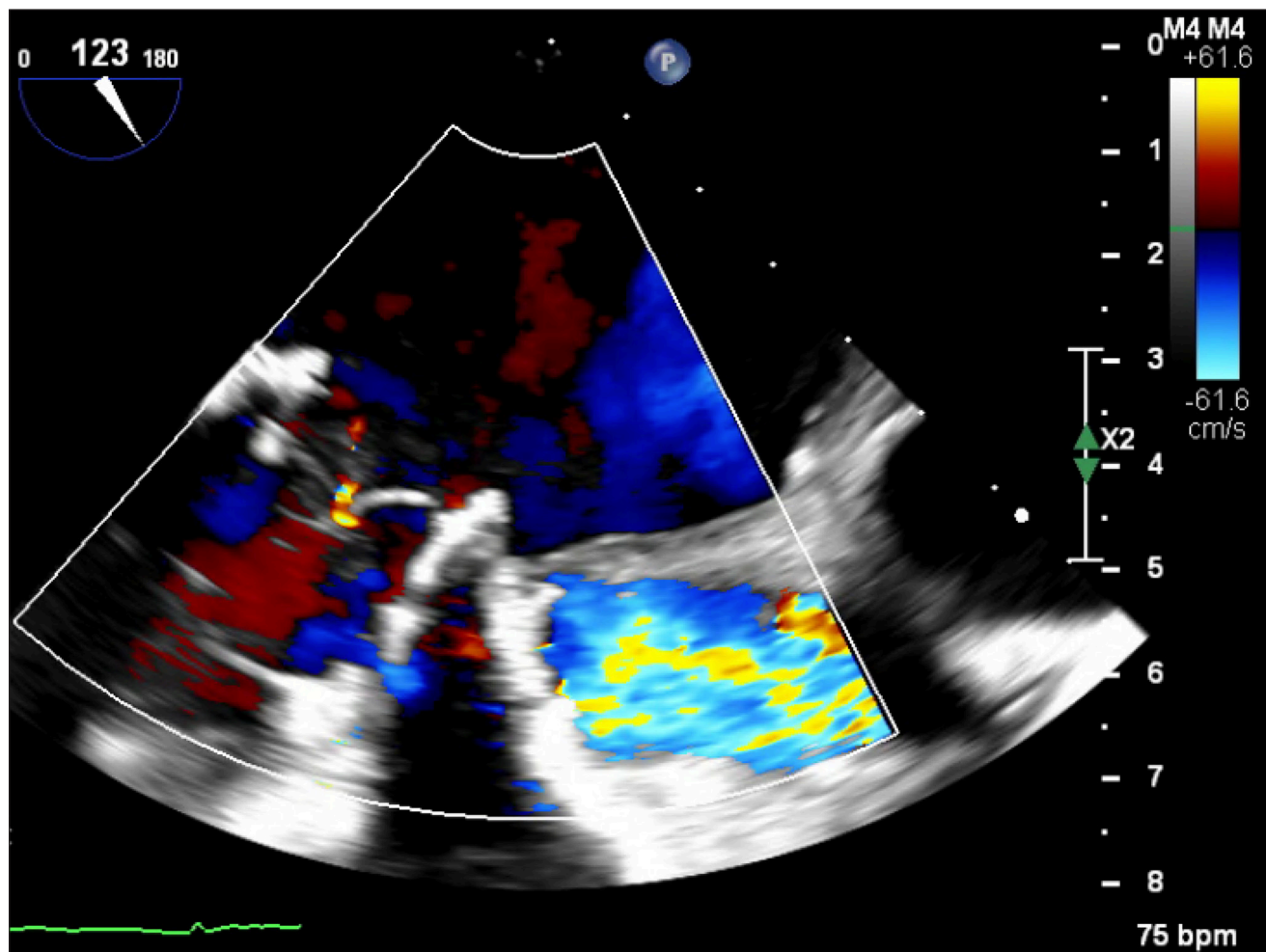
**Figure 1** Transesophageal echocardiogram showing severe mitral regurgitation.



**Video 1 (A)** Transesophageal echocardiogram 2-dimensional video showing a large oscillating echodensity on the bioprosthetic mitral valve, also at <https://youtu.be/hm8LprvaWDY>.



**Video 1 (B)** Transesophageal echocardiogram 3-dimensional video of oscillating echodensity, also at <https://youtu.be/qfxDc736LG4>.



**Figure 2** Transesophageal echocardiogram showing trivial mitral regurgitation after valve-in-valve procedure.

The aortic bioprosthesis displayed normal function. Blood cultures were obtained, and intravenous antibiotics were started. Based on her clinical presentation, history of flu-like illness 3 months prior to presentation, and negative blood cultures, this was determined to be an old vegetation.

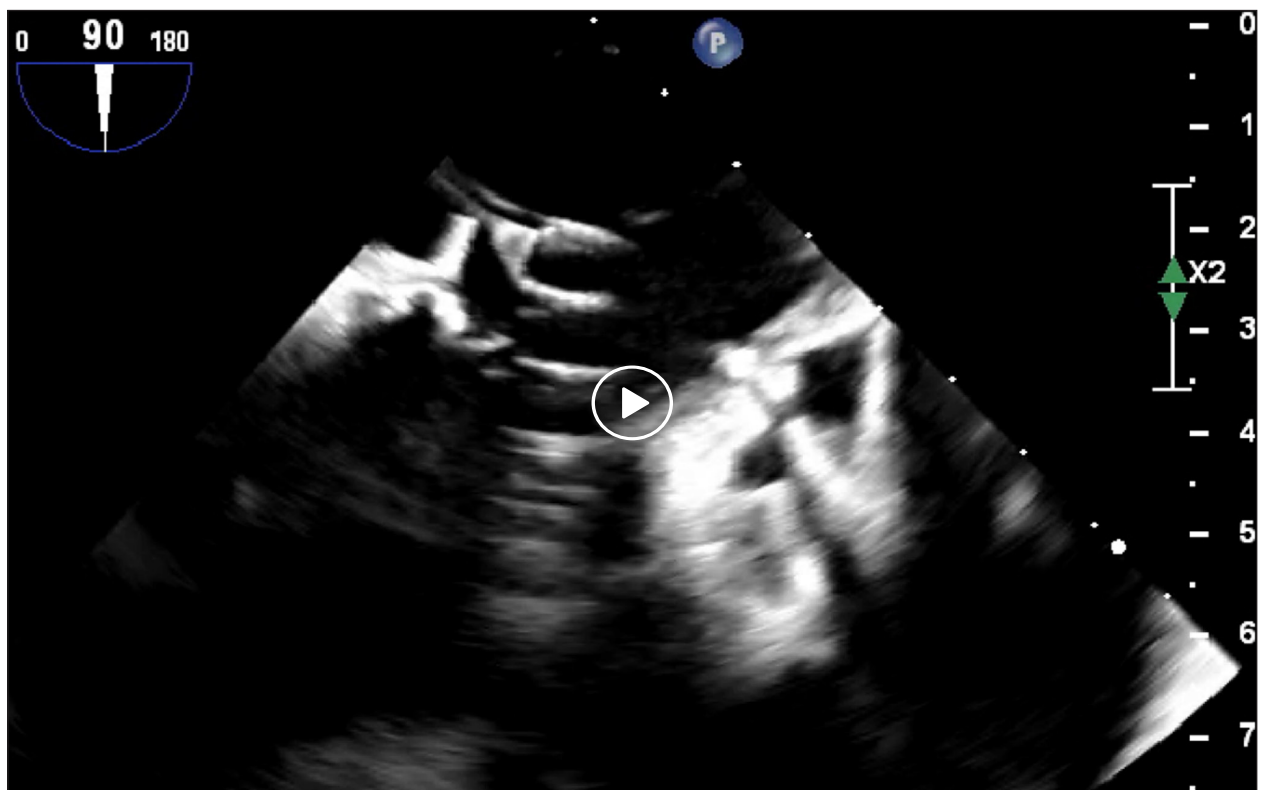
The patient was deemed to be at prohibitive surgical risk for a redo mitral valve surgery because her Society of Thoracic Surgeons risk score was found to be 10.5% for mitral valve repair and 15.6% for mitral valve replacement. After a multidisciplinary team discussion and shared decision making with the patient, the decision was made to undergo extracorporeal aspiration of the mitral valve vegetation using the AngioVac system as well as a percutaneous transcatheter MVIV replacement. The patient was treated with antibiotics and anticoagulation for several weeks prior to the procedure in an attempt to stabilize the vegetation as much as possible. Blood cultures were negative prior to the MVIV.

Due to the risk of thromboembolism and stroke during AngioVac of left-sided endocarditis, we considered using a SENTINEL™ Cerebral Protection System (Boston Scientific

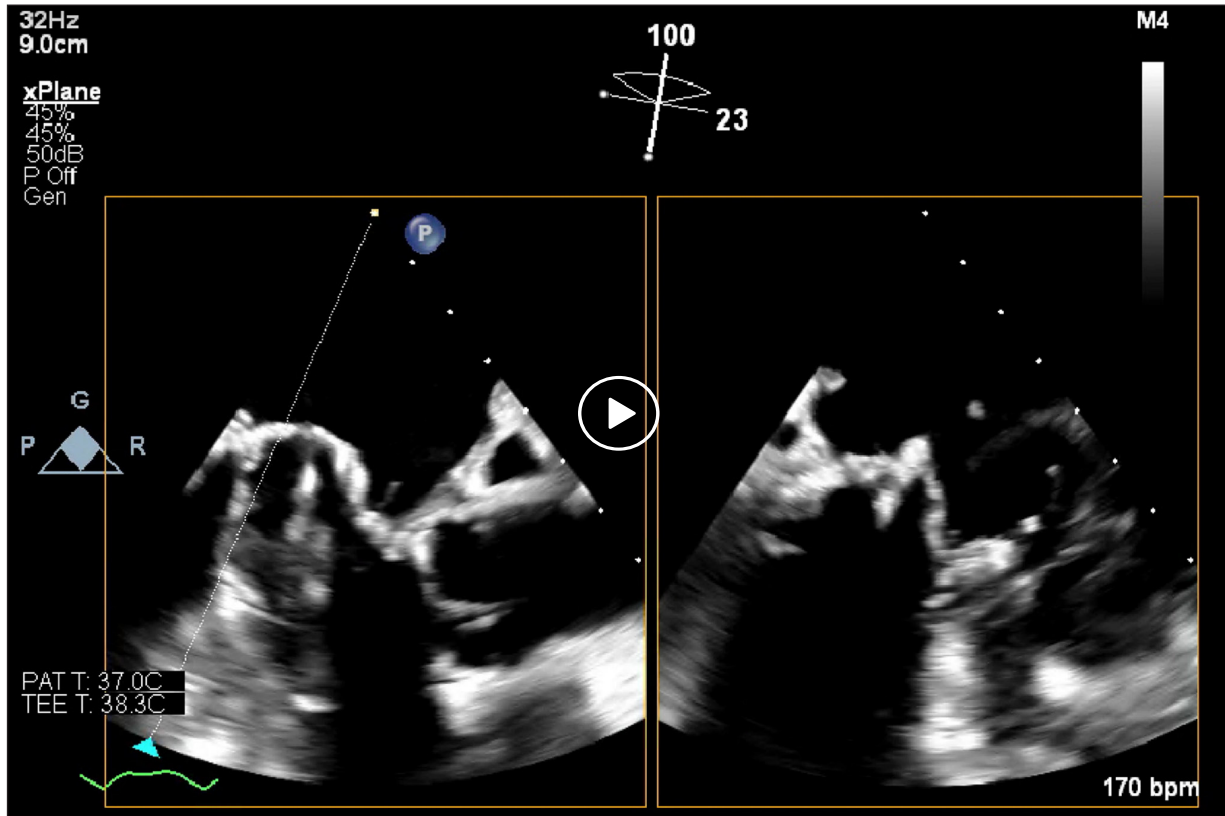
Corp.) but were unable due to access issues in the setting of her atrioventricular fistula. Under general anesthesia, a transeptal puncture was performed using a right femoral vein approach. The left femoral vein was also cannulated for the return of blood. Afterwards, the AngioVac cannula was advanced into the left atrium with the cannula directed towards the vegetation at the posterior aspect of the valve. The residual vegetation was carefully evacuated (Figure 3, Video 2). Then, an Agilis HisPro™ steerable catheter (Abbott) was used, and the bioprosthetic mitral valve was crossed using a JR 4 and J wire. A 26-mm Edwards S3 prosthesis was implanted through the same transeptal puncture site (Video 3). There was no residual vegetation, and the mean transmitral gradient after MVIV implantation was 5 mm Hg (Video 4). The vegetation (Figure 3) was sent for culture and subsequently showed no growth. The iatrogenic atrial septal defect was not closed, which is typical unless special circumstances arise. After the procedure, the patient was treated with vancomycin, ceftazidime, and doxycycline for a 6-week course. She was not discharged on anticoagulation due to her bleeding risk and especially given her ESRD. She



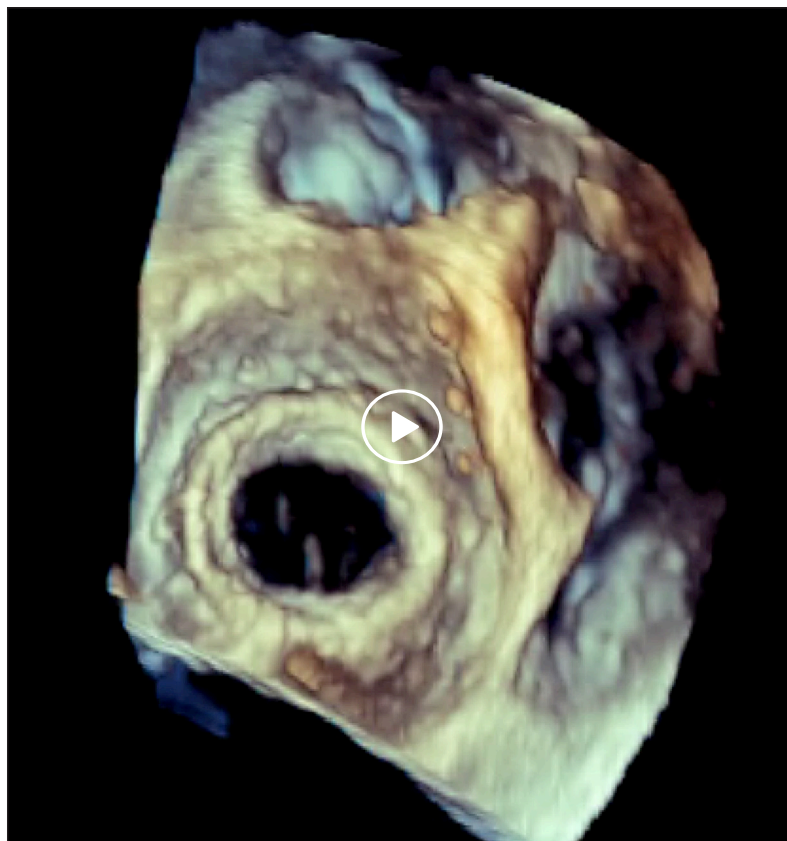
**Figure 3** Aspirated material after AngioVac removal.



**Video 2** Transesophageal echocardiogram video showing AngioVac removal of the vegetation, also at <https://youtu.be/HJ1yQsG7wPU>.



**Video 3** Transesophageal echocardiogram video showing successful deployment of a 21-mm Edwards Trifecta™ Bioprosthesis in the bioprosthesis mitral valve, also at <https://youtu.be/qvsrElMhhKs>.



**Video 4** Transesophageal echocardiogram 3-dimensional video showing final results, also at <https://youtube.com/shorts/vG34eVLoP5M>.

was eventually discharged home with resolution of her symptoms. One month after the procedure, TTE showed no residual mitral regurgitation (Video 5).

## DISCUSSION

This case was challenging since the patient was at prohibitive surgical risk, with a large vegetation that caused severe mitral regurgitation and a failing mitral bioprosthesis. Medical management alone was unlikely to resolve such a large vegetation or the severe mitral regurgitation. The initial AngioVac evacuation allowed safe implantation of the MViV prosthesis. Transcatheter aortic ViV implantation for aortic regurgitation secondary to bioprosthetic aortic valve endocarditis was reported by Fathi et al.<sup>9</sup> They described a ViV transcatheter aortic valve implantation 8 months after treatment of infective endocarditis, and antibiotics were administered 6 weeks post procedure. The most common indications of ViV replacements include degenerated mitral prostheses, failed surgical rings, and severe mitral annular calcifications.<sup>10</sup>

A meta-analysis of studies using the AngioVac system has shown resolution of endocarditis in 80% of patients.<sup>8</sup> Furthermore, a retrospective analysis of high-risk patients

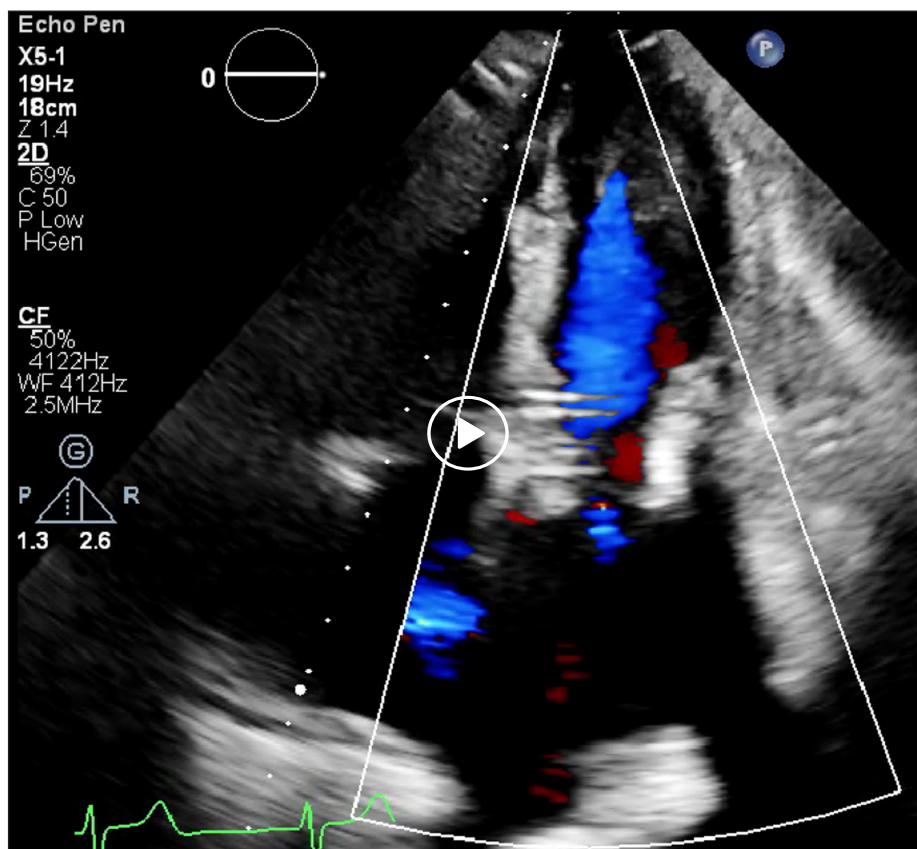
with a median Society of Thoracic Surgeons score of 10% who underwent MViV showed a 90.9% technical success rate and a 30-day mortality rate of 8.1%,<sup>1</sup> with a left ventricular outflow tract obstruction rate of 0.7%. Post-procedure mitral valve function was good, with a median mitral valve gradient of 4 mm Hg and residual mitral regurgitation of 1+ or less in 98.1% of patients.<sup>10</sup> However, the long-term effects of these procedures are not known and require further studies.

## CONCLUSION

This was a novel case of treatment for a failed mitral stented bioprosthesis using the AngioVac system to remove a large left-sided vegetation followed by a transcatheter MViV. Based on these findings, concomitant use of both procedures can be considered for large left-sided vegetations. While not approved by the US Food and Drug Administration for this indication, this combined approach may be an option for patients with high to prohibitive surgical risk.

## COMPETING INTERESTS

The authors have no competing interests to declare.



**Video 5** Transthoracic echocardiogram 1 month after valve-in-valve procedure, also at <https://youtu.be/CqxZ1Pfmt-o>.

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