

USE OF RIGHT-SIDED SUPPORT DEVICE IN ISOLATED RIGHT VENTRICULAR FAILURE FROM DEGENERATION OF BIOPROSTHETIC SURGICAL MITRAL VALVE



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Introduction

Use of right-sided device in the setting of isolated right ventricular failure resulting from degeneration of bioprosthetic surgical mitral valve has not been previously reported.

Discussion

This is the first time a transeptal mitral valve in valve replacement has been done using a double lumen right internal jugular VPa ECMO circuit in a setting of isolated decompensated right heart failure from mitral stenosis. Three mechanisms associated with mitral valve disease likely caused the pulmonary hypertension which lead to the RV failure. These include: backward transmission of elevated left atrial and pulmonary venous pressures into the pulmonary artery, pulmonary arteriolar vasoconstriction induced by pulmonary venous hypertension, and morphologic changes in the pulmonary vasculature. The backflow pressure and pulmonary arteriolar vasoconstriction were rapidly reversed by pressure after TMVR; however, the morphologic changes were not. The patient did have significant improvement of the RV mean pressure gradient, pulmonary artery pressure and RV function.

Case Presentation

49 year- old female presented for shortness of breath in December 2023. She had history of bacterial endocarditis which occurred after a dental infection. This patient underwent bioprosthetic aortic and mitral valve replacement in 2012. She also had transaortic valve replacement (TAVR) inside of surgical aortic valve replacement (SAVR) in 2022 due to severe aortic stenosis (AS) from structural valve degradation. A transesophageal echo revealed severe mitral stenosis (MS) with severe AS, however surgical intervention was postponed due to COVID.

In January 2024, the patient's breathing worsened - she had isolated decompensated right heart failure. Right heart catheter showed cardiac output (CO) of 3, cardiac index (CI) of 1.5, systemic vascular resistance (SVR) of 1811 and pulmonary arterial (PA) pressure of 88/33 mmHg. Management included diuretics, milrinone, norepinephrine with inhaled epoprostenol for cardiogenic shock and severe pulmonary hypertension. The patient developed refractory hypoxia and worsening shock requiring intubation. She then received venous-pulmonary artery (VPa) extracorporeal membrane oxygenation (ECMO) via single cannula double lumen right internal jugular catheter. Since surgical mortality percentage was high, patient underwent transcatheter mitral valve replacement (TMVR) into her existing bioprosthetic MV. This resulted in reduction in her MV gradient from 29.2 mmHg to 5 mmHg and improvement in right ventricular systolic pressure from 120 mmHg to 83 mmHg. The following day she received TAVR-in-TAVR-in-SAVR and showed improvement in peak and mean pressure gradient of 116 mmHg and 70 mmHg to post-valve gradient of 34 mmHg and 14 mmHg with a trace paravalvular leak.

Conclusion

In the setting of isolated RV failure, as a result of severe MS, use of a right-sided support device is a viable option for RV support when it is accompanied by percutaneous replacement for long-term recovery.

Social Determinants of Health

It is well known that bioprosthetic valves only last approximately 10 years and are usually reserved for those greater than 70 years old. Unfortunately, at the age of 37, the patient and operating surgeon went forth with bioprosthetic valves over mechanical valves so the patient would be able to avoid life-long anticoagulation. It is very likely that should the patient have had proper education on the risks and benefits of mechanical valves and anticoagulation, a different decision would have been made and the patient might still be alive today. Thus, it is extremely important to take a holistic and extremely thorough approach to patient education.