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**RESEARCH ARTICLE**

# VALVE IN VALVE TRANSCATHETER AORTIC VALVE REPLACEMENT IN A PATIENT WITH FAILED BIOPROSTHETIC VALVE POST BENTALL SURGERY - A CASE REPORT

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**ABSTRACT**

One of the major concerns of using bioprosthetic valve in Surgical Aortic Valve Replacement (SAVR) or Bentall surgery is the risk of structural valve deterioration (SVD) leading to bioprosthetic failure. It can lead to aortic stenosis, regurgitation or combined stenosis and regurgitation. As a redo-surgery can be associated with multiple complications, Valve in valve Transcatheter Aortic Valve Replacement (VIV-TAVR) can provide a safer alternative.



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# INTRODUCTION

Authors report the case of a 73-years old female patient who presented with severe aortic restenosis owing to structural valve deterioration (SVD) after a Bentall surgery with bioprosthetic valve (Bio-bentall) and underwent Valve in Valve Transcatheter Aortic Valve Replacement (VIV TAVR) under conscious sedation. The patient was a known case of diabetes, hypertension, atrial fibrillation, coronary artery disease and moderate Left ventricle (LV) dysfunction.

She underwent single vessel grafting of Left internal mammary artery (LIMA) to Left anterior descending (LAD) artery along with Bio-Bentall procedure surgery involving aortic root replacement with concomitant replacement of aortic valve with a bio-prosthesis several years ago. She gave history of recurrent admissions in the last year due to heart failure which was managed medically. She was started on anti-failure medications and rate control drugs.She now presented with chest tightness and exaggerated shortness of breath on routine activities and on evaluation, was found to have valvular

degeneration causing severe Aortic stenosis (AS) due to bio-prosthesis failure. ECG revealed atrial fibrillation and conduction abnormality. Serum creatinine was 1.1 and potassium was 6.0 for which nephrologist opinion was taken and correction was given for same. Other laboratory parameters were within normal limits. She had a moderate LV dysfunction with ejection fraction of 45%. Coronary angiogram was done which revealed a patent LIMA to LAD graft and 50-60% lesion in left circumflex artery. Valve-in-valve TAVR within an aortic valve and root homograft was plannedas it is a less invasive and safer method to treat structural valve deterioration (SVD) than a redo open heart surgery. Patient and relatives were explained regarding the high risk associated with the procedure and need for emergency surgery in case of any procedural complication. General and high-risk anaesthesia consent was taken. On the day of the surgery, the regular medications were continued. Under local anaesthesia, a wide bore 18-gauge peripheral venous line, left femoral arterial line and left femoral venous line were secured. The procedure was performed under mild sedation using midazolam and fentanyl. The procedure was perfomed via right transfemoral route with self-expanding Evolut R 23mmvalve. Postoperative transthoracic echocardiography (TTE) demonstrated normal functioning of the newly implanted aortic valve with a gradient of 5mmhg across the valve with no paravalvular leak or regurgitation. No bleeding/hematoma/ focal neuro-deficit was noted at the end of procedure. Patient tolerated the procedure well. She was hemodynamically stable throughout the procedure and was shifted to ICU afterwards for monitoring. Once stable, she was shifted out to ward on second postoperative day and mobilised gradually. She was discharged in stable condition after 7 days of hospital stay.

# DISCUSSION

Patients undergoing an aortic root replacement with concomitant replacement of the aortic valve with a bioprosthesis (Bio-bentall) are at risk for bioprosthesis failure.Compared with mechanical valves, bioprosthetic valves are associated with fewer bleeding complications but a higher risk of reoperation for SVD.[1,2] SVD is a gradual process which is characterized by progressive calcification, fibrosis, and wear and tear of valve leaflets, ultimately leading to valve dysfunction secondary to stenosis (~40%), regurgitation (~30%), or combined stenosis and regurgitation (~30%).[3] The younger a patient is at the time of bioprosthetic valve implantation, the greater are the chances of reoperation for SVD in his lifetime.[4] Although TAVR is rapidly gaining popularity as an alternative to SAVR for ASand is the treatment of choice in patients who are at high risk for surgical repair, valve in valve TAVR is a particularly challenging subsetwith limited published reports. There are very few cases reported on VIV-TAVR in patients with failed Bio-bentall. Beigel et al reported two cases with Marfans syndrome who underwent a valve in valve TAVR in the setting of a previous Bio-bentall.[5] VIV TAVR has several advantages over SAVR including avoidance of sternotomy, aortotomy, need for cardiopulmonary bypass (CPB) and thus decreased perioperative risks and better outcome. VIV- TAVR has the potential to reduce high perioperative mortality associated with redo- SAVR and improves the long term survival. There are some rare complications associated with TAVR which can be life threatening like vascular injuries, arrhythmias, renal impairment, neurological complications, cardiac tamponade, prosthesis mal-positioning and is thus reserved mostly for patients who are not fit or are at high risk for surgical repair. [6,7] Intraoperative monitoring should include the standard ASA monitors, central venous pressure, invasive blood pressure, urine output, pulmonary artery pressure in selected cases, TEE and cardiac output monitoring whenever required. The choice of anaesthesia technique for TAVR varies from local anaesthesia with sedation (LAS) to general anaesthesia (GA) and the decision is taken by the anaesthesiologist based on preoperative comorbidities, procedural approach and protocol of the institute. GA is advisable in patients who are unable to lie supine for prolonged period of time like those with neurological impairment and patients with advanced heart failure with pulmonary edema.Apart from patient tolerability, other advantages of GA include patient immobility during valve positioning, reduction of breathing artifacts andto facilitate the use of transesophageal echocardiography (TEE) to assist optimal valve placement and prompt recognition of complications such as tamponade or interference with mitral valve and to identify any residual regurgitation or paravalvular leaks after valve implantation.[8]We chose LAS as the choice of anaesthetic technique as it provides better hemodynamic stability which is the main objectiveincluding maintaining preload and a low heart rate to allow adequate diastolic filling in view of AS and to maintain sinus rhythm. Intraoperative TEE was not done in our case as only mild sedation was given and instead we used TTE at the end of procedure.

Intraoperative monitoring should include the standard ASA monitors, central venous pressure, invasive blood pressure, temperature, urine output, pulmonary artery pressure in selected cases, TEE if under general anaesthesia and cardiac output monitoring whenever required. TAVR is performed predominantly via a transfemoral arterial approach, where a transcatheter heart valve (THV) is delivered in a retrograde fashion through the iliofemoral arterial system and into the native aortic valve annulus.[9] In our case, the procedure was uneventful and was performed under mild sedation with local anaesthesia and had good recovery in the postoperative period. It can thus be concluded that VIV TAVR can be considered as a new option in the management of patients with bioprosthetic valves and can reduce the concern of durability of Bio-bentall by providing an option of percutaneous VIV-TAVR in case of SVD.However, further studies are needed to compare its safety versus redo open heart surgery for patients with failed Bio-bentall or failed bioprosthetic valve post SAVR.

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