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From TAVR to SAVR: Surgical Rescue After Embolized Transcatheter Aortic Valve

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Abstract

Background: Transcatheter aortic valve replacement (TAVR) is an established treatment for severe aortic stenosis; however, emergent conversion to surgical aortic valve replacement (SAVR), although uncommon, remains associated with substantial morbidity and mortality.
Case Report: A 71-year-old man with mixed aortic valve disease, including severe aortic stenosis by Doppler parameters and moderate-to-severe aortic regurgitation, underwent elective transfemoral TAVR with a 26-mm SAPIEN 3 Ultra Resilia valve. The valve was deployed using nominal plus 2 mL balloon volume, with an estimated implantation depth of 80% aortic and 20% ventricular. Immediate post-deployment transthoracic echocardiography demonstrated satisfactory valve position and hemodynamic function. On postoperative day 1, routine transthoracic echocardiography revealed embolization of the transcatheter valve into the left ventricular outflow tract (LVOT). Intraoperative transesophageal echocardiography demonstrated interference with the anterior mitral leaflet and moderate mitral regurgitation. Surgical exploration revealed a transcatheter valve rotated approximately 90 degrees within the LVOT with laceration of the ventricular surface of the anterior mitral leaflet by the proximal stent struts. The valve was successfully explanted, the mitral leaflet was repaired, and SAVR was performed using a 27-mm Edwards Inspiris bioprosthetic valve. The postoperative course was complicated by transient acute kidney injury, which resolved before discharge on postoperative day 9.
Conclusion: This case demonstrates a rare and potentially catastrophic complication of TAVR involving delayed valve embolization into the LVOT with secondary mitral leaflet injury. Early recognition, careful post-procedural imaging, multidisciplinary decision-making, and immediate access to cardiac surgical expertise are essential for successful management.

Keywords: transcatheter aortic valve replacement, valve embolization, surgical bailout, left ventricular outflow tract, mitral valve injury

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1. Introduction

Transcatheter aortic valve replacement (TAVR) has become an established treatment for patients with symptomatic severe aortic stenosis, particularly when a transcatheter approach is favored after multidisciplinary heart-team evaluation. Although improvements in valve design, delivery systems, imaging, and procedural technique have substantially improved procedural safety, rare catastrophic complications may still require emergent conversion to open cardiac surgery.

In a large retrospective analysis of 47,546 patients from the Society of Thoracic Surgeons/American College of Cardiology Transcatheter Valve Therapy (STS/ACC TVT) Registry who underwent TAVR between 2011 and 2015, surgical bailout occurred in 1.17% of cases. The most common indications were valve dislodgement, ventricular rupture, and aortic annular rupture. Surgical bailout was associated with approximately 50% mortality at 30 days and approximately 60% mortality at 1 year. [1]

More contemporary data from the National Inpatient Sample Database included 68,141 patients undergoing percutaneous TAVR between 2017 and 2021. Surgical conversion occurred in 410 patients (0.6%). Although conversion remained uncommon, it was associated with substantial mortality. Liver disease, malnutrition, and rheumatic valve disease were identified as predictors of conversion. [2]

Long-term outcomes among patients who survive the initial high-risk period may be more favorable. A recent propensity-matched landmark analysis demonstrated that patients who survived at least 30 days following emergent conversion had 1-year outcomes comparable to those of matched patients undergoing uncomplicated TAVR. [3] These findings emphasize the importance of timely recognition and successful surgical rescue.

Valve embolization or malposition is among the recognized indications for surgical bailout. [1] The present case is unusual because the embolized valve migrated into the left ventricular outflow tract (LVOT), became rotated approximately 90 degrees relative to the native outflow tract axis, interfered mechanically with the mitral valve apparatus, and caused laceration of the ventricular surface of the anterior mitral leaflet. The case provides an opportunity to examine potential mechanisms of valve migration and emphasizes the importance of early

2. Objectives for Case Reporting

The objective of this case report is to describe a rare delayed embolization of a balloon-expandable transcatheter aortic valve into the LVOT with secondary mechanical injury to the anterior mitral leaflet, requiring emergent conversion to SAVR. The case also highlights considerations regarding valve selection and deployment in a patient with mixed aortic stenosis and significant aortic regurgitation.

3. Case Report

Patient Information

A 71-year-old man with a medical history significant for hypertension, hyperlipidemia, type 2 diabetes mellitus, atrial fibrillation, and obesity was evaluated for elective TAVR because of progressive symptomatic aortic valve disease. Before admission, he reported mild exertional dyspnea and bilateral lower-extremity edema.

Clinical Findings

On physical examination, the patient had 2+ bilateral pedal edema and a late-peaking systolic ejection murmur. He was 6 feet 2 inches (1.88 m) tall and weighed 320 lb (145.2 kg), with a body mass index of 31.09 kg/m² and a calculated body surface area of 2.654 m². No additional significant abnormalities were noted.

Diagnostic Assessment

Preprocedural transthoracic echocardiography demonstrated a trileaflet aortic valve with moderate leaflet sclerosis, moderate-to-severe aortic regurgitation, and moderate-to-severe aortic stenosis. Holodiastolic flow reversal was present in the descending aorta, with an aortic regurgitation pressure half-time of 394.5 ms. The mean aortic valve gradient was 36 mmHg, peak aortic jet velocity was 4.0 m/s, and aortic valve area calculated by the continuity equation was 1.3 cm². The LVOT-to-aortic valve velocity-time integral ratio was 0.32. The left atrium was severely dilated. Mild mitral and tricuspid regurgitation were present, with preserved left ventricular systolic function.

Computed tomography angiography performed for TAVR planning demonstrated an aortic annulus measuring 24 × 29 mm, with an annular area of 563 mm² and perimeter of 85 mm.

Coronary angiography demonstrated no significant obstructive coronary artery disease. Right-sided heart catheterization demonstrated elevated right-sided filling pressures and severe pulmonary hypertension.

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The patient underwent multidisciplinary heart-team evaluation and was considered an appropriate candidate for TAVR. The Society of Thoracic Surgeons Predicted Risk of Mortality (STS-PROM) score was 1.3%.

Therapeutic Intervention

The patient underwent elective transfemoral TAVR using a 26-mm SAPIEN 3 Ultra Resilia valve (Edwards Lifesciences, Irvine, CA, USA). Following balloon aortic valvuloplasty, the transcatheter valve was deployed in a standard fashion using nominal plus 2 mL balloon volume. The estimated implantation depth was approximately 80% aortic and 20% ventricular.

Immediate post-deployment transthoracic echocardiography (TTE) demonstrated satisfactory valve position. Hemodynamic assessment showed a mean aortic valve gradient of 8 mmHg, a peak aortic jet velocity of 2.0 m/s, and an LVOT-to-aortic valve velocity-time integral ratio of 0.65. No immediate evidence of significant prosthetic valve dysfunction was identified. The patient was transferred to the cardiovascular intensive care unit for postoperative monitoring.

Delayed Valve Embolization and Conversion to Surgical Aortic Valve Replacement

The immediate postoperative course was initially uneventful except for episodes of severe hypertension, with systolic blood pressure exceeding 200 mmHg. On postoperative day 1, routine transthoracic echocardiography demonstrated migration of the transcatheter valve into the LVOT, with an associated mean gradient of 18 mmHg.

Given the risk of progressive LVOT obstruction, mitral valve interference, and hemodynamic deterioration, the multidisciplinary heart team determined that emergent surgical removal of the transcatheter valve and conversion to SAVR was indicated.

Intraoperative transesophageal echocardiography demonstrated the embolized transcatheter valve positioned predominantly within the LVOT, with interference with the anterior mitral leaflet during diastole and associated moderate mitral regurgitation.

Following median sternotomy and initiation of cardiopulmonary bypass, cardioplegic arrest was achieved. Through a standard aortotomy, the transcatheter valve was found to be freely positioned within the LVOT and rotated approximately 90 degrees from the native outflow tract axis. The ventricular surface of the anterior mitral leaflet was lacerated by the proximal stent struts of the transcatheter valve.

The transcatheter valve was successfully explanted. Following removal of the native aortic valve and annular debridement, SAVR was performed using a 27-mm Edwards Inspiris bioprosthetic valve (Edwards Lifesciences, Irvine, CA, USA). The mitral leaflet laceration was repaired using a single 5-0 polypropylene figure-of-eight suture.

Concomitant procedures included biatrial cryoablation and a bipolar MAZE procedure with left atrial appendage exclusion for atrial fibrillation. Post-cardiopulmonary bypass transesophageal echocardiography demonstrated a well-seated surgical bioprosthetic valve without transvalvular or paravalvular regurgitation, with a mean transvalvular gradient of 2 mmHg. The mitral valve apparatus demonstrated normal function following repair.

Postoperative Course and Follow-Up

The postoperative course was complicated by acute kidney injury, which resolved with supportive management. Inotropic support was successfully discontinued by postoperative day 7.

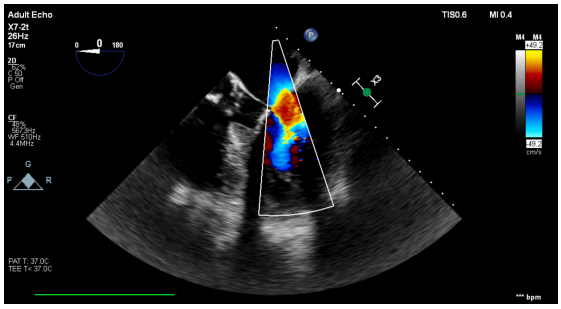

Figure 1 demonstrates the embolized transcatheter valve positioned within the LVOT on postoperative transthoracic echocardiography.

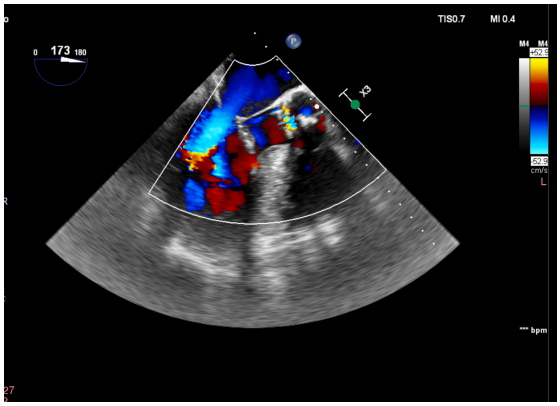

Figure 2. Transesophageal echocardiography, long-axis view. The embolized transcatheter aortic valve is visualized within the LVOT, demonstrating its abnormal position and interference with anterior mitral leaflet motion, resulting in functional mitral inflow obstruction.

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Repeat transthoracic echocardiography demonstrated a left ventricular ejection fraction of 50% and a mean aortic valve gradient of 14 mmHg.

The patient was discharged home in stable condition on postoperative day 9. At discharge, he was hemodynamically stable, breathing comfortably on room air, and ambulating independently. Close outpatient follow-up with cardiology and nephrology was arranged.

At 30-day surgical follow-up, the incisions were well healed and the patient was functioning independently without reported limitation.

4. Discussion

TAVR has substantially changed the management of severe aortic stenosis, with progressive reductions in procedural complications and emergent conversion to open cardiac surgery. Nevertheless, surgical bailout remains an uncommon but potentially catastrophic event. In the STS/ACC TVT Registry, surgical bailout occurred in 1.17% of 47,546 TAVR procedures, with valve dislodgement representing approximately 22% of bailout cases. Mortality remained approximately 50% at 30 days. [1] Contemporary National Inpatient Sample data demonstrated a 0.6% conversion rate among 68,141 TAVR procedures performed between 2017 and 2021. [2]

The present case is notable not only because of transcatheter valve embolization but also because of the location and consequences of the migration. The valve migrated into the LVOT, rotated approximately 90 degrees, and subsequently interacted directly with the anterior mitral leaflet. This resulted in mechanical laceration of the ventricular surface of the leaflet and moderate mitral regurgitation. Such collateral injury highlights the potential for an embolized valve to cause progressive damage to adjacent cardiac structures even when the patient is not initially in overt hemodynamic collapse.

Potential Mechanisms of Valve Embolization

The mechanism of valve migration in this patient is likely multifactorial. Severe postoperative hypertension may have contributed to increased mechanical forces acting on the recently implanted prosthesis; however, hypertension alone cannot establish the cause of embolization. Other recognized contributors include inadequate prosthetic anchoring, insufficient interaction between the prosthesis and the native annulus, prosthesis-annulus mismatch, deployment depth, valve underexpansion, annular

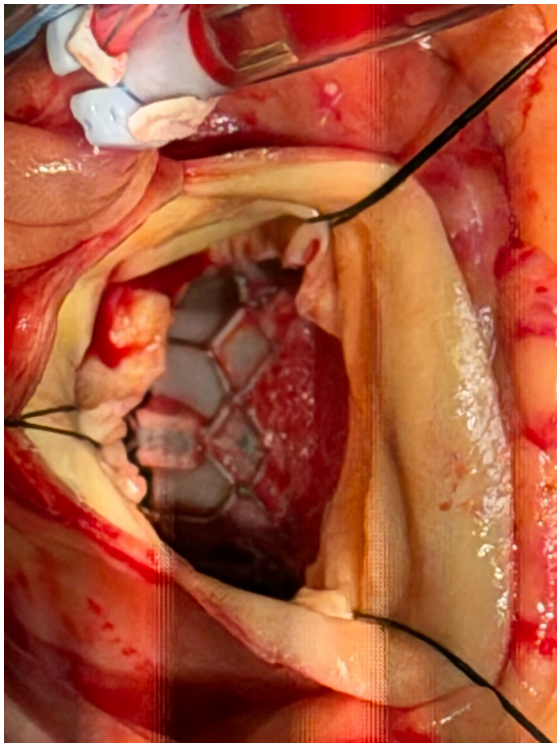

Figure 3. Intraoperative view. Direct surgical inspection demonstrates the embolized transcatheter aortic valve freely positioned within the left ventricular outflow tract and left ventricular cavity.

geometry, and the degree and distribution of native leaflet or annular calcification.

The presence of significant aortic regurgitation is particularly relevant. Unlike aortic stenosis, native aortic regurgitation may be associated with less calcification available for anchoring a transcatheter valve. Conventional TAVR devices have historically been designed primarily for calcific aortic stenosis, and their use in pure native aortic regurgitation has generally been considered off-label. Lack of adequate calcification can increase the risk of prosthetic valve migration or embolization. [4,5]

In this patient, the preprocedural echocardiogram demonstrated mixed aortic valve disease, including moderate-to-severe aortic regurgitation and moderate-to-severe aortic stenosis. The peak velocity of 4.0 m/s and mean gradient of 36 mmHg demonstrated substantial stenotic physiology, although the calculated valve area was 1.3 cm^2. Thus, the indication should be understood in the context of mixed disease rather than pure aortic regurgitation.

Valve Sizing and Deployment Considerations

The preprocedural CT demonstrated an annular area of 563 mm^2 and perimeter of 85 mm. This measurement lies near the upper portion of

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the sizing range for a 26-mm SAPIEN 3 Ultra valve and raises an important question regarding whether a 29-mm valve might have provided a different degree of annular engagement.

In the present case, the 26-mm valve was deployed using nominal plus 2 mL balloon volume, with an estimated 80/20% aortic/ventricular implantation depth. The medical record available for this report does not document the specific rationale for selecting a 26-mm rather than a 29-mm valve. Therefore, the authors cannot retrospectively establish whether use of a larger prosthesis would have prevented migration.

Similarly, it cannot be determined from this single case whether initial SAVR would necessarily have produced a superior outcome. The patient underwent heart-team evaluation and had an STS-PROM of 1.3%, and the decision to perform TAVR was made based on the clinical assessment at that time. Nevertheless, the presence of substantial aortic regurgitation and the relatively large annular dimensions emphasize the importance of individualized heart-team assessment of valve morphology, annular sizing, anchoring characteristics, and the appropriateness of a transcatheter versus surgical strategy.

Data regarding TAVR in native aortic regurgitation support this concern. In a U.S. database analysis, patients undergoing TAVR for pure native aortic regurgitation had a higher incidence of surgical bailout than patients undergoing TAVR for aortic stenosis. [4] More recent literature also emphasizes the limitations of conventional transcatheter valves in native aortic regurgitation and the potential advantages of devices specifically designed for this anatomy. [5]

Timing of Recognition and Surgical Rescue

The timing of recognition was critical in this case. Immediate post-deployment TTE showed satisfactory prosthetic valve position and function. However, routine imaging on postoperative day 1 identified migration of the valve into the LVOT. The absence of immediate severe hemodynamic collapse should not be interpreted as evidence that a migrated valve is benign. An embolized prosthesis can progressively obstruct the LVOT, interfere with the mitral valve apparatus, or produce structural injury.

The intraoperative findings demonstrated that the valve had rotated approximately 90 degrees and that its proximal stent struts had lacerated the anterior mitral leaflet. Earlier surgical intervention likely limited the extent of secondary structural damage. Although the present case cannot establish a causal relationship between timing and the extent of leaflet injury, it illustrates the importance of prompt recognition and intervention when a transcatheter valve migrates into the LVOT.

The high mortality historically associated with emergent surgical bailout is largely related to the severity of the underlying complication and the physiologic instability accompanying conversion. In the STS/ACC TVT Registry, 30-day mortality following surgical bailout was approximately 50%. [1] More contemporary data suggest that outcomes have improved, with in-hospital mortality after conversion declining in recent years. [2] Furthermore, among patients who survive the initial 30-day period, subsequent outcomes may approach those of uncomplicated TAVR patients. [3]

Clinical Implications

This case has several implications for clinical practice. First, meticulous preprocedural assessment of valve morphology and annular dimensions remains essential, particularly when significant aortic regurgitation accompanies aortic stenosis. Second, the degree of native calcification and the anticipated anchoring mechanism should be considered when selecting and sizing a transcatheter prosthesis. Third, post-procedural imaging remains important even when immediate post-deployment assessment is reassuring.

Finally, TAVR programs should maintain immediate access to multidisciplinary heart-team expertise and cardiothoracic surgical support. The ability to rapidly transition from transcatheter therapy to surgical rescue was critical in this case. The favorable outcome despite a potentially catastrophic complication demonstrates that timely recognition and definitive surgical management can result in successful recovery.

5. Conclusion

Delayed embolization of a transcatheter aortic valve into the LVOT is a rare but potentially life-threatening complication of TAVR. In this case, valve migration resulted in rotation of the prosthesis, LVOT obstruction, and mechanical laceration of the anterior mitral leaflet, necessitating emergent conversion to SAVR. The case emphasizes several important considerations: careful assessment of valve morphology and annular dimensions before TAVR, appropriate prosthesis selection and deployment, consideration of significant native aortic regurgitation as a potential risk factor for inadequate valve anchoring, vigilant post-

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procedural imaging, and rapid multidisciplinary response to valve migration. Although the specific mechanism of embolization in this patient cannot be definitively established, early recognition and prompt surgical intervention prevented further structural injury and resulted in a favorable short-term outcome.

6. Declarations

Ethics Approval and Consent to Participate

The case was reviewed and approved by the Institutional Review Board of St. Elizabeth Youngstown Hospital. Written informed consent was obtained from the patient for publication of clinical information and accompanying images.

Consent for Publication

Written informed consent for publication of the patient's clinical information and images was obtained from the patient.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Author Contributions

All authors participated in the clinical management, preparation, review, and approval of the final manuscript. All authors accept responsibility for the accuracy and integrity of the work.

References

1. Pineda AM, Harrison JK, Kleiman NS, Rihal CS, Kodali SK, Kirtane AJ, et al. Incidence and outcomes of surgical bailout during TAVR: insights from the STS/ACC TVT Registry. JACC Cardiovasc Interv. 2019;12(18):1751-1764. doi:10.1016/j.jcin.2019.04.026.
2. McGrath D, Sun C, Zhu M, Warner P, Yin K, Zhan Y. Incidence and outcomes of surgical bailout for transcatheter aortic valve replacement. Eur J Cardiothorac Surg. 2026;68(1). doi:10.1093/ejcts/ezaf435.
3. Nasso G, Vignaroli W, Contegiacomo G, Marchese A, Greco E, Fattouch K, et al. Conditional 1-year outcomes after emergent conversion to open heart surgery during transcatheter aortic valve implantation: a propensity-matched landmark analysis. Front Cardiovasc Med. 2025;12:1660381. doi:10.3389/fcvm.2025.1660381.
4. Isogai T, Saad AM, Ahuja KR, Shekhar S, Abdelfattah OM, Gad MM, et al. Short-term outcomes of transcatheter aortic valve replacement for pure native aortic regurgitation in the United States. Catheter Cardiovasc Interv. 2021;97(3):477-485. doi:10.1002/ccd.29189.
5. Urena M, Himbert D, Ohlmann P, Capretti G, Goublaire C, Kindo M, et al. Transcatheter aortic valve replacement to treat pure aortic regurgitation on noncalcified native valves. J Am Coll Cardiol. 2016;68(15):1707-1710. doi:10.1016/j.jacc.2016.07.746.

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