TAV-in-TAV for Acute Failure of a Transcatheter Aortic Valve in a High Surgical Risk Octogenarian Patient

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Abstract

An 82-year-old patient with severe aortic valve stenosis and high risk for conventional surgery due to chronic renal dysfunction and restrictive lung disease underwent transfemoral transcatheter aortic valve implantation (TAVI) using a self-expanding Navitor® prosthesis (Abbott). Immediately after implantation, valve dysfunction was observed, characterized by inversion of the right coronary leaflet, resulting in severe acute prosthetic regurgitation and hemodynamic instability. Therefore, a 21.5 mm balloon-expandable Myval® prosthesis was also implanted (TAV-in-TAV). The critical condition was resolved with immediate hemodynamic recovery. This case demonstrates the efficacy and safety of TAV-in-TAV as a bailout intervention in acute prosthetic failure.

Introduction

Degenerative aortic stenosis is the most prevalent valvular heart disease in older patients and is often associated with high mortality when untreated.[1,2] The standard treatment is valve replacement; however, the surgical risk is elevated in older patients and in those with significant comorbidities.[1,2] Transcatheter aortic valve implantation (TAVI) is a safe and effective alternative in these cases.[1-3] Although immediate mechanical complications (e.g., acute prosthetic dysfunction) are rare, they may be potentially fatal.[1-4] Immediate malfunction of Navitor® prostheses has recently been reported, possibly related to manufacturing defects or adverse anatomical interactions.[5]

This report describes a case of immediate dysfunction of a self-expanding prosthesis (Navitor®), successfully corrected using an emergent transcatheter aortic valve–in–transcatheter aortic valve (TAV-in-TAV) along with a balloon-expandable prosthesis (Myval®).

Keywords

Aortic Valve Stenosis; Prostheses and Implants; Aortic Valve Insufficiency; Heart Valve Prosthesis

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Case Report

An 82-year-old female patient presented severe symptomatic aortic stenosis (New York Heart Association [NYHA] functional class III), chronic renal dysfunction (estimated glomerular filtration rate of 28 mL/min/1.73 m²), and chronic restrictive lung disease. The Society of Thoracic Surgeons score indicated a high risk for open valve replacement surgery. After discussion, the team chose to treat using TAVI.

The valve annulus area and perimeter were 325 mm² and 64 mm, respectively (Figure 1). Considering the symmetrical structural pattern and the degree and distribution of calcifications, a self-expanding prosthesis (Navitor®) was chosen.

The procedure was performed under sedation and local anesthesia, with access through the right femoral artery. After valvuloplasty with an 18x40 mm balloon, a 25 mm Navitor® self-expanding prosthesis (Abbott) was implanted. Delivery was uneventful. However, immediately after, angiography showed severe aortic insufficiency. Intraoperative transesophageal echocardiography revealed severe prosthetic insufficiency resulting from the inversion of the right coronary leaflet of the prosthesis (Figure 2). The patient developed significant hemodynamic instability, requiring inotropic support and advanced airway management.

The team attempted to correct the complication using Pigtail and Simon catheters to adjust the inverted leaflet, as well as a post-dilation with a 20 x 40 mm balloon; both attempts were ineffective. Therefore, an emergency TAV-in-TAV implantation was performed. Since the origin of the left coronary artery was relatively low (11 mm) and the sinotubular junction was narrow (24 x 25 mm), the implantation of a new self-expanding prosthesis could potentially cause coronary occlusion or sequestration of the coronary sinus. Therefore, a balloon-expandable prosthesis (Myval® 21.5 mm; Meril) was implanted, along with a drug-eluting stent in the left main coronary artery for protection. The procedure was guided simultaneously by fluoroscopy and transesophageal echocardiography and achieved technical success, with immediate correction of valvular insufficiency, restoration of hemodynamic stability, and absence of limited coronary perfusion (Figure 2). The mean trans prosthetic gradient after the procedure was 6 mmHg, without evidence of paravalvular leak.

The patient remained hemodynamically stable and was discharged after four days. At the 30-, 60-, and 90-day follow-up appointments, she remained in functional class I (NYHA), without additional complaints.

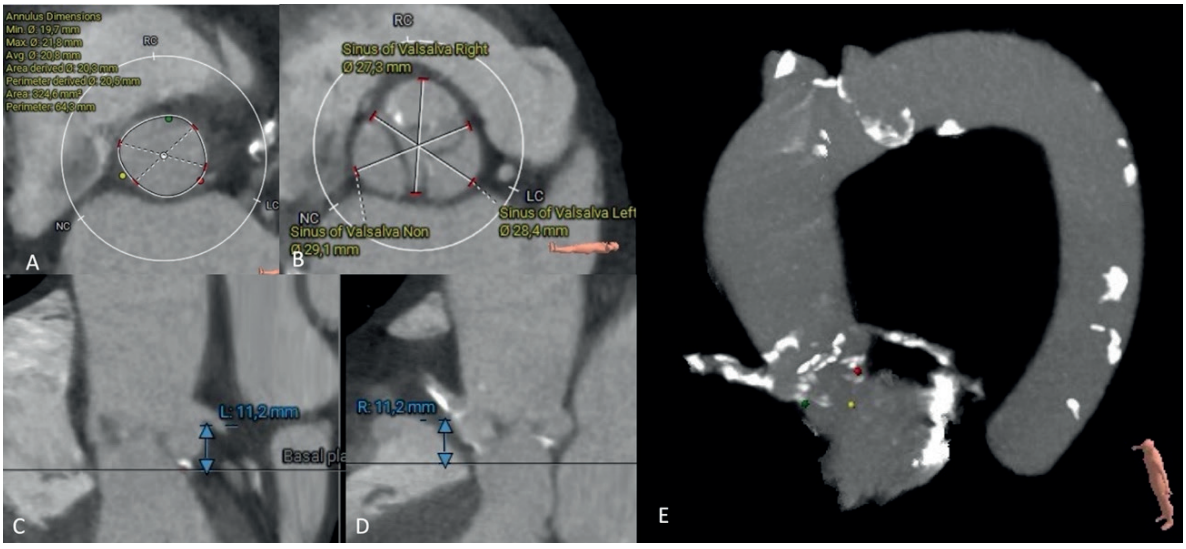

Figure 1 – *Structural characteristics of the aortic valve to be addressed. A – The valve annulus has few irregularities, with symmetrical calcifications of the cusps without extension to the left ventricular outflow tract (area 325 mm² and perimeter 64 mm). B – Wide sinuses of Valsalva with symmetrical points of calcification. C and D – Adequate heights of the left and right coronary arteries, respectively. E – Significant coronary artery calcifications, moderate to significant in the aortic valve, and discrete calcifications in the ascending and descending thoracic aorta.*

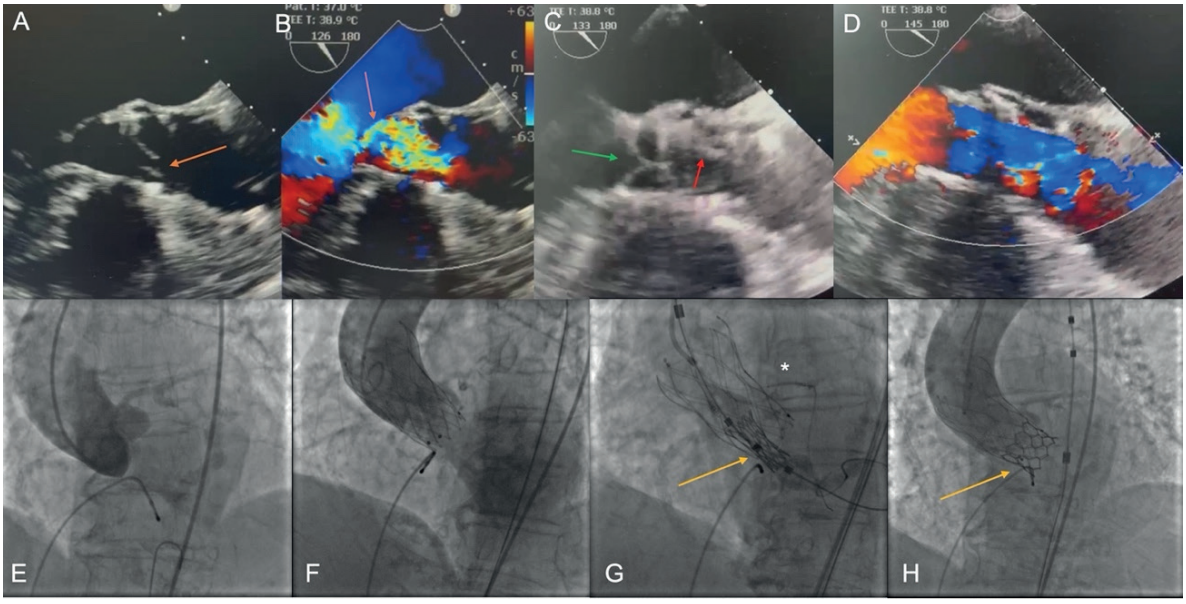

Figure 2 – *Echocardiogram and fluoroscopy images. A and B – Echocardiogram showing the damaged NAVITOR prosthesis leaflet (arrow), with significant regurgitation (arrow). C and D – Myval prosthesis implanted inside the NAVITOR prosthesis, functioning normally on echocardiogram. E – Angiography of the native aortic valve with significant stenosis and slight regurgitation. F – NAVITOR prosthesis implanted with significant regurgitation. G – (*) Stent positioned in the left main coronary artery. G and H - Positioning of the Myval prosthesis (arrow) and after its implantation inside the NAVITOR prosthesis (arrow), functioning normally.*

Discussion

Acute malfunction of a percutaneous aortic prosthesis is a rare complication, usually associated with freezing of one of the prosthesis leaflets, which may be corrected with catheters.[4] In contrast, the prosthetic dysfunction in this case was due to the inversion of one of the leaflets of the newly implanted prosthesis, which did not respond to manipulation. In the literature, only one similar case was found, in which the authors attributed the complication to unfavorable anatomy leading to asymmetrical under-expansion of the prosthesis and leaflet failure, which was also successfully treated by implanting a second balloon-expandable prosthesis within the initial prosthesis.[5]

Acute malfunction of transcatheter prostheses should not be attributed only to device defects or failures in the preparation and handling of the delivery system.[1,5] Anatomy plays a determining role in the immediate performance and adequate expansion and coaptation of the leaflets, especially in self-expanding valves. Elliptical or markedly asymmetrical annuli, intense and heterogeneous calcification, calcium protrusion into the left ventricular outflow tract or into the sinuses of Valsalva, and irregular distribution of radial forces along the annulus may hinder proper prosthesis positioning, potentially causing underexpansion, malposition, structural stent distortion, and immediate valve dysfunction; these features did not occur in this case. These aspects reinforce the importance of a tomographic preprocedural evaluation, with detailed three-dimensional analysis of the ring geometry and calcification pattern, and the need for an individualized implant strategy and selection of the prosthesis type, particularly in challenging anatomies.[1,5] On the other hand, the present case raises discussion about the quality control and traceability of transcatheter prostheses, as subtle manufacturing defects may only be identified at implantation, as also reported in recent studies.[5]

The literature supports that transcatheter reintervention in previously implanted valves is a safe and effective alternative to reoperation, especially in high-risk patients.[6-11] However, this study demonstrates the effectiveness of the TAV-in-TAV in acute cases and reinforces the importance of complete preprocedural planning to guide the emergency selection of a second prosthesis and to determine techniques to avoid additional complications, such as acute coronary occlusion secondary to the second implant.[12]

Coronary occlusion, particularly of the left main coronary artery, is one of the most feared complications during valve-in-valve (ViV) and TAV-in-TAV procedures, especially in anatomies with small sinuses of Valsalva, low coronary ostia height, and prosthetic leaflets at risk of displacement towards the coronary arteries.[12] In this study, a prophylactic strategy was chosen, with a stent prepositioned in the left main coronary artery, ready for immediate release in case of limited coronary flow after ViV prosthesis implantation. Given adequate flow preservation and the absence of angiographic or hemodynamic evidence of coronary obstruction, a "chimney" technique was not required, and the stent was safely removed. This approach illustrates a staged, individualized strategy that mitigates risk in potentially unfavorable anatomies, avoiding unnecessary additional interventions in the absence of actual coronary compromise.[1,12]

Although conventional surgery is viable for treating transcatheter prosthesis failures, this procedure is associated with high perioperative morbidity and mortality, especially in older and high-risk patients.[13-15] In this study, due to the age of the patient and comorbidities, the team chose an emergency transcatheter approach, resulting in an immediate hemodynamic recovery and avoiding a high-risk reoperation.

The literature on transcatheter ViV implantation in dysfunctional bioprostheses mainly describes the use of balloon-expandable prostheses from the Edwards SAPIEN family, particularly in the initial series and multicenter registries that established the feasibility and safety of the technique. However, growing evidence suggests that the TAV-in-TAV may be successfully applied using different transcatheter platforms, provided that anatomical and technical criteria are met.[16] In this study, the immediate availability of a Myval® balloon-expandable prosthesis (Meril) enabled a rescue TAV-in-TAV, with rapid restoration of valve competence and clinical stabilization. This outcome reinforces that, in critical scenarios, prompt therapeutic decision-making and versatility in the use of different transcatheter devices may determine the success of the procedure, increasing the applicability of the ViV beyond the devices most widely described in the literature, particularly when surgery is prohibitive.

Immediate hemodynamic recovery and sustained clinical stability illustrate the importance of advanced training of the multidisciplinary team and the strict application of the techniques described in current guidelines and contemporary TAV-in-TAV series.[1-4,13-15]

Conclusions

This case illustrated a rare yet critical immediate dysfunction of a self-expanding prosthesis during transcatheter aortic valve implantation, which was successfully corrected with TAV-in-TAV using a balloon-expandable prosthesis. This technique may represent an immediate, effective, and potentially lifesaving alternative, especially in patients with high surgical risk; however, its success depends on an experienced team, detailed prior anatomical planning, and multiple device options.

Author Contributions

Conception and design of the research: Carvalho G, Calegari P; acquisition of data: Carvalho G, Carvalho MFM, Guérios EE, Zanlorensi CB, Botelho FS, Erbano BO, Calegari P, Vaz VD; analysis and interpretation of the data: Carvalho G, Carvalho MFM, Guérios EE; obtaining financing: Carvalho G, Carvalho MFM; writing of the manuscript: Carvalho G, Carvalho MFM; critical revision of the manuscript for intellectual content: Carvalho G, Guérios EE; angiography images: Carvalho G; echocardiogram images: Zanlorensi CB, Botelho FS; reference review: Erbano BO, Calegari P, Vaz VD.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Study Association

This study is not associated with any thesis or dissertation work.

Ethics Approval and Consent to Participate

This study was approved by the Ethics Committee of the Hospital de Clínicas da Universidade Federal do Paraná under the protocol number 93429725.9.0000.0096. All the procedures in this study were in accordance with the 1975 Helsinki Declaration, updated in 2013. Informed consent was obtained from all participants included in the study.

Use of Artificial Intelligence

The authors did not use any artificial intelligence tools in the development of this work.

Availability of Research Data

The underlying content of the research text is contained within the manuscript.

References

1. Praz F, Borger MA, Lanz J, Marin-Cuartas M, Abreu A, Adamo M, et al. 2025 ESC/EACTS Guidelines for the Management of Valvular Heart Disease. Eur Heart J. 2025;46(44):4635-736. doi: 10.1093/eurheartj/ehaf194.
2. Tarasoutchi F, Montera MW, Ramos AIO, Sampaio RO, Rosa VEE, Accorsi TAD, et al. Update of the Brazilian Guidelines for Valvular Heart Disease - 2020. Arq Bras Cardiol. 2020;115(4):720-75. doi: 10.36660/abc.20201047.
3. Leon MB, Smith CR, Mack M, Miller DC, Moses JW, Svensson LG, et al. Transcatheter Aortic-Valve Implantation for Aortic Stenosis in Patients Who Cannot Undergo Surgery. N Engl J Med. 2010;363(17):1597-607. doi: 10.1056/NEJMoa1008232.
4. Bansal A, Puri R, Yun J, Krishnaswamy A, Jilaihawi H, Makkar R, et al. Management of Complications after Valvular Interventions. EuroIntervention. 2025;21(8):e390-e410. doi: 10.4244/EIJ-D-24-00066.
5. Horita R, Hachinohe D, Otake R, Diaz JA, Shitan H, Fujita T. Acute Leaflet Malfunction of Navitor Valve with Severe Intraprosthetic Aortic Insufficiency Immediately after Implantation. Cardiovasc Interv Ther. 2024;39(3):331-2. doi: 10.1007/s12928-024-00995-6.
6. Eggebrecht H, Schäfer U, Treede H, Boekstegers P, Babin-Ebell J, Ferrari M, et al. Valve-in-Valve Transcatheter Aortic Valve Implantation for Degenerated Bioprosthetic Heart Valves. JACC Cardiovasc Interv. 2011;4(11):1218-27. doi: 10.1016/j.jcin.2011.07.015.
7. Deharo P, Bisson A, Herbert J, Lacour T, Etienne CS, Porto A, et al. Transcatheter Valve-in-Valve Aortic Valve Replacement as an Alternative to Surgical Re-Replacement. J Am Coll Cardiol. 2020;76(5):489-99. doi: 10.1016/j.jacc.2020.06.010.
8. Sá MPBO, Van den Eynde J, Simonato M, Cavalcanti LRP, Doulamis IP, Weixler V, et al. Valve-in-Valve Transcatheter Aortic Valve Replacement versus Redo Surgical Aortic Valve Replacement: An Updated Meta-Analysis. JACC Cardiovasc Interv. 2021;14(2):211-20. doi: 10.1016/j.jcin.2020.10.020.
9. Ktenopoulos N, Apostolos A, Karanasos A, Drakopoulou M, Katsaros O, Simopoulou C, et al. Safety and Efficacy of Transcatheter Aortic Valve Implantation (TAVI) for Pure Aortic Regurgitation; A Systematic Review and Meta-Analysis. Eur Heart J. 2024;45(Suppl 1):ehae666.1905. doi: 10.1093/eurheartj/ehae666.1905.
10. Gallo M, Fovino LN, Blitzer D, Doulamis IP, Guariento A, Salvador L, et al. Transcatheter Aortic Valve Replacement for Structural Degeneration of Previously Implanted Transcatheter Valves (TAVR-in-TAVR): A Systematic Review. Eur J Cardiothorac Surg. 2022;61(5):967-76. doi: 10.1093/ejcts/ezab443.
11. Makkar RR, Kapadia S, Chakravarty T, Cubeddu RJ, Kaneko T, Mahoney P, et al. Outcomes of Repeat Transcatheter Aortic Valve Replacement with Balloon-Expandable Valves: A Registry Study. Lancet. 2023;402(10412):1529-40. doi: 10.1016/S0140-6736(23)01636-7.
12. Tarantini G, Fabris T, Nai Fovino L. TAVR-in-TAVR and Coronary Access: Importance of Preprocedural Planning. EuroIntervention. 2020;16(2):e129-32. doi: 10.4244/EIJ-D-19-01094.
13. Todaro D, Picci A, Tamburino C, Barbanti M. Self-Expanding vs. Balloon-Expandable Devices for Transcatheter Aortic Valve Implantation. In: Giordano A, Biondi-Zoccai G, Frati G, editors. Transcatheter Aortic Valve Implantation: Clinical, Interventional and Surgical Perspectives. Cham: Springer; 2019. p. 305-29.
14. Landes U, Webb JG, De Backer O, Sondergaard L, Abdel-Wahab M, Crusius L, et al. Repeat Transcatheter Aortic Valve Replacement for Transcatheter Prosthesis Dysfunction. J Am Coll Cardiol. 2020;75(16):1882-93. doi: 10.1016/j.jacc.2020.02.051.
15. Hirji SA, Percy ED, McGurk S, Malarczyk A, Harloff MT, Yazdchi F, et al. Incidence, Characteristics, Predictors, and Outcomes of Surgical Explantation after Transcatheter Aortic Valve Replacement. J Am Coll Cardiol. 2020;76(16):1848-59. doi: 10.1016/j.jacc.2020.08.048.
16. Hahn RT, Webb J, Pibarot P, Ternacle J, Herrmann HC, Suri RM, et al. 5-Year Follow-Up from the PARTNER 2 Aortic Valve-in-Valve Registry for Degenerated Aortic Surgical Bioprostheses. JACC Cardiovasc Interv. 2022;15(7):698-708. doi: 10.1016/j.jcin.2022.02.014.