

VALVULAR HEART DISEASE

CLINICAL CASE

Unusual Case of Acute Type A Aortic Dissection During TAVR Bailout With a Self-Expanding Valve



Lianyue Ma, MD,^a Yongfeng Liang, MBBS,^b Wei Gao, MBBS,^a Mei Dong, MD,^a Xiangjuan Liu, MD,^a Yuan Cao, MD,^a Xiao Meng, MD,^a Guipeng An, MD^a

ABSTRACT

BACKGROUND Over the past 2 decades, transcatheter aortic valve replacement (TAVR) has emerged as a widely accepted treatment for patients with severe aortic valve stenosis. Acute aortic dissection, although rare, is a life-threatening complication associated with TAVR.

CASE SUMMARY An older man with severe aortic stenosis underwent TAVR. During valve deployment, catheter manipulation caused intimal disruption, leading to acute type A aortic dissection (TAAD). Remarkably, the dissection spontaneously sealed after prosthetic valve placement, thereby avoiding emergency surgery. A 6-month follow-up computed tomography angiography scan showed no extension of the dissection.

DISCUSSION In the case we report, the dissection spontaneously sealed with the use of a prosthetic valve, a finding that reinforces the feasibility of nonsurgical management of iatrogenic TAAD during TAVR in select cases.

TAKE-HOME MESSAGE The use of a biological valve offers a novel perspective on the conservative management of iatrogenic aortic dissection in high-risk patients during TAVR. (JACC Case Rep. 2025;30:103919) © 2025 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

HISTORY OF PRESENTATION

An 82-year-old man was admitted for worsening dyspnea on exertion, which had persisted for the previous 2 years, particularly during fatigue or emotional excitement. In severe cases, the symptoms were accompanied by wheezing and chest discomfort. He had received a diagnosis of severe aortic stenosis on the basis of transthoracic echocardiogram at a local

hospital. Treatment with medications such as spironolactone and furosemide was ineffective. The patient experienced progressive symptom exacerbation and reduced functional capacity for physical exertion. He also experienced syncopal episodes and unremitting precordial pain.

One month earlier, the patient's wheezing worsened again and did not improve with rest. He sought care at the local emergency department. Medications

From the ^aState Key Laboratory for Innovation and Transformation of Luobing Theory; Key Laboratory of Cardiovascular Remodeling and Function Research, Chinese Ministry of Education, Chinese National Health Commission and Chinese Academy of Medical Sciences; Department of Cardiology, Qilu Hospital of Shandong University, Jinan, China; and the ^bDepartment of Radiology, Qilu Hospital of Shandong University, Jinan, China.

The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).

Manuscript received February 14, 2025; revised manuscript received March 26, 2025, accepted March 28, 2025.

**ABBREVIATIONS
AND ACRONYMS****CTA** = computed tomography angiography**STS PROM** = Society of Thoracic Surgeons Predicted Risk Of Mortality**TAAD** = type A aortic dissection**TAVR** = transcatheter aortic valve replacement**THV** = transcatheter heart valve

slightly alleviated his symptoms. However, after discharge, he continued to experience chest tightness and wheezing with minimal activity. Therefore, the patient was admitted to our departments in the Qilu Hospital of Shandong University (Jinan, China) for further evaluation and management.

On physical examination, his body weight was 65 kg, his blood pressure was 113/61 mm Hg, and his pulse rate was 64 beats/min. The heart sounds were faint, and a grade 3/6 systolic jet murmur was audible in the aortic auscultation area.

PAST MEDICAL HISTORY

The patient had received a diagnosis of coronary atherosclerotic heart disease 10 years before presentation, characterized by occasional precordial pain relieved by nitroglycerin. He also had a 12-year history of hypertension, with the highest recorded blood pressure of 200/110 mm Hg. At the current presentation, he was taking sacubitril/valsartan and amlodipine for blood pressure management, with current readings well controlled. Additionally, he had received a diagnosis of pulmonary embolism 1 year before this admission.

INVESTIGATIONS

Transthoracic echocardiography revealed a preserved left ventricular ejection fraction of 60% and severe degenerative aortic stenosis, with a mean pressure gradient of 68 mm Hg and a peak velocity of 5.12 m/s.

MANAGEMENT

Given his high surgical risk (Society of Thoracic Surgeons Predicted Risk Of Mortality [STS PROM], 12%), the medical team planned for a transcatheter aortic valve replacement (TAVR). Computed tomography angiography (CTA) revealed the following measurements: an aortic annulus area of 489.2 mm², a perimeter of 79.4 mm, and a calcium score of 537. The coronary heights on the left and right sides were 11.3 mm and 13.9 mm, respectively. A 29-mm self-expanding Venus A-Plus transcatheter heart valve (THV) (Venus Medtech) was selected for the procedure.

TAVR was performed by a minimalist approach through transfemoral access and using local anesthesia with sedation and left ventricular guidewire pacing. Balloon aortic valvuloplasty was conducted

TAKE-HOME MESSAGES

- Self-sealing aortic dissection: Rare iatrogenic TAAD during TAVR may be mechanically sealed by the prosthetic valve, thus avoiding surgery, with stable outcomes confirmed by imaging.
- Nonsurgical option for high-risk cases: Hemodynamically stable dissections in select TAVR patients can be managed conservatively with close monitoring and cautious procedural techniques.

before implantation of the Venus A-Plus THV. The THV system was successfully navigated through the aortic arch. However, during the initial valve release (approximately 30% deployment), the THV unexpectedly moved upward into the aorta, thus necessitating prompt retrieval under rapid pacing (Video 1).

The second attempt proceeded smoothly, and the THV was successfully implanted in the optimal position. The pressure gradient decreased significantly from 81 mm Hg to 2 mm Hg. Arteriography performed after valve deployment showed only mild aortic regurgitation. However, localized dissection of the ascending aortic root, extending to the crown of the bioprosthetic valve, was observed (Figure 1A, Video 2). A prompt transesophageal echocardiogram confirmed the presence of type A aortic dissection (TAAD) (Figures 1B and 1C, Video 3), with no signs of pericardial effusion or involvement of the coronary ostia. It was concluded that the TAAD likely occurred during the initial valve release and retrieval procedure.

Initially, surgical intervention was considered. However, given the patient's stable hemodynamics (blood pressure of 137/65 mm Hg) and angiography showing no extension of the dissection (Video 4), conservative medical management was chosen.

OUTCOME AND FOLLOW-UP

It is believed that the bioprosthetic valve may have compressed the entry portion of the dissection, thereby reducing the risk of further extension. Following the procedure, the patient remained hemodynamically stable and asymptomatic. Compared with the preprocedural CTA (Figures 1D and 1G), postprocedural CTA performed 3 days later demonstrated a localized TAAD adjacent to the bioprosthetic valve (Figures 1E and 1H). Follow-up CTA at 30 days (Figures 1F and 1I) and 6 months (Figures 2A and 2B)

showed no evidence of dissection progression. The patient's recovery was uneventful, with no recurrence of symptoms, and he exhibited improved exercise tolerance at 6 months post-procedure.

DISCUSSION

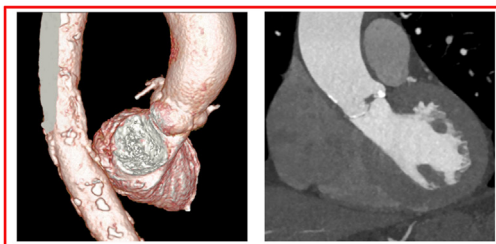
TAVR is recommended for patients with severe aortic stenosis who are aged ≥ 75 years, those with a high surgical risk (STS PROM $>8\%$), or those deemed inoperable.¹ Acute TAAD is a rare but catastrophic complication of TAVR, with an incidence of approximately 1.9%.^{2,3} Untreated noniatrogenic TAAD carries a mortality rate of approximately 7% within the first hour of symptom onset, and the mortality rate escalates to 90% by 24 hours.⁴ Multiple factors may contribute to the occurrence of TAAD during TAVR, including interactions with stiff wires in the ascending aorta, catheter-induced intimal disruption, interactions during post-dilation with balloons, heavy calcification, suboptimal measurements of the aortic valve complex, aggressive balloon valvuloplasty, an excessively oversized valve, and difficult valve positioning.⁵⁻⁷

Despite the severity of TAAD, standardized management protocols for TAAD during TAVR remain undefined. A literature review of all published cases of TAAD occurring during TAVR from 2010 to 2025 is presented in [Table 1](#).⁶⁻¹⁷ Twelve publications documenting TAAD during TAVR were identified, encompassing 16 cases. The patients' ages ranged from 60 to 90 years, with a female predominance (11 of 16; 68.8%). Most patients (61.5%) exhibited bicuspid aortic valve morphology. TAAD cases were equally distributed between balloon-expandable valves (8 of 16) and self-expandable valves (8 of 16). Treatment approaches included conservative medical management (11 of 16), surgical repair, and thoracic endovascular aortic repair. The overall survival rate was 75% (12 of 16), with 4 fatalities attributed to direct TAAD complications (eg, aortic rupture) or intervention-related sequelae (eg, COVID-19-associated complications and septic shock). The aforementioned findings suggest that conservative medical management may represent a viable option in carefully selected patients.

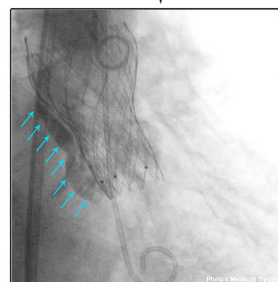
The equipoise between emergency surgery and conservative strategies hinges on hemodynamic stability and anatomical containment of the dissection.

VISUAL SUMMARY Acute Aortic Dissection During TAVR and Follow-Up

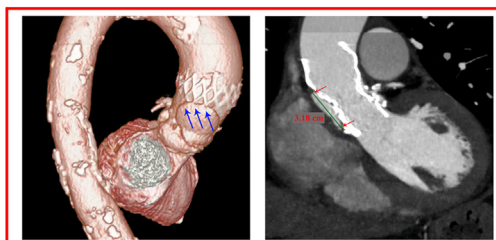
CTA scan of the aortic root before TAVR



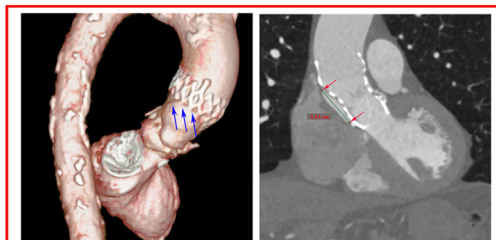
acute aortic dissection was observed during the TAVR and was sealed by the THV



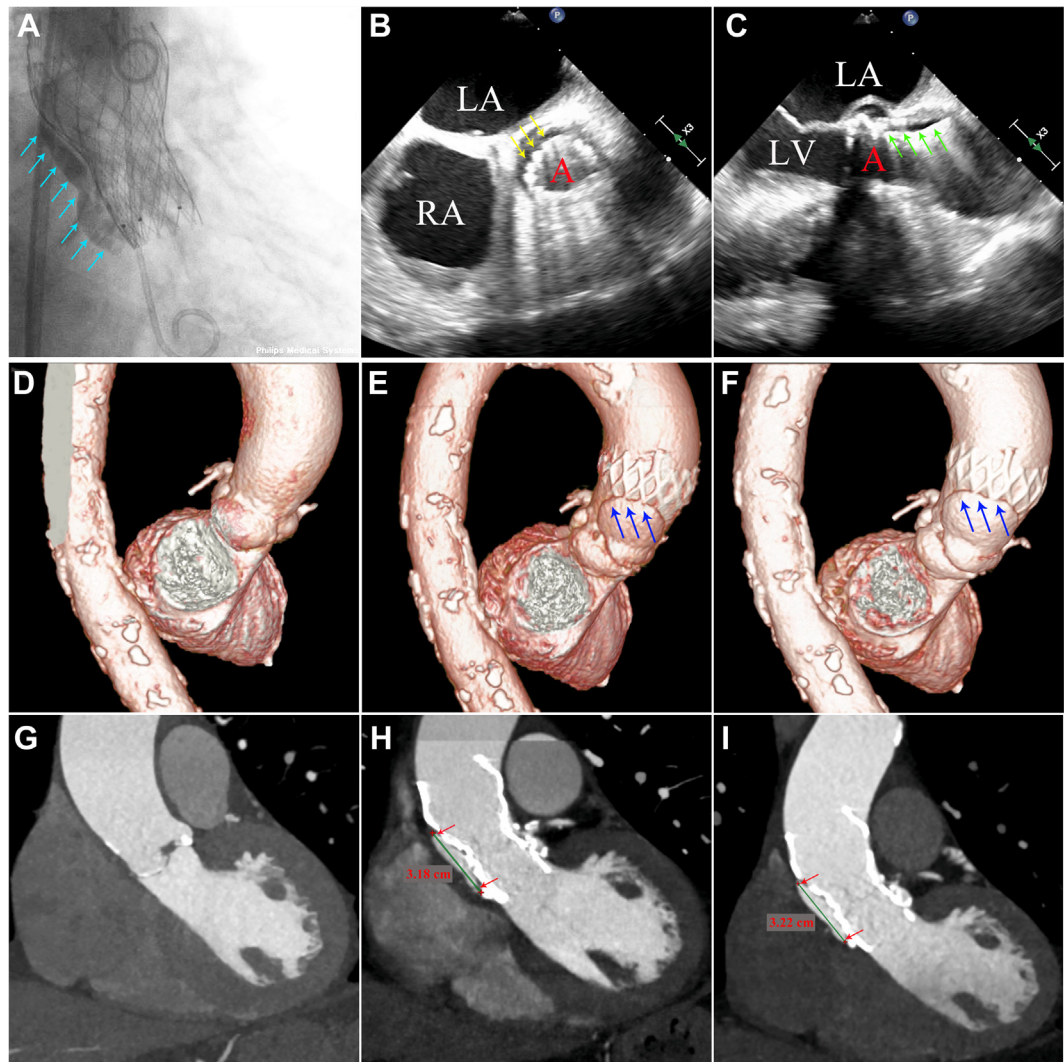
aortic dissection was sealed by the THV in 3-day CTA



6-month follow-up CTA scan showed no progression of the dissection



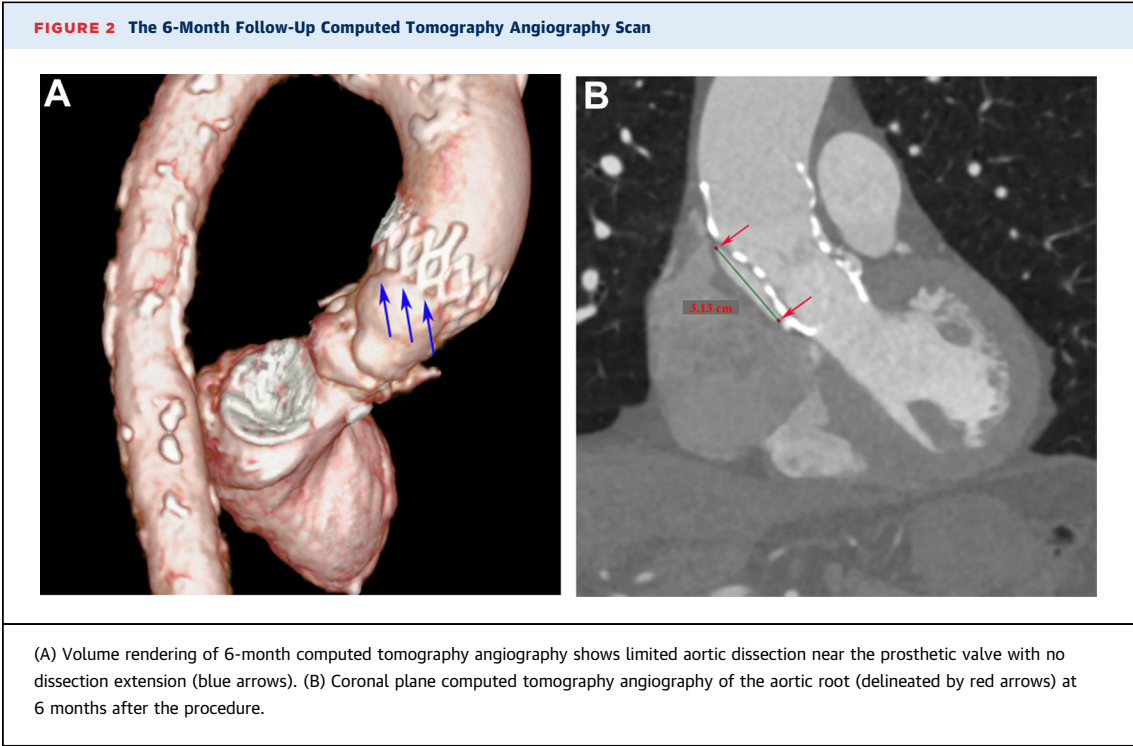
CTA = computed tomography angiogram; TAVR = transcatheter aortic valve replacement; THV = transcatheter heart valve.

FIGURE 1 Preprocedure, Intraprocedure, and Postprocedure Imaging Findings

(A) Arteriography reveals a “double shadow,” indicating type A aortic dissection (light blue arrows). (B and C) Midesophageal aortic valve short-axis and long-axis transesophageal echocardiography views confirm type A aortic dissection (yellow and green arrows). (D to F) Volume rendering of preprocedure, third-day, and 30th-day computed tomography angiography shows limited aortic dissection near the prosthetic valve with no dissection extension (blue arrows). (G to I) Coronal plane computed tomography angiography of the aortic root before the procedure, as well as 3 days and 30 days after the procedure, shows no dissection extension (delineated by red arrows). A = aortic root; LA = left atrium; LV = left ventricle; RA = right atrium.

Although urgent surgery remains the gold standard to mitigate early mortality, this case demonstrates that select high-risk patients—those with hemodynamic stability and an absence of neurologic manifestations or end-organ perfusion abnormalities—may benefit from nonsurgical approaches. Spontaneous sealing of the dissection entry by the THV underscores the

potential for device-based solutions to stabilize anterograde TAAD, thereby circumventing the morbidity of surgery in frail patients. Critical to this decision making is multidisciplinary consensus, integrating input from interventional cardiologists, cardiac surgeons, and radiologists to weigh procedural risks against the patient’s clinical trajectory.



Serial imaging (eg, echocardiography or CTA) and hemodynamic monitoring are essential to detect dissection progression and ensure that conservative management remains safe. This paradigm shift emphasizes the need for collaborative risk stratification and tailored innovation in TAAD management.

Here we report a high-risk male patient who developed acute TAAD during TAVR as a result of catheter-induced intimal injury during valve deployment. Postprocedural angiography revealed that the bioprosthetic valve compressed the dissection's distal segment and, achieved hemodynamic stability

TABLE 1 Summary of Literature Review of Type A Aortic Dissection During Transcatheter Aortic Valve Replacement					
First Author, Year	Sex, Age (y)	Valve Type	THV Type, Size (mm)	Management	Outcome
Dang, ⁸ 2024	Male, 86	Unknown	Evolut PRO (Medtronic), 34	TEVAR	Dead: COVID-19-related
Cavanaugh, ⁹ 2023	Female, 75	TAV	Evolut FX, 29	Surgery	Alive
Hiruma, ¹⁰ 2023	Female: 4/5; median age, 88	3 BAV/ 2 TAV	Evolut PRO/Evolut R/SAPIEN 3 (Edwards Lifesciences), 26	Medical	Alive
Fried, ¹¹ 2022	Female, 85	BAV	SAPIEN S3U, 23	Medical	Dead: AD-related
Hameed, ¹² 2022	Female, 90	Unknown	Evolut PRO, 26 (n = 2)	Surgery	Alive
Hashemi, ¹³ 2022	Female, 85	BAV	SAPIEN 3, 23	Medical	Dead: AD-related
Park, ⁷ 2022	Female, 78	BAV	SAPIEN XT, 26	Medical	Alive
Zhu, ¹⁴ 2021	Female, 86	Unknown	Venus A (Venus Medtech), 26	Medical	Alive
Dachille, ¹⁵ 2017	Male, 60	TAV	Direct Flow Medical, 27	Medical	Alive
Patrice Mwipatayi, ¹⁶ 2013	Male, 83	BAV	SAPIEN XT, 26	Surgery	Alive
D'Onofrio, ¹⁷ 2012	Female, 79	BAV	SAPIEN XT, 26	Surgery	Dead: septic shock
Ong, ⁶ 2011	Male, 90	TAV	CoreValve (Medtronic), 29	Medical	Alive

AD = aortic dissection; BAV = bicuspid aortic valve; TAV = tricuspid aortic valve; TEVAR = thoracic endovascular aortic repair; THV = transcatheter heart valve.

without extension. Surgical intervention was avoided, thereby eliminating its inherent risks.

CONCLUSIONS

This case underscores that although TAAD remains a rare yet catastrophic complication of TAVR, spontaneous sealing by the THV offers a viable nonsurgical alternative in select high-risk patients with hemodynamic stability.

FUNDING SUPPORT AND AUTHOR DISCLOSURES

This work was supported by a grant from the National Natural Science Foundation of China (81800382). The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

ADDRESS FOR CORRESPONDENCE: Dr Guipeng An, Department of Cardiology, Qilu Hospital of Shandong University, No. 107, Wenhuxi Road, Jinan, Shandong 250012, China. E-mail: guipengan@126.com.

REFERENCES

1. Langer NB, Hamid NB, Nazif TM, et al. Injuries to the aorta, aortic annulus, and left ventricle during transcatheter aortic valve replacement: management and outcomes. *Circ Cardiovasc Interv*. 2017;10(1):e004735.
2. DeGraaff B, DeRoo SC, George I. Aortic dissection following transcatheter aortic valve replacement. *Semin Thorac Cardiovasc Surg*. Published online December 13, 2024. <https://doi.org/10.1053/j.semtcvs.2024.11.006>
3. Vahanian A, Beyersdorf F, Praz F, et al. 2021 ESC/EACTS guidelines for the management of valvular heart disease. *Eur Heart J*. 2022;43(7):561–632.
4. Mehta RH, Suzuki T, Hagan PG, et al. Predicting death in patients with acute type A aortic dissection. *Circulation*. 2002;105(2):200–206. <https://doi.org/10.1161/hc0202.102246>
5. Thomas M, Schymik G, Walther T, et al. Thirty-day results of the SAPIEN aortic Bioprosthesis European Outcome (SOURCE) Registry: a European registry of transcatheter aortic valve implantation using the Edwards SAPIEN valve. *Circulation*. 2010;122(1):62–69.
6. Ong SH, Mueller R, Gerckens U. Iatrogenic dissection of the ascending aorta during TAVI sealed with the CoreValve revalving prosthesis. *Catheter Cardiovasc Interv*. 2011;77(6):910–914.
7. Park J, Lee SA, Kang DY, et al. Spontaneous resolution of extensive iatrogenic type A aortic dissection after transcatheter aortic valve replacement. *JACC Case Rep*. 2022;4(8):464–469.
8. Dang VC, Haddad P, McFall RG, Klopfenstein J, Reardon MJ, Rahimi M. Thoracic endovascular aortic repair (TEVAR) for an acute type A aortic dissection following transcatheter aortic valve replacement (TAVR). *J Vasc Surg Cases Innov Tech*. 2024;11(1):101653.
9. Cavanaugh S, Amirjamshidi H, Hisamoto K. Navigating the unexpected: iatrogenic aortic injuries during transcatheter aortic valve replacement (TAVR). *J Clin Med*. 2023;12(24):7630.
10. Hiruma T, Higuchi R, Saji M, et al. Transcatheter aortic valve replacement-related aortic dissection: a clinical case series. *Catheter Cardiovasc Interv*. 2023;101(3):668–675.
11. Fried EA, Salter BS, Weiner MM, et al. Type A aortic dissection after a transcatheter aortic valve replacement in a prohibitive surgical risk candidate. *J Cardiothorac Vasc Anesth*. 2022;36(8 pt A):2803–2810.
12. Hameed I, Boix-Garibo R, Ahmed A, Forrest JK, Vallabhajosyula P. Emergent repair of acute type A aortic dissection from transcatheter aortic valve replacement. *Can J Cardiol*. 2022;38(3):404–406.
13. Hashemi H, Khera S, Anastasius M, et al. Acute type A aortic dissection after TAVR in an octogenarian with ascending aorta aneurysm. *JACC Cardiovasc Interv*. 2022;15(2):220–222.
14. Zhu Q, Sondergaard L, Liu X, Wang J. Iatrogenic type-A aortic dissection due to transcatheter aortic valve implantation. *Eur Heart J Case Rep*. 2021;5(2):ytab024.
15. Dachille A, Iacovelli F, Giardinelli F, et al. Dissezione aortica acuta durante tentativo inefficace di impianto transcateretere di protesi aortica totalmente riposizionabile e recuperabile [Acute aortic dissection during ineffective attempt of transcatheter implant of a fully resheathable, repositionable and retrievable aortic valve]. *G Ital Cardiol (Rome)*. 2017;18(2 suppl 1):315–345.
16. Patrice Mwipatayi B, Nair R, Papineau JL, Vijayan V. A difficult case of retrieval of an aortic valve and balloon during a transcatheter aortic valve implantation. *Int J Surg Case Rep*. 2013;4(10):846–848.
17. D'Onofrio A, Tessari C, Bianco R, et al. Acute ascending aortic dissection during transcatheter balloon-expandable aortic valve implantation. *J Thorac Cardiovasc Surg*. 2012;144(3):e97–e99.

KEY WORDS TAVR, transcatheter heart valve, type A aortic dissection

APPENDIX For supplemental videos, please see the online version of this paper.