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PSEUDOANEURYSM OF THE LEFT VENTRICULAR APEX AFTER TRANSFEMORAL TRANSCATHETER AORTIC VALVE IMPLANTATION PROCEDURE – CASE REPORT

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ABSTRACT

Aortic stenosis represents one of the most prevalent degenerative valvular defects in the aging population. The advent of Transcatheter Aortic Valve Implantation (TAVI) has facilitated the effective treatment of high-risk patients who were previously disqualified from surgery. While this minimally invasive method significantly reduces the risk of perioperative complications compared to traditional surgery, it does not entirely eliminate them. The occurrence of life-threatening mechanical complications following TAVI is uncommon but requires immediate recognition. This study aims to present a rare case of an iatrogenic left ventricular pseudoaneurysm following a transfemoral procedure. This report details the case of a 73-year-old female patient with severe aortic stenosis and multiple comorbidities who underwent elective TAVI via transfemoral access. During the procedure, a stiff guidewire was positioned in the left ventricle. Although the implantation was technically successful, routine diagnostic imaging on the first postoperative day revealed an abnormality. Based on the patient's clinical condition, transthoracic echocardiography (TTE), and a subsequent contrast-enhanced Computed Tomography (CT) scan, a pseudoaneurysm of the left ventricular apex with active bleeding into the pericardial sac was confirmed. The patient required urgent conversion to classical cardiac surgery. The left ventricular perforation was successfully repaired via median sternotomy, which resulted in the patient's recovery, albeit with a prolonged hospitalization. Bleeding complications remain one of the most common causes of surgical reoperation following TAVI. Such events have been demonstrated to significantly impact the risk of mortality and extend the overall duration of hospitalization. Formed apical pseudoaneurysms represent a particularly rare complication. in the literature, such cases are predominantly described in the context of transapical access, which necessitates traversing the heart wall. However, this case highlights that iatrogenic perforation of the ventricle by the guidewire can also occur during transfemoral access. Routine postoperative imaging is crucial for the early detection and successful management of this life-threatening condition.

KEYWORDS

Pseudoaneurysm, Transcatheter Aortic Valve Replacement, Aortic Valve Stenosis, Case Report, Bleeding, Reoperation

CITATION

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Introduction

Aortic stenosis (AS) affects 5% of patients over the age of 65, with the risk of the disease increasing with age(Praz et al., 2025). Many patients present with multimorbidity, which significantly impacts the overall clinical picture, increases the risk of postoperative complications, and elevates the mortality rate. These factors collectively serve as the basis for disqualification from standard aortic valve replacement (AVR) surgery. Transcatheter aortic valve implantation (TAVI), as a minimally invasive technique that eliminates the need for median sternotomy and extracorporeal circulation (ECC), has made it possible to treat high-risk patients(Carroll et al., 2020; Praz et al., 2025). This method significantly reduces the risk of complications, although it does not entirely eliminate it. Complications following TAVI are uncommon; however, should they arise, it is imperative that they are promptly identified and treated in an appropriate manner(Généreux et al., 2012).

Methodology

This study was designed as a retrospective, descriptive case report. The analysis focuses on the diagnostic and therapeutic process of a patient treated at the Department of Cardiac Surgery, Silesian Center for Heart Diseases in Zabrze, Poland. The observation period encompassed the patient's admission, the TAVI procedure, the subsequent surgical reintervention, and the postoperative period up to discharge. The reporting of this case follows the CARE guidelines for clinical case reporting. The subject of the analysis was a 73-year-old female patient selected based on the occurrence of a rare, life-threatening complication—left ventricular pseudoaneurysm—following a transfemoral TAVI procedure. The inclusion criteria for this report were the availability of complete medical documentation, including high-quality imaging data confirming the diagnosis and the management pathway.

Data were collected retrospectively from the hospital's electronic medical records system. The analysis included:

1. Clinical Data: Review of the patient's medical history, physical examination findings, and operative reports (TAVI and cardiac surgery protocols).
2. Laboratory Analysis: Assessment of standard biochemical parameters, with a focus on coagulation profiles and hemoglobin levels monitoring.
3. Diagnostic Imaging:
   - Transthoracic Echocardiography (TTE): Used for initial assessment and postoperative monitoring. Images were acquired using standard views to assess ventricular wall motion and pericardial fluid.
   - Computed Tomography (CT): A contrast-enhanced cardiac CT scan was utilized as the gold standard tool to confirm the presence of the pseudoaneurysm, measure the defect size (7x16 mm), and visualize active extravasation.
   - Aortography: Performed intraoperatively during TAVI to assess valve positioning and paravalvular leakage.

Results

A 73-year-old female patient with severe aortic stenosis and multiple comorbidities (NYHA Class II) was admitted for elective transcatheter aortic valve implantation (TAVI). The patient reported a history of dyspnea, shortness of breath, intermittent headaches, and dizziness. Upon physical examination, auscultation revealed a distinct systolic murmur over the aortic valve. Her medical history included mild mitral regurgitation, chronic heart failure with preserved ejection fraction (HFpEF), chronic coronary syndrome, hypertension, dyslipidemia, and bronchial asthma. She had undergone balloon valvuloplasty 10 months prior, resulting in a significant reduction in the mean aortic valve pressure gradient (49.2 mmHg preoperatively to 24.5 mmHg postoperatively). However, a pre-procedural transesophageal echocardiogram confirmed the recurrence of aortic stenosis with a gradient of 72/44 mmHg and a maximum velocity of 4.23 m/s. Given the patient's advanced age, risk of pulmonary hypertension, and multimorbidity, the Heart Team recommended aortic valve replacement using the TAVI technique with transfemoral access.

The procedure was performed under local anesthesia. A 6F vascular sheath was inserted into the left femoral artery for a Pigtail 6F aortography catheter. Two ProStyle systems were utilized to secure access to the right femoral artery under ultrasound guidance, followed by the placement of a 10F sheath. A 6F vascular cuff was inserted into the left femoral vein to facilitate the insertion of a temporary pacing lead. A straight hydrophobic guidewire was used to cross the degenerated native valve. Subsequently, a rigid Confida guidewire was placed within the left ventricle via a Pigtail catheter (Figure 1).

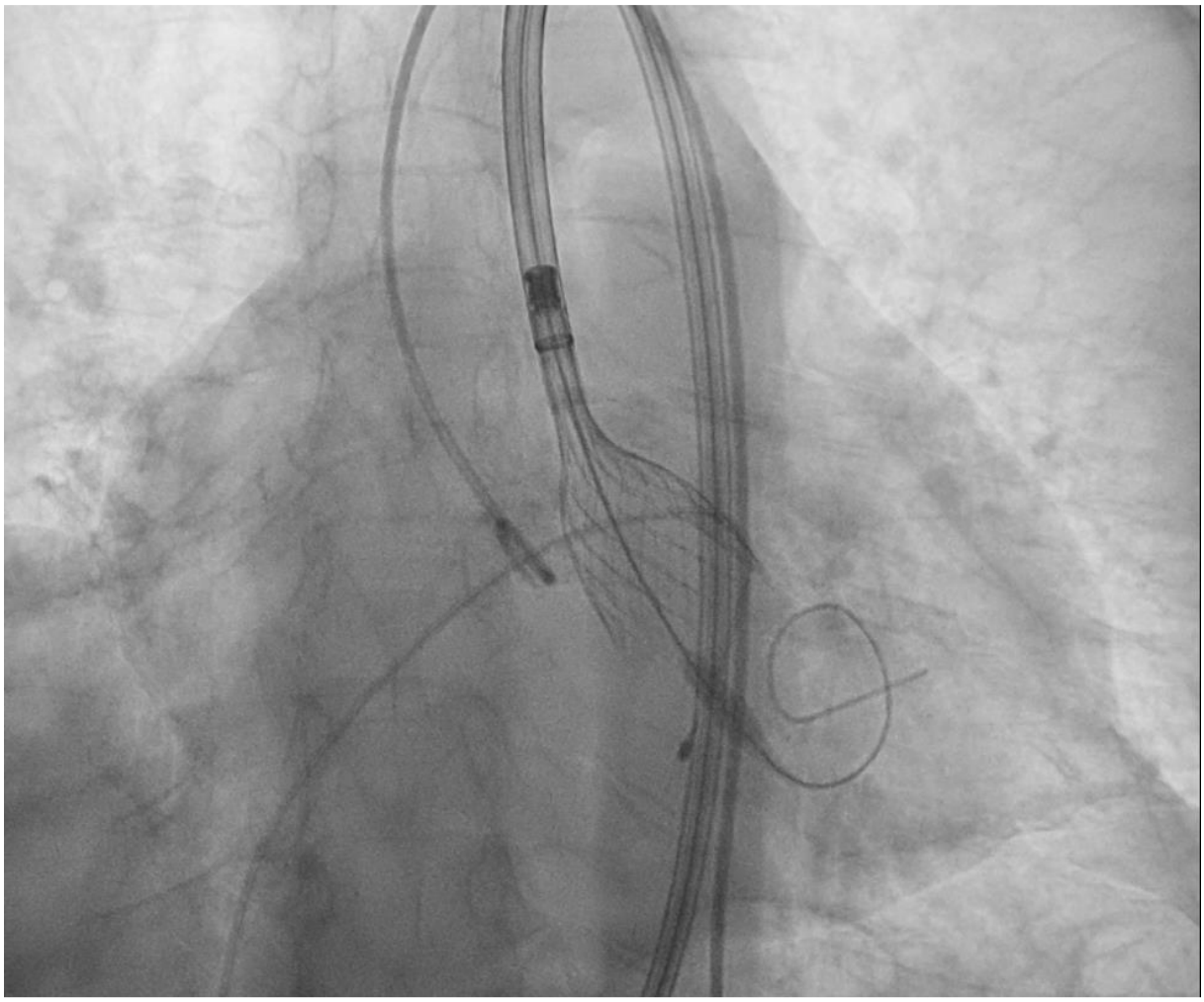

***Fig. 1**. The Confida guidewire is inserted into the left ventricle.*
Source: Records of the Department of Cardiac Surgery, Transplantation, Vascular and Endovascular Surgery, Silesian Center for Heart Diseases

Balloon valvuloplasty was performed with a 20x40mm Valver balloon at a rate of 180/min during rapid ventricular pacing. The 10F sheath was then replaced with the EnVeo Pro system, and an Evolut Pro 26 valve prosthesis was implanted. Following implantation, a perivalvular leak was observed on echocardiography and aortography. This resolved after post-dilatation with a Valver 23x40mm balloon. Repeat follow-up echocardiography and aortography showed no leakage. Access points were closed with AngioSeal systems. A temporary lead was left in the right ventricle to protect against potential atrioventricular block.

The subsequent transthoracic echocardiography (TTE) conducted the following day (Figure 2) revealed the presence of hypokinesis at the left ventricular apex, accompanied by a fluid collection suggestive of a pseudoaneurysm measuring 7x16mm. Further diagnostic imaging with a contrast-enhanced computed tomography (CT) scan confirmed the diagnosis (Figure 3). The patient was referred for urgent cardiac surgery. Access was obtained through a median sternotomy. Intraoperative inspection confirmed perforation of the left ventricular apex with active extravasation of blood. The operation was performed with extracorporeal circulation under normothermia on a beating heart. The perforation site was repaired using sutures on felt pads, and thrombi located in the pericardium were removed. The postoperative course in the intensive care unit and later in the surgical ward was uncomplicated.

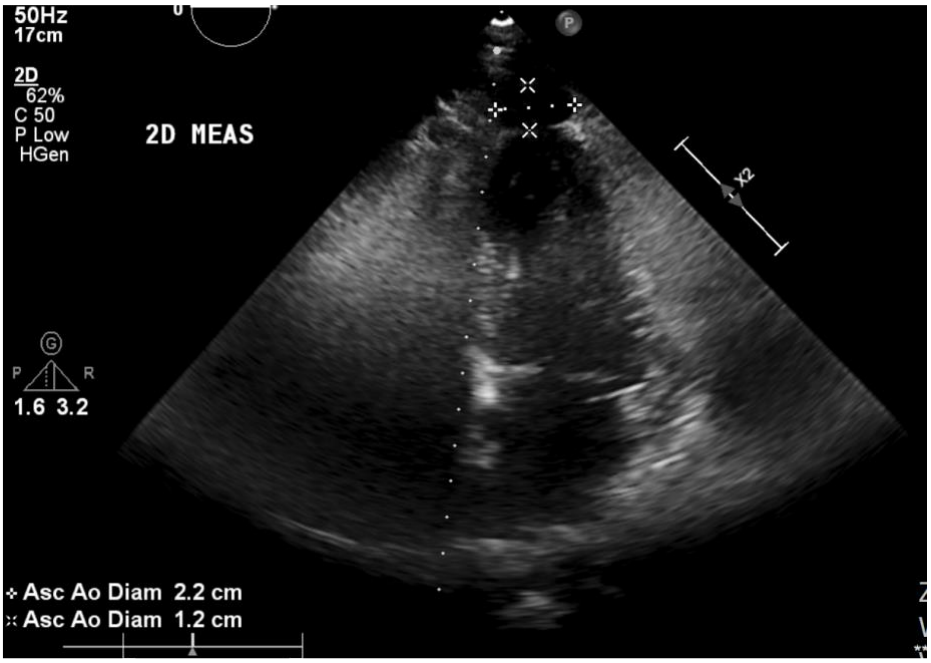

Fig. 2. *Transthoracic Echocardiography (TTE) with suspected pseudoaneurysm.*
Source: Records of the Department of Cardiac Surgery, Transplantation, Vascular and Endovascular Surgery, Silesian Center for Heart Diseases

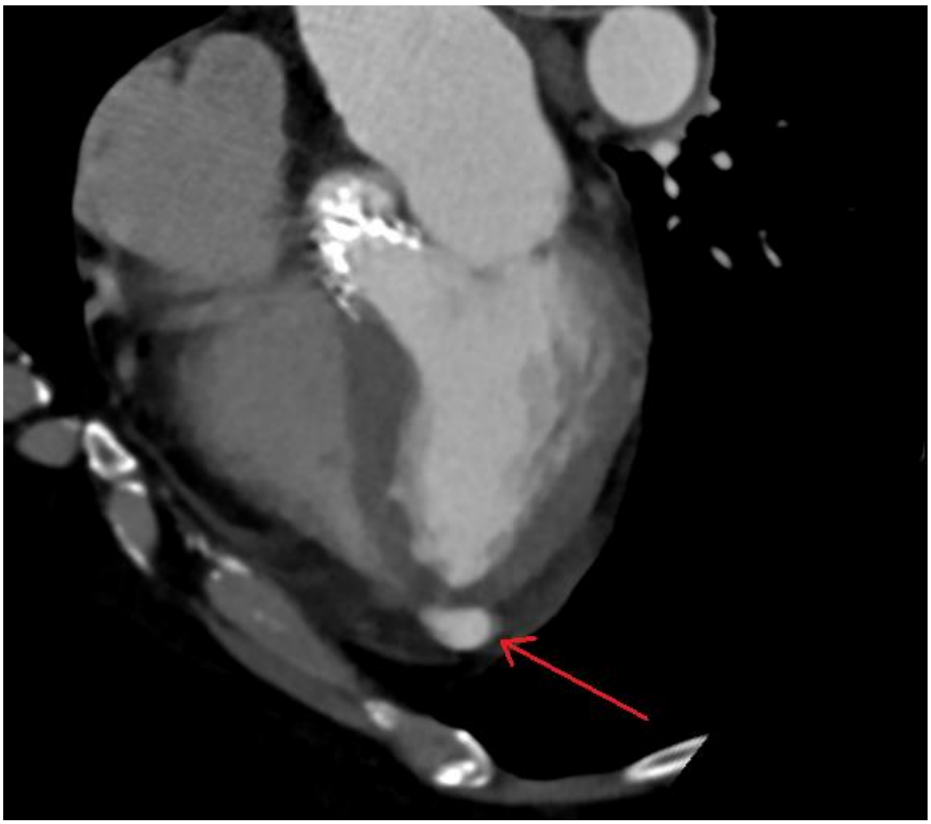

Fig. 3. *A cardiac CT scan revealed the presence of contrast material outside of the vasculature, indicative of a pseudoaneurysm (red arrow).*
Source: Records of the Department of Cardiac Surgery, Transplantation, Vascular and Endovascular Surgery, Silesian Center for Heart Diseases

Discussion

Cardiac tamponade resulting from left ventricular (LV) perforation is a rare but life-threatening complication of TAVI, with an incidence ranging from up to even 4% (Chaudhry & Sardar, 2017; Rezq et al., 2012). While most perforations are associated with the transapical approach, transfemoral TAVI carries a risk of iatrogenic injury due to guidewire manipulation (Chatterjee et al., 2025; David M Holzhey 1, Martin Hänsig, Thomas Walther, Joerg Seeburger, Martin Misfeld, Axel Linke, Michael A Borger, Friedrich W Mohr, n.d.). In the presented case, the injury was sustained in the left ventricular apical region. The rigid Confida wire likely caused a breach in the myocardium. Although modern preshaped guidewires are designed to reduce trauma, LV perforation remains a risk, particularly in patients with specific anatomical predictors (Stąpór et al., 2020). As highlighted by Okada et al., a small left ventricular cavity significantly increases the difficulty of safe wire placement (Nielsen et al., 2019). In our patient, the preoperative CT visualization revealed a narrow lumen (Figure 4), which likely contributed to the difficulty in maneuvering the guidewire and preventing its abutment against the apical wall. Initially, the injury resulted in minimal bleeding, likely contained by a thrombus, which explains the delayed presentation. Delayed tamponade is insidious; therefore, as seen in this case, routine postoperative imaging is crucial. Prompt identification allowed for urgent sternotomy, which remains the gold standard for uncontained rupture, although percutaneous closure has been described in selected cases (Chatterjee et al., 2025; Chaudhry & Sardar, 2017).

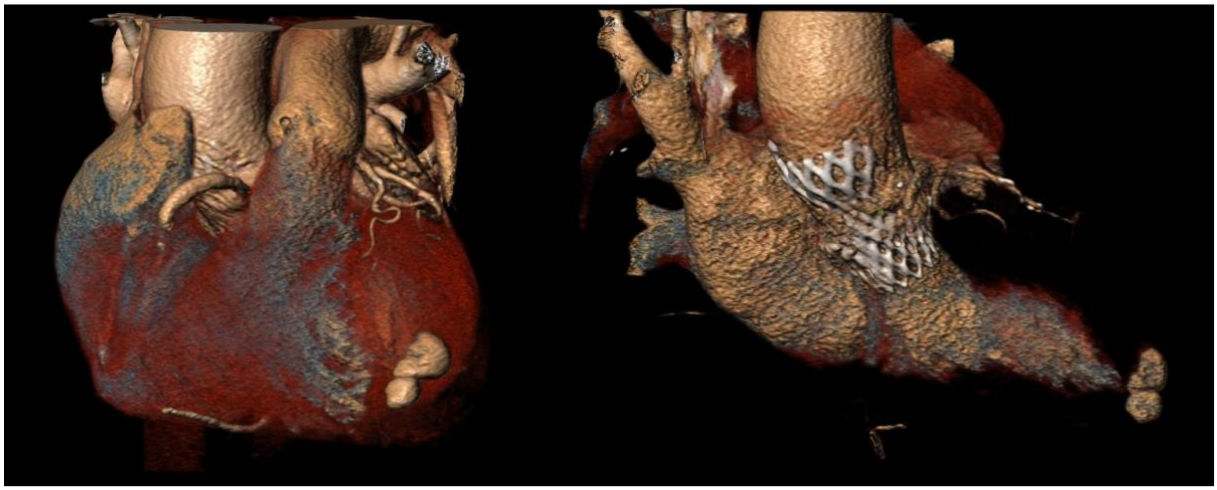

Fig. 4. *The preoperative examination and CT visualization of the left ventricle reveals a narrow lumen*
Source: Records of the Department of Cardiac Surgery, Transplantation, Vascular and Endovascular Surgery, Silesian Center for Heart Diseases

Conclusions

Vascular complications resulting in bleeding represent the most common cause of reintervention following TAVI(Généreux et al., 2012). It is estimated that these complications account for 6-8% of all postoperative complications, significantly affecting the risk of death and prolonging patient hospitalization. It is therefore crucial to exercise great care when handling vascular guidewires, which can cause cardiac and vascular injury(Holmes et al., 2015; Praz et al., 2025). Discrete iatrogenic cardiac injury is often difficult to recognize in the early stages. It is essential to conduct postoperative follow-up with imaging studies before the patient is discharged, in order to ensure their safety and protect them from serious complications.

Ethical Considerations

Ethics Approval: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Bioethics Committee of the Medical University of Silesia (protocol code BNW/NWN/0052/KB/171/25 and date of approval 6 July 2025).

Plagiarism: I declare that this manuscript is an original work, has not been published before, and is not currently being considered for publication elsewhere. The text has been written by the authors and properly cites all sources.

Conflicts of Interest: The authors have no conflicts of interest to report.

REFERENCES

1. Carroll, J. D., Mack, M. J., Vemulapalli, S., Herrmann, H. C., Gleason, T. G., Hanzel, G., Deeb, G. M., Thourani, V. H., Cohen, D. J., Desai, N., Kirtane, A. J., Fitzgerald, S., Michaels, J., Krohn, C., Masoudi, F. A., Brindis, R. G., & Bavaria, J. E. (2020). STS-ACC TVT registry of transcatheter aortic valve replacement. *Journal of the American College of Cardiology, 76*(21), 2492–2516. https://doi.org/10.1016/j.jacc.2020.09.595
2. Chatterjee, K., Telyuk, P., Grant, S. W., Williams, P. D., Muir, D. F., & Vijayan, S. (2025). Percutaneous management of left ventricular perforation causing late cardiac tamponade after transcatheter aortic valve implantation. *JACC: Case Reports, 30*(5), 103193. https://doi.org/10.1016/j.jaccas.2024.103193
3. Chaudhry, M. A., & Sardar, M. R. (2017). Vascular complications of transcatheter aortic valve replacement: A concise literature review. *World Journal of Cardiology, 9*(7), 574–582. https://doi.org/10.4330/wjc.v9.i7.574
4. Généreux, P., Head, S. J., Van Mieghem, N. M., Kodali, S., Kirtane, A. J., Xu, K., Smith, C., Serruys, P. W., Kappetein, A. P., & Leon, M. B. (2012). Clinical outcomes after transcatheter aortic valve replacement using Valve Academic Research Consortium definitions. *Journal of the American College of Cardiology, 59*(25), 2317–2326. https://doi.org/10.1016/j.jacc.2012.02.022
5. Holmes, D. R., Brennan, J. M., Rumsfeld, J. S., Dai, D., O'Brien, S. M., Vemulapalli, S., Edwards, F. H., Carroll, J., Shahian, D., Grover, F., Tuzcu, E. M., Peterson, E. D., Brindis, R. G., & Mack, M. J. (2015). Clinical outcomes at 1 year following transcatheter aortic valve replacement. *JAMA, 313*(10), 1019–1026. https://doi.org/10.1001/jama.2015.1474
6. Holzhey, D. M., Hänsig, M., Walther, T., Seeburger, J., Misfeld, M., Linke, A., Borger, M. A., & Mohr, F. W. (2012). Transapical aortic valve implantation—the Leipzig experience. *Annals of Cardiothoracic Surgery, 1*(2), 129–137. https://doi.org/10.3978/j.issn.2225-319X.2012.06.09
7. Nielsen, N. E., Baranowska, J., Bramlage, P., & Baranowski, J. (2019). Minimizing the risk for left ventricular rupture during transcatheter aortic valve implantation by reducing the presence of stiff guidewires in the ventricle. *Interactive CardioVascular and Thoracic Surgery, 29*(3), 365–370. https://doi.org/10.1093/icvts/ivz107
8. Praz, F., Borger, M. A., Lanz, J., Marin-Cuartas, M., Abreu, A., Adamo, M., Ajmone Marsan, N., Barili, F., Bonaros, N., Cosyns, B., De Paulis, R., Gamra, H., Jahangiri, M., Jeppsson, A., Klautz, R. J. M., Mores, B., Pérez-David, E., Pöss, J., Prendergast, B. D., ... Moorjani, N. (2025). 2025 ESC/EACTS guidelines for the management of valvular heart disease. *European Heart Journal, 46*(44), 4635–4736. https://doi.org/10.1093/eurheartj/ehaf194
9. Rezq, A., Basavarajaiah, S., Latib, A., Takagi, K., Hasegawa, T., Figini, F., Cioni, M., Franco, A., Montorfano, M., Chieffo, A., Maisano, F., Corvaja, N., Alfieri, O., & Colombo, A. (2012). Incidence, management, and outcomes of cardiac tamponade during transcatheter aortic valve implantation. *JACC: Cardiovascular Interventions, 5*(12), 1264–1272. https://doi.org/10.1016/j.jcin.2012.08.012
10. Stąpór, M., Trębacz, J., Wiewiórka, Ł., Ostrowska-Kaim, E., Nawara-Skipirzepa, J., Sobczyński, R., Konstanty-Kalandyk, J., Musiał, R., Trębacz, O., Kleczyński, P., Żmudka, K., Kapelak, B., & Legutko, J. (2020). Direct left ventricular wire pacing during transcatheter aortic valve implantation. *Kardiologia Polska, 78*(9), 882–888. https://doi.org/10.33963/KP.15440