INTERVENTIONAL CARDIOLOGY PERSPECTIVES

Inter Cardio Pers

DOI: 10.4274/intercardiopers.2025.2025-3-5

CASE REPORT

Closing Road and Opening Trap: ProGlide Paradox in TAVI: A Case Report and Management Strategies Review

İrem Bilge Bulburu, Umutcan Vurucu, Uğur Özkan

Department of Cardiology, Trakya University Faculty of Medicine, Edirne, Türkiye

ABSTRACT

Transcatheter aortic valve implantation offers a minimally invasive solution for patients with severe aortic stenosis who are at elevated surgical risk. Despite advances in access techniques and closure devices, vascular complications remain a significant procedural hazard. Suture-mediated systems, such as ProGlide, are widely adopted for achieving hemostasis but can cause rare, serious complications, particularly in patients with calcified or complex iliofemoral vascular anatomy. We report a unique case in which a ProGlide suture inadvertently entrapped a 7F sheath, requiring urgent surgical intervention. This underscores the need for meticulous preprocedural imaging, operator vigilance, and adaptable access planning to minimize such complications.

Keywords: Transcatheter aortic valve implantation, transfemoral access, peripheric complications

INTRODUCTION

The prevalence of degenerative aortic stenosis has risen in parallel with increased life expectancy. Although surgical aortic valve replacement remains the definitive treatment, transcatheter aortic valve implantation (TAVI) has emerged as a less invasive alternative, particularly for high-risk patients. Despite ongoing advancements in device technology and procedural techniques, vascular complications—reported in 4.5-15% of cases—continue to challenge interventional cardiologists. These complications are frequently linked to large-bore arterial access and the deployment of closure devices. Vascular complication rates range from 2% to 9% with closure devices commonly used in TAVI procedures, including ProGlide, MANTA, and ProStar.[1,2] We describe a rare complication involving the inadvertent entrapment of a 7F sheath by a ProGlide closure device, necessitating prompt surgical intervention. The report emphasizes the significance of preprocedural assessment, alternative access strategies, and intraprocedural tactics to mitigate vascular complications.

CASE REPORT

A 77-year-old male with a history of coronary artery bypass grafting, atrial fibrillation, diabetes mellitus, and treated diffuse large B-cell lymphoma presented with NYHA class 3 dyspnea. Transthoracic echocardiography demonstrated severe aortic stenosis (mean gradient: 40 mmHg, peak velocity: 4.3 m/s, valve area: 0.7 cm²) with preserved ejection fraction (59%) and moderate aortic regurgitation. A calcified trileaflet aortic valve with a left coronary ostial height of 7 mm was detected on computed tomography (CT) scan. Although the left common iliac artery appeared suitable for access apart from a focal calcific plaque at the target site, the right common iliac artery exhibited significant calcification and stenosis.

Given these findings, vascular access was established via the left groin. After administering 5,000 IU of heparin, a 7-F sheath was positioned in the right femoral artery for angiographic assessment of the left common iliac artery, and a temporary pacemaker lead was inserted via the right femoral vein. However, fluoroscopy identified critical stenosis at the left common iliac junction, which had not been detected on CT, prompting a switch of access to the right femoral artery (Figure 1A). A puncture was subsequently performed at a more favorable site on the same vessel, and two ProGlide devices were pre-deployed using the "pre-close" technique before inserting a 14F sheath for valve delivery.

Due to the proximity of the aortic valve to the left coronary ostium, a protective strategy (Chimney technique) was employed, involving placement of a balloon in the left coronary system via the right radial artery. The 27-mm self-expandable Navitor valve was successfully implanted, and post-dilation with a 25-mm balloon resulted in only trace paravalvular leakage (Figure 1B). Hemostasis was verified following removal of the 14F sheath. However, during attempts to retrieve the 7F sheath, persistent resistance was encountered despite multiple traction maneuvers. Closer inspection revealed that one of

Address for Correspondence: İrem Bilge Bulburu MD, Department of Cardiology, Trakya University Faculty of Medicine, Edirne, Türkiye
E-mail: drirembilge@gmail.com **ORCID ID:** orcid.org/0009-0009-1843-3123

Cite as: Güner ZE, Zehir R. Simultaneous percutaneous closure of a patent foramen ovale and left atrial appendage. *Inter Cardio Pers.* [Epub Ahead of Print]

Received: 29.03.2025
Accepted: 11.06.2025
Epub: 11.07.2025

the ProGlide sutures inadvertently engaged the 7F sheath, effectively securing it to the vessel wall (Figure 1C, 1D). To avoid the risk of vascular injury, the patient was promptly transferred to the operating room, and the entrapped sheath was surgically removed. The patient experienced an uneventful recovery and was discharged without further complications. Written informed consent was obtained from the patient and his relatives for the publication of this case report.

DISCUSSION

Vascular complications are among the most prevalent adverse events during TAVI, with major events occurring in approximately 4.5% of cases and being closely linked to both operator experience and patient-specific vascular anatomy.[3] While minor complications, including hematomas or pseudoaneurysms, are frequent and usually manageable, the present case demonstrates an uncommon and potentially hazardous complication related to the use of suture-mediated closure devices.

Several Key Factors Contributed to This Complication

Potential challenges encountered during the TAVI procedure, along with corresponding recommendations, are summarized in Table 1.

Pre-procedural Imaging and Access Selection

Although preprocedural CT imaging is crucial for planning TAVI access, it may fail to detect focal calcific stenoses that become apparent under fluoroscopy due to the number of slices. Ancillary modalities, such as Doppler ultrasound guidance, can enhance the precision of femoral puncture by delineating vascular landmarks and identifying calcific deposits.

Device Selection and Technique

Although sheath sizes have decreased from 18F to 14F due to advancements in TAVI, the sheath-to-femoral artery ratio remains a critical determinant of vascular complications.[4] In this case, the retention of a 7F sheath as a precautionary measure for rapid intervention in the event of femoral rupture was deemed justified. However, the concomitant use of the ProGlide device led to unanticipated suture entrapment. Alternative strategies—including protamine administration before attempting sheath removal—could potentially mitigate vascular tension and facilitate secure extraction of adjunctive sheaths. Protamine may be administered when adequate hemostasis cannot be achieved using closure devices or manual compression.

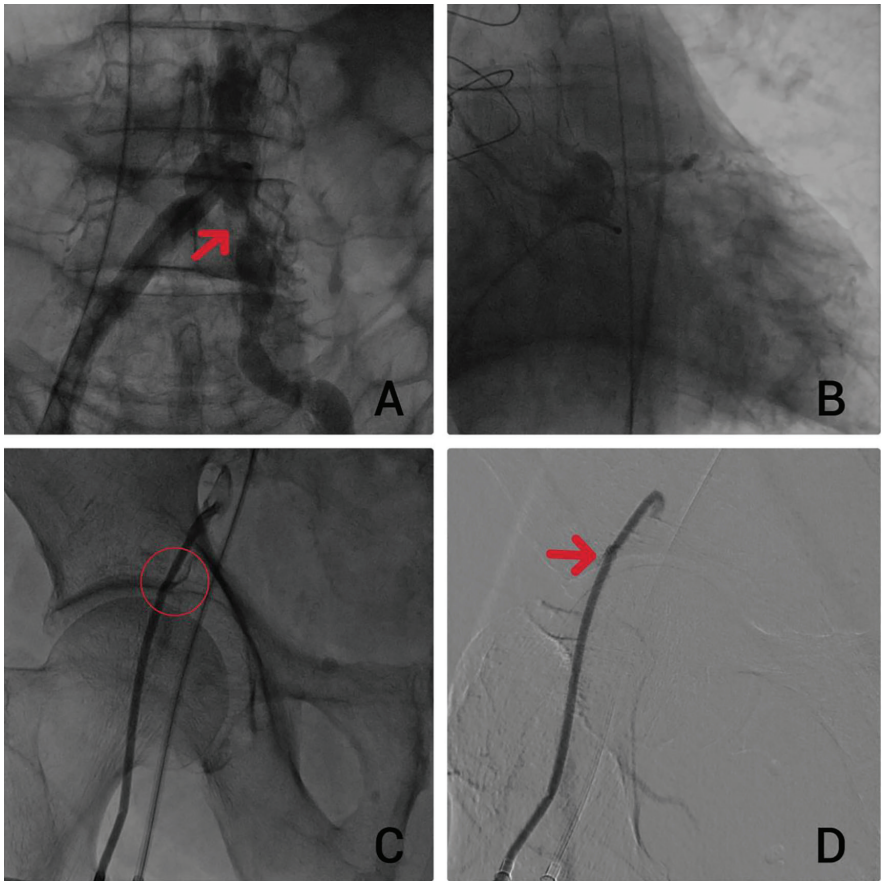

Figure 1. (A) A critical left common iliac junction stenosis indicated by a red arrow. B) Successfully implanted TAVI valve. C) Fluoroscopic image of the ProGlide mark on the 7F sheath and the opaque substance flowing through the holes made by the ProGlide on the sheath, in the red circle. D) DSA image showing the ProGlide suture mark on the 7F sheath, indicated with a red arrow

DSA: Digital subtraction angiography, TAVI: Transcatheter aortic valve implantation

Table 1. TAVI procedural pitfalls and recommendations

Procedural pitfall	Recommendation
Insufficient preprocedural vascular imaging	CT angiography should always be performed to evaluate access vessel size, tortuosity, and extent of calcification.
Improper selection of vascular closure devices	Device selection hould be based on access vessel diameter, extent of calcification, and operator experience
Suboptimal puncture site	Use fluoroscopy and ultrasound guidance for precise common femoral artery access and evaluate contralateral femoral and iliac arteries via angiography for crossover feasibility.
Delayed hemostasis or bleeding	Ensure correct closure device deployment; closely monitor access site

CT: Computed tomography

Management of Closure-related Complications

In case of suspected suture entrapment, immediate reevaluation using imaging modalities such as fluoroscopy or ultrasound is recommended. Some authors have suggested that in the presence of calcified vessels, pre-closure may be optimized by balloon angioplasty or even intravascular lithotripsy to improve vessel diameter and reduce the risk of closure device misdeployment—particularly when aiming to preserve the access site, as in our case.[5] Furthermore, awareness of this potential complication should prompt operators to apply controlled traction and, if resistance is encountered, to consider pharmacological reversal of heparin with protamine before proceeding with further manipulation.

Literature Context

Similar complications have been documented in isolated case reports. For example, Hu et al.[5] (2015) reported a case of ProGlide-related vascular injury necessitating surgical repair, highlighting the significance of early recognition and intervention. Other studies have underscored the significance of advanced imaging and alternative access strategies to minimize vascular complications during TAVI.

Overall, this case illustrates the vital role of combining thorough preprocedural planning with intraprocedural vigilance to promptly identify and manage unexpected complications.

CONCLUSION

For patients with severe aortic stenosis, TAVI remains a less-invasive treatment option; however, the risk of vascular complications limits its effectiveness. This rare complication demonstrates the significance of procedural planning, operator training, and the use of alternative adjunctive strategies for calcified vessels. Pre-procedural imaging may be inadequate for accurately assessing vessel anatomy and calcifications, potentially leading to complications during guidewire insertion and sheath entry. In our patient, critical stenosis was not evident on preprocedural CT but was identified on fluoroscopy and necessitated a change of access site. In addition, the need for operators experienced in recognizing complications early and intervening is once again emphasized. The correct use of closure devices is critical, particularly in patients with complex vascular anatomy. Alternative approaches, including peripheral balloon angioplasty or intravascular lithotripsy, for calcified vessels can facilitate correct placement of closure devices and minimize the risk of complications by appropriately dilating the vessels. Incorporating such strategies into routine practice may aid in reducing the incidence of vascular complications, especially in TAVI procedures involving complex anatomy.

Informed Consent: Consent form was filled out by all participants.

Authorship Contributions: Surgical and Medical Practices: İ.B.B., U.V., U.Ö., Concept: İ.B.B., U.V., U.Ö., Design: İ.B.B., U.V., Data Collection or Processing: İ.B.B., Analysis or Interpretation: İ.B.B., U.Ö., Literature Search: İ.B.B., U.V., Writing: İ.B.B., U.V., U.Ö.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

REFERENCES

1. Rahhab Z, Misier KR, El Faquir N, et al. Vascular complications after transfemoral transcatheter aortic valve implantation: a systematic review and meta-analysis. *Structural Heart*. 2020;4:62-71.
2. Van Mieghem NM, Tchetche D, Chieffo A, et al. Incidence, predictors, and implications of access site complications with transfemoral transcatheter aortic valve implantation. *Am J Cardiol*. 2012;110:1361-1367.
3. Alvarez-Covarrubias HA, Joner M, Cassese S, et al. Iliofemoral artery predilation prior to transfemoral transcatheter aortic valve implantation in patients with aortic valve stenosis and advanced peripheral artery disease. *Catheter Cardiovasc Interv*. 2023;101:628-638.
4. Nardi G, Backer OD, Saia F, et al. 680 Peripheral intravascular lithotripsy of ILEO-femoral arteries to facilitate transfemoral TAVI: a multicentric prospective registry. *European Heart Journal Supplements*. 2021;23(Supplement_G):suab134.039.
5. Hu G, Chen B, Fu W, Xu X, Guo D, Jiang J, Yang J, Wang Y. Predictors and treatments of Proglide-related complications in percutaneous endovascular aortic repair. *PLoS One*. 2015;10:e0123739.