

STRUCTURAL HEART DISEASE

IMAGING VIGNETTE: CLINICAL VIGNETTE

Circumflex to Left Atrial Appendage Fistula Associated With Watchman FLX Closure Device



Stefan Milutinovic, MD,^a Juan Lopez-Mattei, MD,^b Jeffrey Rosen, MD,^{b,c} Anuj Agarwal, MD,^{b,c} Ricardo O. Escárcega, MD^{a,b,c}

ABSTRACT

An 82-year-old man who had undergone Watchman FLX (Boston Scientific) device implantation presented with dyspnea. Multimodality evaluation demonstrated a small fistula from the proximal circumflex artery to the left atrial appendage. Anatomically, the left circumflex artery is close to the atrial appendage; therefore, it is plausible that fistula formation could be a late complication of implantation of the device. (J Am Coll Cardiol Case Rep 2024;29:102202) © 2024 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/>).

The combined 5-year outcome from 2 randomized trials comparing Watchman (Boston Scientific) device implantation with warfarin treatment suggests that the device provides a reduction in stroke comparable to that of warfarin, with decreases in major bleeding and mortality.¹ Thus, the use of this device has become a reasonable alternative to anticoagulation in selected patients.

An 82-year-old man with a history of paroxysmal atrial fibrillation status who had undergone Watchman FLX device implantation at an outside institution presented to our center for progressive dyspnea on exertion of 2 weeks' duration. The patient underwent invasive coronary angiography (ICA) for suspected acute coronary syndrome. ICA demonstrated flow from the circumflex to the left atrial appendage (LAA) and left atrium (Supplemental Figure 1). Computed tomography (CT) was obtained to evaluate the anatomy of the fistula, its course, and its size. The CT image confirmed a fistula (1.8 mm × 8 mm) coming off from the proximal circumflex artery to the LAA where the device sits (Figures 1A, 1B, and 1D). The Watchman FLX device was well seated, with a gap between the device shoulder inferiorly of 4.7 mm with an uncovered small lobe of LAA (Figure 1C). There was no evidence of a fistula on previous ICA in 2010. The patient was not having active angina or decompensated heart failure. Ultimately, the decision was made to continue antiplatelet therapy and manage his fistula with medical therapy.

Since the pivotal trials were conducted, this device has evolved, and the technique has been refined. The first-generation device was associated with a complication rate incidence of 2.2%.² Further improvements in device technology were developed in the current-generation Watchman FLX. It comprises a self-expanding nitinol frame with 18 peripheral fixation anchors and a permeable polyester fabric covering the atrial-facing surface. The 18-strut rather than 10-strut design, along with an open architecture configuration, allows the device to conform to the LAA ostium and reduce peridevice leak. The atraumatic closed distal end was

From the ^aFlorida State University College of Medicine Internal Medicine Residency Program at Lee Health, Cape Coral, Florida, USA; ^bLee Health Heart Institute, Fort Myers, Florida, USA; and the ^cFlorida Heart Associates, Fort Myers, Florida, USA. 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 August 27, 2023; revised manuscript received December 7, 2023, accepted December 11, 2023.

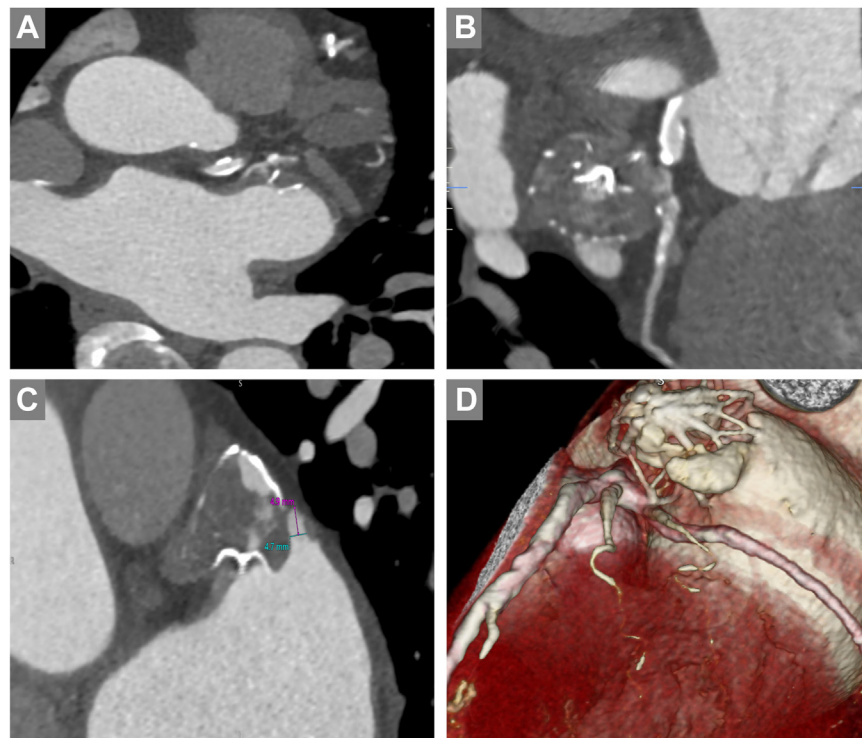
**ABBREVIATIONS
AND ACRONYMS****CT** = computed tomography**ICA** = invasive coronary angiography**LAA** = left atrial appendage

designed to reduce the risk for perforation, along with 2 rows of J-shaped fixation anchors to provide control and stability of deployment, and the ability for full and partial recapture and redeployment. Despite the remarkable safety of this device, physicians must be aware that complications can occur late and are not exclusively intraprocedural.

Anatomically, the left circumflex artery is near the LAA. Current implantation technique dictates that device sizing is performed using the LAA ostium measurement at the level of the circumflex artery by transesophageal echocardiogram.

Proper implantation technique requires that the shoulders of the device sit at the ostium of the LAA, which is anatomically very close to the circumflex artery. Furthermore, the device requires slight compression (10%-30%). It is biologically plausible that in certain patients a late complication could be fistula formation between the LAA and the circumflex artery. Cases of fistula from the LAA to the great cardiac vein³ and other venous structures have been described.

Given the anatomical relationship of the LAA and circumflex artery, fistula formation can be a late complication of the implantation of the Watchman FLX device. Multimodality imaging, in particular cardiac CT, may help identify the precise anatomical location of the fistula.

FIGURE 1 Cardiac Computed Tomography Angiography Evaluation of Coronary Artery-to-Left Atrial Appendage Fistula

(A) Axial slice image of a small fistula from the proximal circumflex artery to the left atrial appendage and showing the origin of the fistula. (B) Curved multiplanar reformat of the fistula connecting to the left atrial appendage and showing vessel formation within the Watchman device, thus causing incomplete endothelialization. (C) A small uncovered lobe with 4.7-mm peridevice leak from the left atrial appendage wall to the device. (D) A 3-dimensional reconstruction of the fistula.

FUNDING SUPPORT AND AUTHOR DISCLOSURES

The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

ADDRESS FOR CORRESPONDENCE: Dr Ricardo O. Escárcega, Florida Heart Associates, 1550 Barkley Circle, Fort Myers, Florida, USA. E-mail: orlando.escarcega@leehealth.org.

REFERENCES

1. Reddy VY, Doshi SK, Kar S, et al. 5-Year outcomes after left atrial appendage closure: from the PREVAIL and PROTECT AF trials. *J Am Coll Cardiol*. 2017;70:2964–2975.
2. Freeman JV, Varosy P, Price MJ, et al. The NCDR Left Atrial Appendage Occlusion Registry. *J Am Coll Cardiol*. 2020;75:1503–1518.
3. Vemulapalli S, Hurwitz Koweek LM, Kiefer TL, Jackson KP, Piccini JP. Left atrial appendage to great cardiac vein fistula complicating Watchman left atrial appendage closure. *Eur Heart J*. 2016;37:1602.

KEY WORDS complication, computed tomography, coronary angiography

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