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MINI-FOCUS ISSUE: CORONARY INTERVENTIONS

ADVANCED

CASE REPORT: CLINICAL CASE

Percutaneous Coiling for Late-Acquired Peri-Device Leak Following Left Atrial Appendage Occlusion

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ABSTRACT

A 77-year-old patient with previous left atrial appendage (LAA) closure suffered from transient ischemic attack 6 years after the initial procedure. Computed tomography (CT) revealed appendage patency related to a late-acquired semicircular peri-device leak. The leak was treated by percutaneous LAA coiling. Subsequent clinical evolution was uneventful. (**Level of Difficulty: Advanced.**) (J Am Coll Cardiol Case Rep 2022;4:962-966) © 2022 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

A 77-year-old woman was referred to our institution for a transient ischemic attack (TIA) (right transient hemiplegia).

PAST MEDICAL HISTORY

The patient suffers from hypertension and persistent atrial fibrillation, complicated with previous embolic stroke. Oral anticoagulation (OAC) was contraindicated because of spontaneous cerebral bleeding under rivaroxaban therapy. She underwent a previous left atrial appendage closure (LAAC) 6 years before, with implantation of a 22-mm Amplatzer Amulet (Abbott Vascular) device. The final transesophageal echocardiogram (TEE) and angiography (**Figure 1A,** Video 1) showed a complete closure with no significant leak. Subsequent follow-up TEE at 8 weeks displayed correct result and no residual flow (**Figure 1B**). The post-intervention treatment included clopidogrel 75 mg per day plus aspirin 75 mg per day for 8 weeks, followed by aspirin alone. The patient had an uneventful post LAAC course with no embolic event since then but benefited from a left anterior descending artery percutaneous coronary intervention for stable angina 3 years after the initial therapy.

LEARNING OBJECTIVES

- To recognize peri-device leak as a potential late complication of percutaneous LAA occlusion in the context of appendage remodeling.
- To understand the potential therapeutic strategies and the role of percutaneous coiling in this situation.

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INVESTIGATIONS

Brain magnetic resonance imaging depicted previous limited stroke sequalae but no recent fixed ischemic lesions. A computed tomography (CT) scan revealed recurrent left atrial appendage (LAA) filling related to the presence of a semicircular peri-device leak (PDL) in its posterosuperior margin and excessive device disc protrusion (**Figure 2**). In addition, the device lobe diameter was increased compared with its immediate post-implantation value (22 mm vs 19 mm). Altogether, these findings suggested an LAA remodeling following the implantation and leading to the late-acquired leak. The rest of the work-up for TIA was normal (no significant carotid artery stenosis nor uncontrolled blood hypertension).

MANAGEMENT

The case was reviewed in a heart-team meeting, and several options were discussed. There were some concerns about the potential device instability and theoretical risk of device late embolization (which was also counterbalanced by the prosthesis anchoring through its hooks), a subsequent percutaneous LAAC by coiling was proposed because of the very high bleeding risk (that contraindicated OAC) and the large leak orifice (that appeared unsuitable for plug closure). Under general anesthesia and TEE guidance, the disc protrusion and posterosuperior PDL were confirmed (**Figure 3,** Videos 2 and 3). Transeptal puncture was performed, and an 8.5-F steerable introducer was placed into the left atrium. A 2.7-F microcatheter was then inserted in the LAA through the gap between appendage wall and device. The residual cavity was then filled with 5 30- and 45-cm vascular packing coils (Penumbra Inc.), leading to its complete occlusion (**Figure 4,** Video 4).

ABBREVIATIONS AND ACRONYMS

CT = computed tomography

LAA = left atrial appendage

LAAC = left atrial appendage closure

OAC = oral anticoagulation

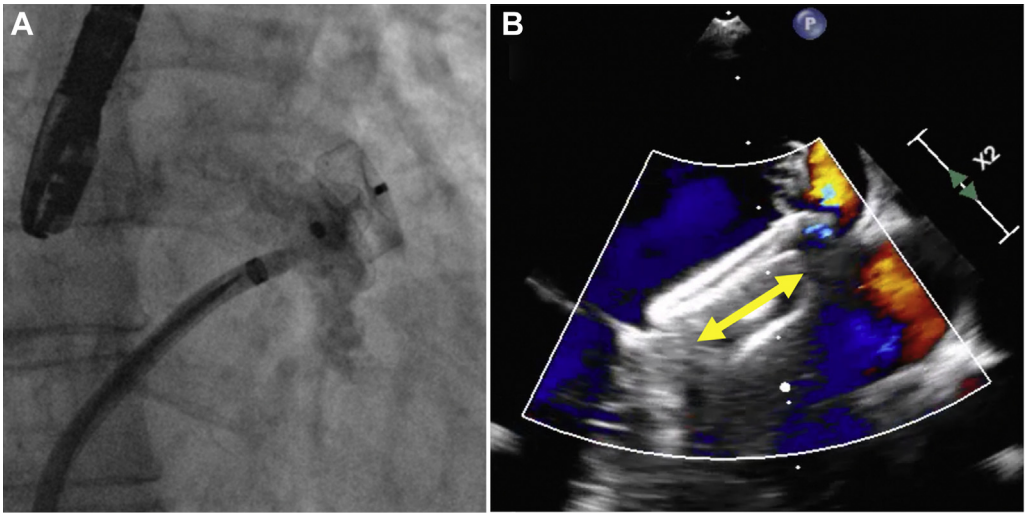
PDL = peri-device leak

TEE = transesophageal echocardiogram

DISCUSSION

LAAC has been established in clinical practice as a safe therapeutic option for prevention of stroke in patients with atrial fibrillation and contraindication to OAC. The aim of the procedure is to occlude the cavity by implanting a device that will be subsequently covered by endocardial tissue, leading to complete sealing. However, previous reports suggested that the dimensions of the LAA could increase following the procedure.[1] Whether the phenomenon is related to the self-expanding device behavior or LAA wall mechanical properties remains undetermined. Whereas most PDLs are identified shortly after initial procedure and are related to device under sizing or suboptimal position, LAA remodeling has

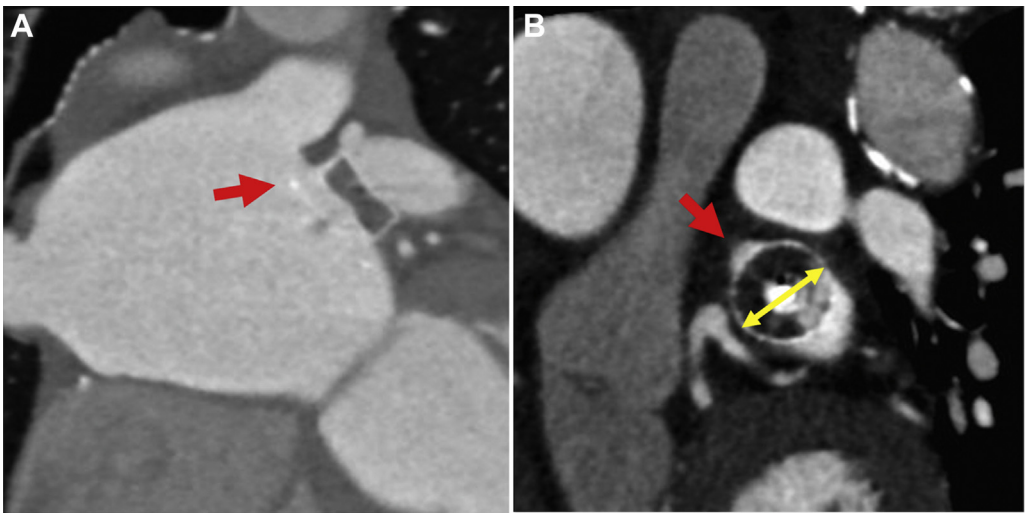
FIGURE 1 Immediate and Short-Term Left Atrial Appendage Closure Results Assessment



(A) Immediate post-implantation left atrial appendage angiography. **(B)** Six-week control transesophageal echocardiogram following the initial left atrial appendage closure procedure revealed no peri-device leak or residual filling. The maximal device lobe diameter **(yellow double-headed arrow)** was 19 mm.

JACC: CASE REPORTS, VOL. 4, NO. 15, 2022
AUGUST 3, 2022:962–966

FIGURE 2 6-Year Follow-Up Computed Tomography Scan

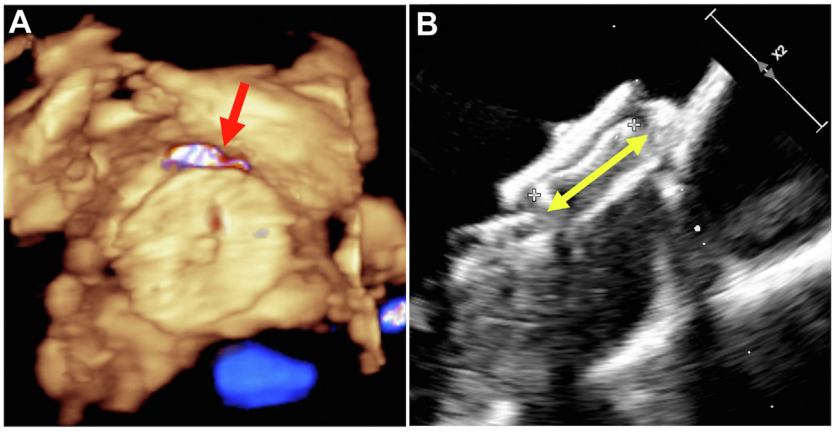


(A) Computed tomography performed 6 years after the initial procedure revealed an excessive device disc protrusion **(red arrow)**. **(B)** Computed tomography scan reconstruction identified a semicircular posterosuperior peri-device leak **(red arrow)** and residual left atrial appendage filling. The maximal device lobe diameter was 22 mm **(yellow double-headed arrow)**.

been suspected to be involved the pathogenesis of late acquired post-LAAC PDL.[2] Moreover, the initial device could have been "borderline-sized" (using TEE measurements) according to the dimensions of the landing zone, which might have favored the leak after remodeling in this case. In this perspective a slightly larger and oversized device might have prevented this phenomenon.

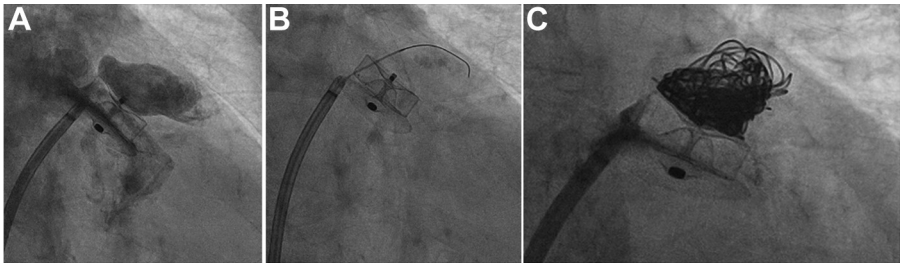
Although PDLs are frequently observed on post-implantation CT scan, they are rarely associated

FIGURE 3 Preoperative Transesophageal Echocardiogram Results



(A) Pre-operative transesophageal echocardiogram analyses identified residual flow between the device lobe and the appendage wall **(red arrow)** related to the peri-device leak. **(B)** The device disc was in a more proximal position, and the lobe was less compressed (diameter: 21.5 mm) compared with the initial transesophageal echocardiogram (Figure 1B).

FIGURE 4 Percutaneous Left Atrial Appendage Coiling Procedure



(A, B) Left atrial appendage was catheterized with a 2.7-F microcatheter within the gap, using a transeptal approach. Five vascular coils were deployed into the appendage successfully. **(C)** Final angiography following complete coiling revealed no residual filling.

with subsequent clinical events.[2] Thus, the optimal management of PDL remains debated and depends on the underlying LAA anatomy, initial device position, leak orifice characteristics, and severity of PDL.[3] The different possible strategies involve conservative medical treatment, percutaneous LAA coiling, vascular plug, septal occlude, or additional LAA occluder implantation.[3] The OAC therapy was not possible in our case because of the initial formal and definite contraindication to this regimen. The percutaneous coiling option was thus chosen here because it was reported as a safe option that can lead to complete LAA occlusion with minimal residual leak in more than 80% of the cases.[4] In addition, the semicircular shape of the leak orifice appeared to be limitation for an efficient closure using conventional vascular plugs, and we thought that multiple plugs implantation could compromise the stability of underlying Amulet device (that was already in superficial position).

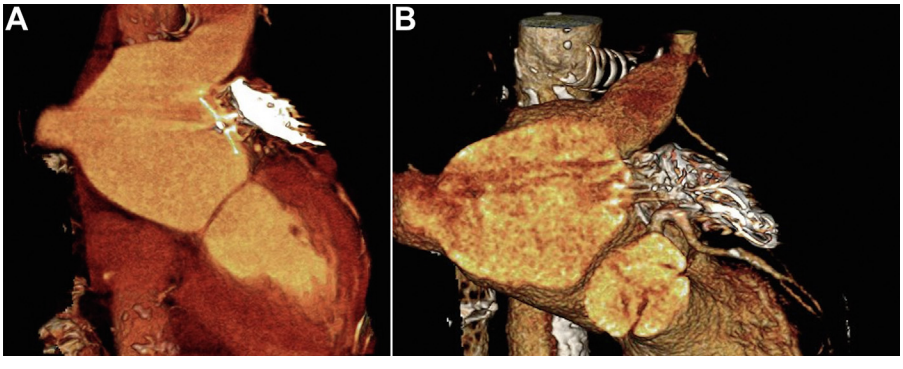
FOLLOW-UP

The clinical evolution was uneventful under double antiplatelet therapy. The 1-month follow-up CT scan didn't identify residual filling nor Amulet device exteriorization within this "full- metal-jacketed "appendage (**Figure 5**). The 6-month clinical follow-up was uneventful.

CONCLUSIONS

This exceptional case illustrates that PDL can be identified very late after the initial LAAC procedure and be clinically relevant. Percutaneous coiling represents a safe and efficient therapeutic option for subsequent redo LAA closure.

FIGURE 5 1-Month Follow-Up Computed Tomography Scan



The computed tomography scan depicted a left atrial appendage fully "jacketed" with coils without any identified residual left atrial appendage patency.

JACC: CASE REPORTS, VOL. 4, NO. 15, 2022
AUGUST 3, 2022:962–966

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KEY WORDS atrial fibrillation, computed tomography, stroke

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