ESC European Society of Cardiology

European Heart Journal - Case Reports (2024) **8**, 1–5
https://doi.org/10.1093/ehjcr/ytae058

CASE REPORT
Electrophysiology

The use of percutaneous left atrial appendage occluder device in a patient with prior surgical ligation with incomplete exclusion: a case report

Raef Fadel, Essaq Khan, and Waddah Maskoun *

Division of Cardiovascular Medicine, Henry Ford Hospital, 2799 W Grand Boulevard, Detroit, MI 48202, USA

Received 5 July 2023; revised 15 January 2024; accepted 25 January 2024; online publish-ahead-of-print 5 February 2024

Background Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia, and the most common cause of cardioembolic stroke. The left atrial appendage (LAA) is the main source of thrombus formation in patients with AF. Therapies include use of percutaneous LAA closure devices, or surgical LAA occlusion (LAAO). Despite these options, complete closure of the LAA is not always achieved, and residual communication between the LAA and atrium may result in increased thrombus formation. Although studies have analysed the use of percutaneous measures such as coils, plugs, or second occluder device deployment in LAA with peri-device leak (PDL), use of percutaneous occlude devices in surgically occluded LAA is far less studied.

Case summary We present a case of a 79-year-old female patient who underwent LAAO device deployment within a surgically occluded LAA with PDL. She underwent 27 mm LAAO device (WATCHMANTM) deployment and all the P.A.S.S. (Position, Anchor, Size, and Seal) criteria were satisfied. Only 1.4 mm PDL was present. She was continued on apixaban and aspirin post-operatively. Post-operative transoesophageal echocardiogram at 6 weeks demonstrated trivial PDL measuring 1.49 mm. Patient was continued on aspirin and clopidogrel, with discontinuation of apixaban.

Discussion Percutaneous LAAO device deployment in previously surgically ligated LAA with incomplete exclusion is a potential therapeutic option for patients with AF and a high bleeding risk seeking a minimally invasive strategy, in an attempt to de-escalate anticoagulation therapy.

Keywords Atrial fibrillation • Left atrial appendage occlusion • Left atrial appendage • Thromboembolism • Stroke • Case report

ESC curriculum 5.3 Atrial fibrillation • 5.4 Atrial flutter

Learning points

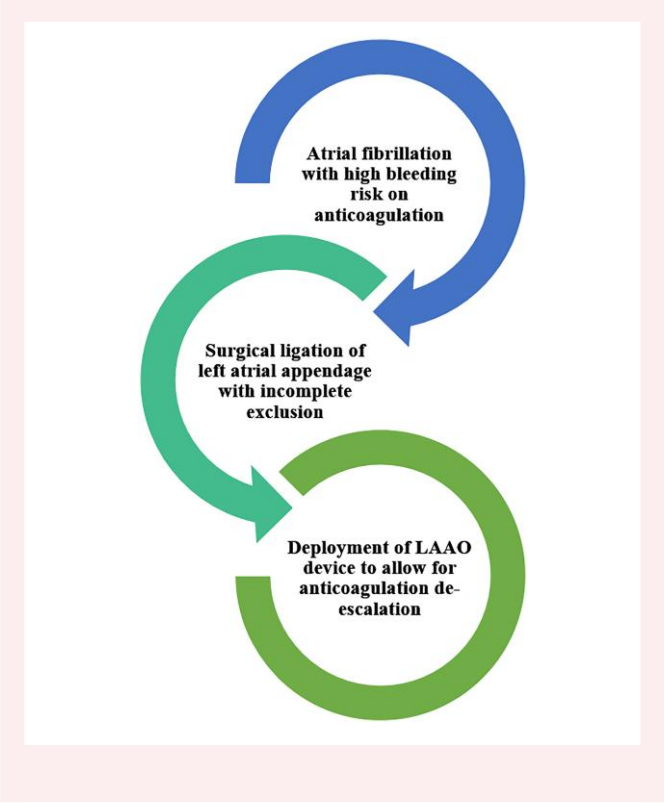
- Surgical ligation of the left atrial appendage may result in incomplete exclusion, resulting in persistent thrombo-embolic risk to patients with atrial fibrillation.
- Percutaneous left atrial appendage occluder devices may provide a therapeutic option to this patient population, offering a non-invasive therapy and also allowing for de-escalation of anticoagulation.

* Corresponding author. Tel: +13134925673, Email: wmaskou1@hfhs.org
Handling Editor: Richard Ang
Peer-reviewers: Sebastian Feickert; Habib Rehman Khan
Compliance Editor: Niklas Schenker

Introduction

Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia, and the most common cause of cardioembolic stroke.[1] Anticoagulation is the first line therapy for patients with elevated risk of stroke according to the CHA2DS2-VASc score. The left atrial appendage (LAA) is the main source of thrombus formation in patients with AF,[2] and the primary target of therapy in patients unable to tolerate anticoagulation secondary to coagulopathy. Therapies include use of anticoagulation, percutaneous LAA closure devices, or surgical LAA occlusion (LAAO).[3,4] Despite these options, complete closure of the LAA is not always achieved, and residual communication between the LAA and atrium may result in increased thrombus formation.[5,6] Although studies have analysed the use of percutaneous measures such as coils, plugs, or second occluder device deployment in LAA with peri-device leak (PDL),[7] use of percutaneous occlude devices in surgically occluded LAA is far less studied.[8,9] We present a case of LAAO device deployment within a surgically occluded LAA with PDL.

Summary figure



Case presentation

A 79-year-old Black female patient was referred for percutaneous LAAO. Past medical history was significant for mitral regurgitation, tricuspid regurgitation, and persistent atrial fibrillation complicated by recurrent significant gastrointestinal haemorrhage on anticoagulation secondary to diverticulosis. Five months prior to referral, she underwent surgical mitral and tricuspid valve repair, as well as LAA ligation with 35 mm AtriClip due to elevated stroke risk (CHA2DS2-VASc score 5) with intolerance to oral anticoagulation. Initial pre-procedural clinical examination revealed a haemodynamically stable, well-appearing female with regular heart rate and irregular rhythm. Pre-operative laboratory assessment revealed normal kidney function (serum creatinine 0.81 mg/dL) and mild anaemia (haemoglobin 10.8 g/dL, reference 12.0–15.0 g/dL). Intra-operative transoesophageal echocardiogram (TEE) demonstrated closure of the LAA. However, 40-day post-operative TEE and cardiac computed tomography (CT) imaging demonstrated a significant persistent communication between the left atrium and LAA with no evidence of LAA thrombus (*Figures 1* and *2*). After comprehensive review of the TEE and CT scan images, we felt that a LAAO device could be used to achieve adequate occlusion of the residual LAA pouch. For LAAO device implantation, trans-septal atrial imaging was performed using fluoroscopic and TEE guidance, with a mid-septal puncture chosen using intracardiac ultrasound guidance. Intra-procedural TEE was used for sizing of the LAA, and based on these measurements, a 27 mm LAAO device (WATCHMAN™) was selected and deployed, with all the P.A.S.S. (Position, Anchor, Size, and Seal) criteria satisfied (*Figure 3*). Only 1.4 mm PDL was present. She continued on apixaban 5 mg twice daily and aspirin 81 mg daily post-operatively. Follow-up TEE at 6 weeks demonstrated a trivial PDL measuring 1.9 mm along posterior aspect, with no thrombus seen. At that point, the decision was made to continue aspirin 81 mg daily and clopidogrel 75 mg daily, with discontinuation of apixaban. The patient has not experienced any further episodes of major bleeding, and we are tentatively planning to stop clopidogrel at 6 months post-operatively, with continuation of aspirin 81 mg daily indefinitely thereafter.

Discussion

Here we describe a case of LAAO device utilization in a previous surgically ligated LAA. The patient required exclusion of the LAA due to demonstrated intolerance of oral anticoagulation with recurrent significant gastrointestinal haemorrhage, and a high risk of stroke (CHA2DS2-VASc score 5), however a persistent communication between the LAA and atrium was still present post-surgical ligation with AtriClip. Based on the size of the residual LAA pouch, we felt that occlusion with the LAAO WATCHMAN™ device was most feasible and offered the best chance of LAA exclusion. The decision to continue aspirin and clopidogrel combination therapy for 6 months post-operatively was made in accordance with guidelines.[10] Had the patient experienced recurrent bleeding while on dual anti-platelet therapy, our plan was to stop clopidogrel.

There is a paucity of clinical experience data utilizing LAAO in patients with prior surgically ligated/occluded LAA. One case series highlighted the successful management of three patients with percutaneous LAAO with the WATCHMAN™ device, after previously undergoing incomplete surgical exclusion of the LAA.[7] Prior studies have suggested 20–40% rate of incomplete surgical LAA ligation.[3,8] In such cases, patients with high bleeding risk should have percutaneous options available to them, which offer a lower risk therapy for minimizing risk of LAA thrombus. Despite their therapeutic indications, LAAO devices carry a risk of complication, primarily including device thrombosis, bleeding from post-procedural anticoagulation use, post-operative pericardial effusions, and post-procedural stroke.[11] Our case study adds a small but growing body of evidence suggesting the safe and efficacious use of percutaneous LAAO device deployment in patients who have undergoing prior surgical ligation with incomplete exclusion of the LAA.

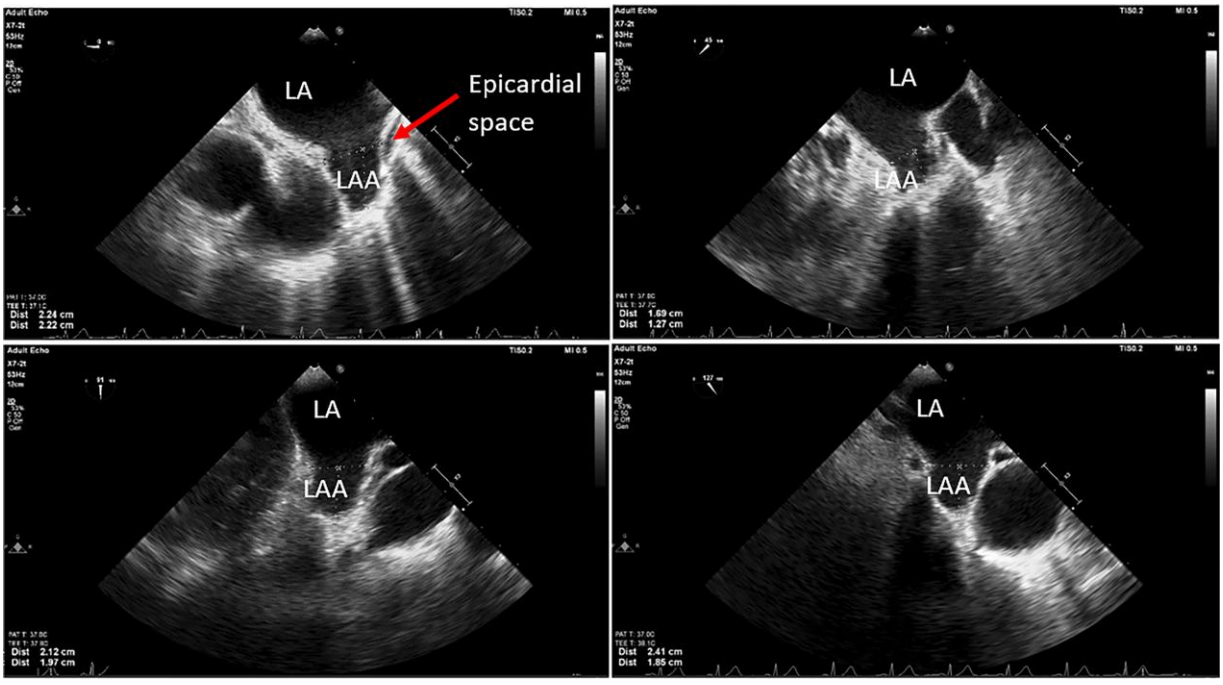


Figure 1 TEE pre-LAAO device deployment demonstrating persistent communication between LAA and left atrium.

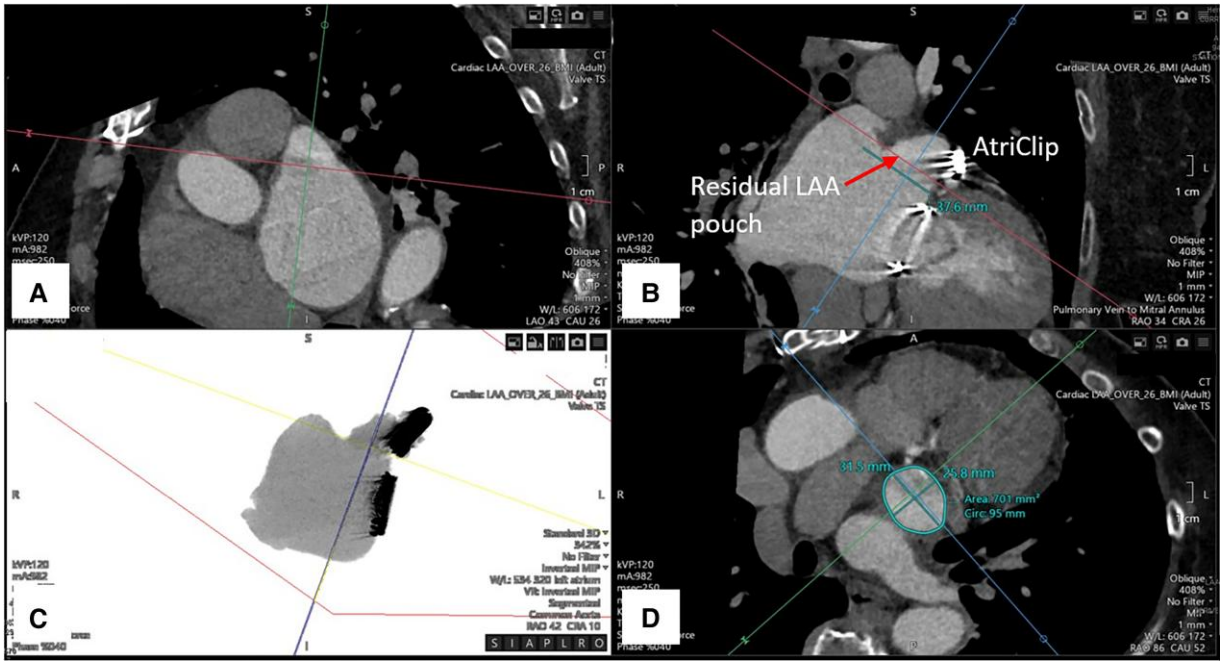


Figure 2 CT reconstruction of the LAA status post-surgical ligation (AtriClip), highlighting presence of the AtriClip with the residual pouch (*B*) the LAA ostium (*A* and *C*) with measurement of the residual communication (*D*).

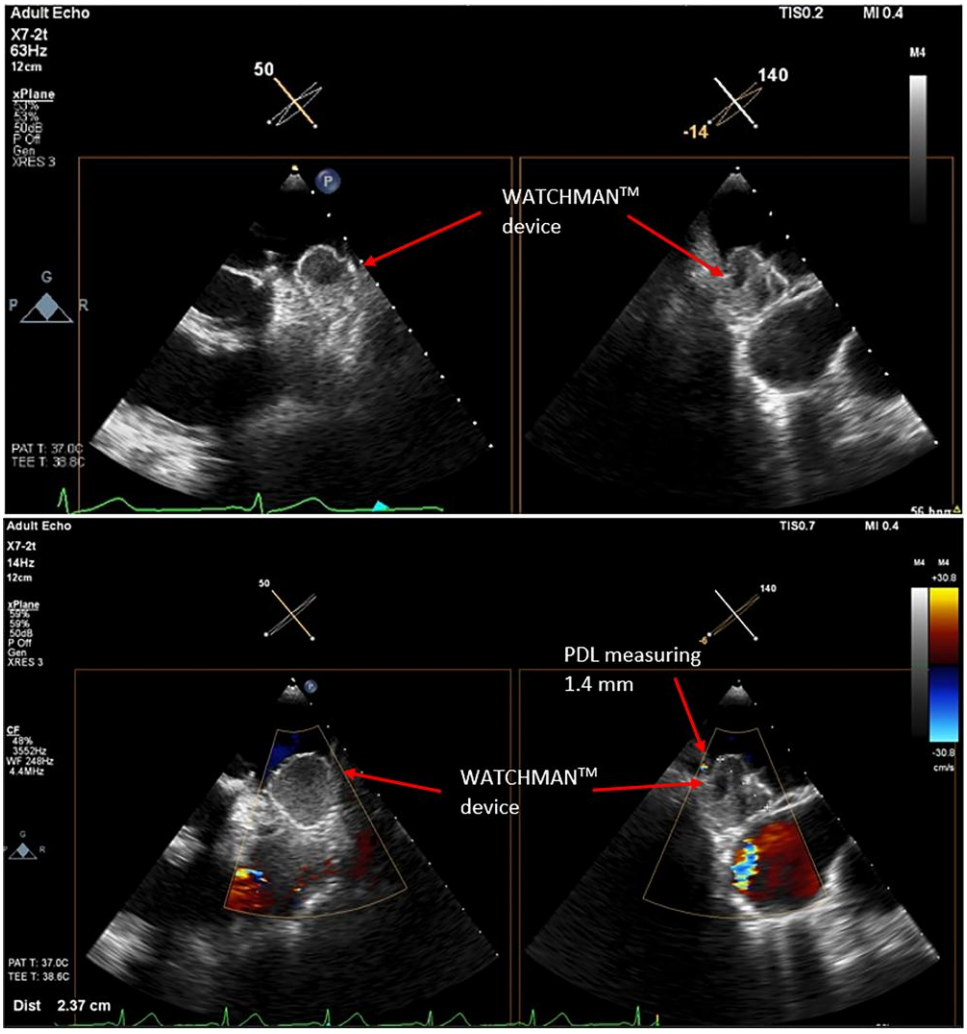
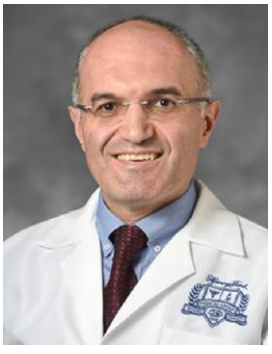


Figure 3 TEE post-LAAO device deployment (WATCHMAN™).

Lead author biography



Dr Waddah Maskoun is a board certified Cardiac Electrophysiologist and Clinical Faculty with Henry Ford Health System in Southeast Michigan. He graduated from Aleppo University School of Medicine, and received post-graduate training in Cardiovascular Medicine from Medical College of Wisconsin, followed by Clinical Electrophysiology from Indiana University Medical Center. He has been involved in a multitude of clinical research publications to-date, focusing on dysrhythmias and complex electrophysiologic therapies.

Consent: The patient provided consent for use of de-identified information for publication and educational purposes, in compliance with COPE guidelines

Conflict of interest: Dr Waddah Maskoun received research grant from Medtronic and Boston Scientific.

Funding: No funding was provided for this research.

Data availability

No new data were generated or analysed in support of this research.

References

1. Miyasaka Y, Barnes ME, Gersh BJ, Cha SS, Bailey KR, Abhayaratna WP, et al. Secular trends in incidence of atrial fibrillation in Olmsted County, Minnesota, 1980 to 2000, and implications on the projections for future prevalence. *Circulation* 2006;**114**: 119–125.
2. Blackshear JL, Odell JA. Appendage obliteration to reduce stroke in cardiac surgical patients with atrial fibrillation. *Ann Thorac Surg* 1996;**61**:755–759.
3. Panikker S, Jarman JW, Virmani R, Kutys R, Haldar S, Lim E, et al. Left atrial appendage electrical isolation and concomitant device occlusion to treat persistent atrial fibrillation: a first-in-human safety, feasibility, and efficacy study. *Circ Arrhythm Electrophysiol* 2016;**9**: e003710.
4. Panikker S, Lord J, Jarman JW, Armstrong S, Jones DG, Haldar S, et al. Outcomes and costs of left atrial appendage closure from randomized controlled trial and real-world experience relative to oral anticoagulation. *Eur Heart J* 2016;**37**: 3470–3482.

5. Kanderian AS, Gillinov AM, Pettersson GB, Blackstone E, Klein AL. Success of surgical left atrial appendage closure: assessment by transesophageal echocardiography. *J Am Coll Cardiol* 2008;**52**:924–929.
6. Viles-Gonzalez JF, Kar S, Douglas P, Dukkipati S, Feldman T, Horton R, et al. The clinical impact of incomplete left atrial appendage closure with the Watchman Device in patients with atrial fibrillation: a PROTECT AF (Percutaneous Closure of the Left Atrial Appendage Versus Warfarin Therapy for Prevention of Stroke in Patients With Atrial Fibrillation) substudy. *J Am Coll Cardiol* 2012;**59**:923–929.
7. Sleiman JR, Lewis AJ, Perez EJ, Sanchez AM, Baez-Escudero JL, Navia JL, et al. Management of peri-device leak following left atrial appendage closure: a systematic review. *Catheter Cardiovasc Interv* 2021;**98**:382–390.
8. Manongi N, Volodarskiy A, Goldbarg S. Left atrial appendage occlusion with Watchman device after incomplete surgical ligation. *BMJ Case Rep* 2022;**15**:e251905.
9. Golzarian H, Mariam A, Shah SR, Pasley BA, Ansah KN, Verma A, et al. Utilization of WATCHMAN FLX for surgically incomplete left atrial appendage occlusion: a multicentre case series. *Eur Heart J Case Rep* 2023;**7**:ytad160.
10. Hindricks G, Potpara T, Dagres N, Arbelo E, Bax JJ, Blomström-Lundqvist C, et al. 2020 ESC guidelines for the diagnosis and management of atrial fibrillation developed in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS): the task force for the diagnosis and management of atrial fibrillation of the European Society of Cardiology (ESC) developed with the special contribution of the European Heart Rhythm Association (EHRA) of the ESC. *Eur Heart J* 2021;**42**:373–498.
11. Reddy VY, Holmes D, Doshi SK, Neuzil P, Kar S. Safety of percutaneous left atrial appendage closure: results from the Watchman Left Atrial Appendage System for Embolic Protection in Patients with AF (PROTECT AF) clinical trial and the Continued Access Registry. *Circulation* 2011;**123**:417–424.