"A heart within the heart": A rare case of a large left atrial appendage occluder device–related thrombus

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Introduction

Left atrial appendage occlusion (LAAO) is an alternative to lifelong anticoagulation in patients with atrial fibrillation.[1,2] Device-related thrombus (DRT) occurs in 3%–4% of patients following LAAO.[3–5] We describe a case of a large, unique-morphology DRT and review the likely cause and procedural techniques to mitigate this.

Case report

An 85-year-old male patient, who 6 months earlier underwent LAAO with the Amulet device for frequent falls and atrial fibrillation, CHA_2DS_2-VASc score 4 with HASBLED score 2, underwent transesophageal echocardiography (TEE) to assess for DRT and peri-device leak prior to coming off the clopidogrel portion of his dual antiplatelet therapy. The patient has no prior strokes or venous thromboembolism.

Several TEE views from 0° to 135° were obtained and revealed a large 3.2 cm × 3.4 cm mass consistent with thrombus arising from an artificially created cul-de-sac between the ridge of the left superior pulmonary vein and the disc of the Amulet device, as shown in Figure 1A and 1B (images taken immediately post Amulet device implant and at 6 months follow-up, respectively). Mass is seen in all TEE views shown in Figure 2 (TEE view at 0° shows heart-shaped morphology).

Oral anticoagulation (OAC) with apixaban was started with a follow-up TEE planned in 8–12 weeks. He has had no ischemic events to date.

Discussion

This case reveals a large DRT following LAAO with the Amulet device. Predictors of DRT include hypercoagulability disorders, iatrogenic pericardial effusion, renal insufficiency, nonparoxysmal atrial fibrillation, and device implantation depth >10 mm from the pulmonary vein limbus.[5] For the Amulet subset of patients who develop DRT, the ridge of the left upper pulmonary vein was found to be uncovered in 82% of cases.[6] This finding was also highlighted by Sedaghat and colleagues,[7] who showed in their study that all thrombi were found between the device and the left upper pulmonary vein ridge, suggesting that incomplete sealing of the left atrial appendage (LAA) ostium and creation of a cul-de-sac may act as a nidus for thrombus formation. Although our patient had nonparoxysmal atrial fibrillation with device implantation of >10 mm from the pulmonary vein limbus, the pronounced cul-de-sec in this case likely was the nidus for thrombus formation.

Studies have shown less DRT with the Amulet as compared with the Watchman, at a rate of 3.3 and 4.5 at 18 months, respectively.[8] Reasons for this include a dual-component design with the ability to place the disc of the Amulet on the base of the LAA and the left superior pulmonary vein ridge, thereby mitigating cervices created by lobe compression.[8,9]

Release of the Amulet device is predicated on the "CLOSE" criteria, which evaluates the compression (C) of the lobe, lobe position two-thirds below the left circumflex (L), orientation (O) of the device coaxial to the LAA, and separation (S) of an elliptical disc (E).[9]

KEY TEACHING POINTS

- Careful patient selection is of high importance for left atrial appendage occlusion (LAAO).
- There is need for risk stratification and optimization of procedure techniques such as the depth of LAAO device implantation.
- It is important to avoid incomplete sealing of the left atrial appendage ostium or creation of an artificial cul-de-sac and to ensure the LAAO device meets the key "CLOSE" criteria prior to release.

KEYWORDS Left atrial appendage occluder device; Atrial fibrillation; Thrombus; Stroke; Echocardiography
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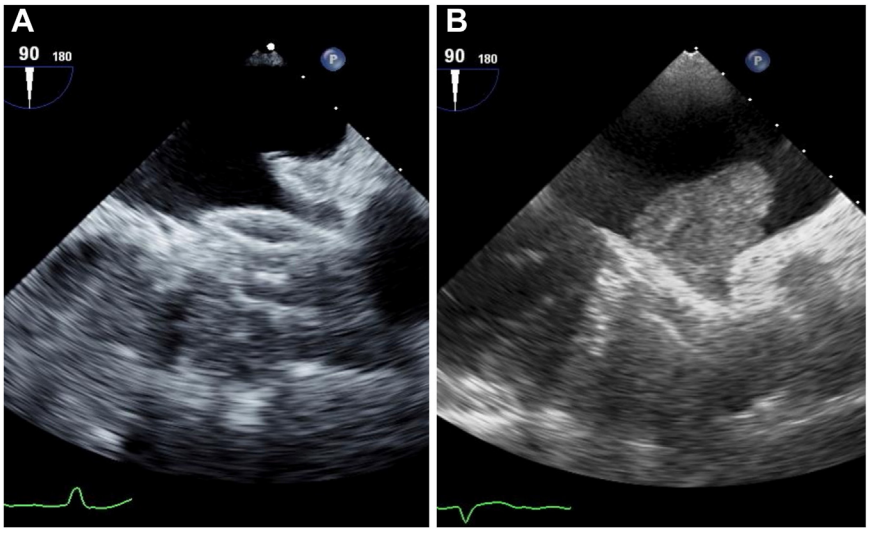

Figure 1 Transesophageal echocardiography image at 90°: **A:** immediately post Amulet device implant and **B:** at 6 months follow-up.

In retrospect, the postimplant TEE views in Figure 1A reveal minimal separation between the lobe and the disc, and possibly a greater traction test to place the disc on the base of the ridge would have been possible. If this could not have been accomplished, risks of a partial or full recapture would need to be considered. If a recapture was not precluded, a partial recapture could have been attempted with a more proximal lobe implant

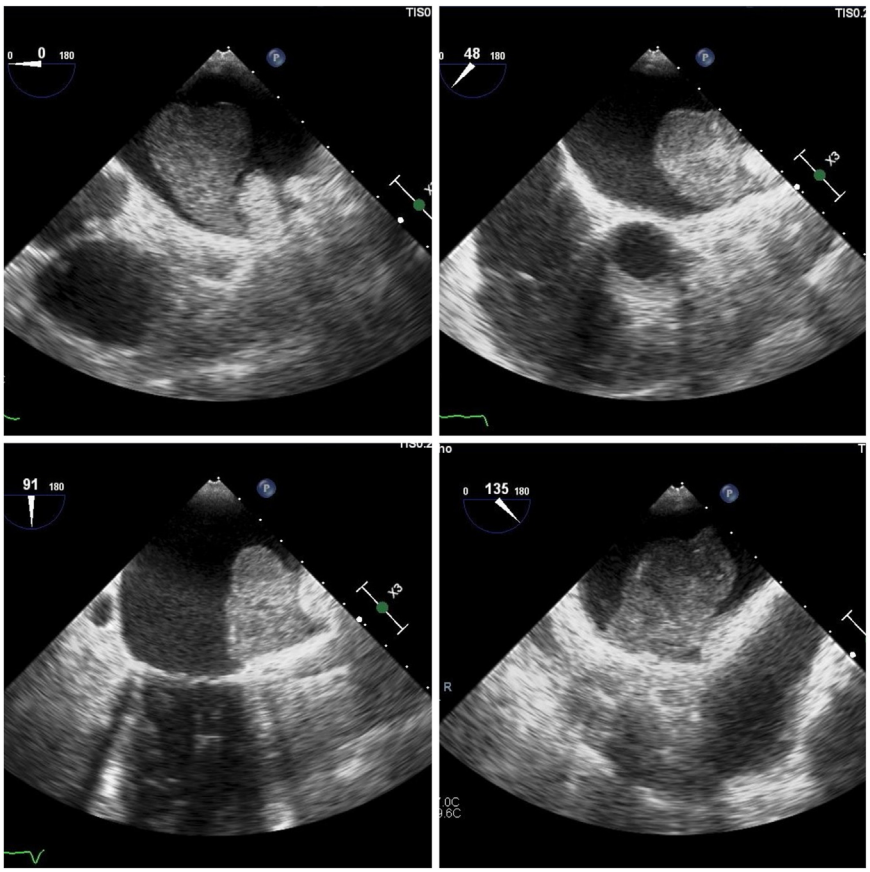

Figure 2 Several transesophageal echocardiography views of a large mass arising from a cul-de-sac between the ridge of the left superior pulmonary vein and the disc of the Amulet device.

to see if the disc could be placed on the base of the ridge. Alternatively, a full recapture could have been performed and a larger device could have assisted in accomplishing the goal of placing the disc on the base of the ridge. In scenarios where this is not possible, OAC postimplant with a shorter TEE follow-up could provide guidance.[4,6]

Conclusion

DRT is a serious complication of LAAO, as it increases the risk of embolic stroke, the very outcome LAAO is meant to prevent. Shared-decision discussions are imperative for LAAO procedures, as patients should recognize that device implantation does not necessarily preclude OAC postprocedure. DRT predictors listed previously, as well as the implant result, may require close follow-up with imaging and necessitate OAC for an undefined period if DRT is found. Careful patient selection for LAAO, risk stratification, and optimization of procedure techniques such as the depth of device implantation, avoiding incomplete sealing of LAA ostium or creation of an artificial cul-de-sac, and ensuring the device meets the key "CLOSE" criteria prior to release will minimize the risk of DRT.

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References

1. Peyrol M, Cautela J, Salaun E, et al. Device-related thrombus after left atrial appendage occlusion with the amulet device. Heart Lung Circ 2019;28:1683–1688.
2. Holmes DR Jr, Doshi SK, Kar S, et al. Left atrial appendage closure as an alternative to warfarin for stroke prevention in atrial fibrillation: a patient-level meta-analysis. J Am Coll Cardiol 2015;65:2614–2623.
3. Dukkipati SR, Kar S, Holmes DR, et al. Device-related thrombus after left atrial appendage closure: incidence, predictors, and outcomes. Circulation 2018; 138:874–885.
4. Fauchier L, Cinaud A, Brigadeau F, et al. Device-related thrombosis after percutaneous left atrial appendage occlusion for atrial fibrillation. J Am Coll Cardiol 2018; 71:1528–1536.
5. Simard T, Jung RG, Lehenbauer K, et al. Predictors of device-related thrombus following percutaneous left atrial appendage occlusion. J Am Coll Cardiol 2021; 78:297–313.
6. Schmidt B, Nielsen-Kudsk JE, Ellis CR, et al. Incidence, predictors, and clinical outcomes of device-related thrombus in the Amulet IDE trial. JACC Clin Electrophysiol 2023;9:96–107.
7. Sedaghat A, Schrickel JW, Andrié R, Schueler R, Nickenig G, Hammerstingl C. Thrombus formation after left atrial appendage occlusion with the Amplatzer Amulet device. JACC Clin Electrophysiol 2017;3:71–75.
8. Lakkireddy D, Thaler D, Ellis CR, et al. Amplatzer Amulet left atrial appendage occluder versus Watchman device for stroke prophylaxis (Amulet IDE): a randomized, controlled trial. Circulation 2021;144:1543–1552.
9. Ellis CR. Amplatzer Amulet™ left atrial appendage occluder: a step-by-step guide to device implantation. J Cardiovasc Electrophysiol 2022;33:1881–1887.