CASE REPORT

Post occlusive left atrial appendage thrombosis with extension into the left atrium

Alaa Shalaby,^{1,2} Marwan Refaat,² Joan Lacomis,³ Marco Zenati²

¹Division of Cardiology, VA Pittsburgh Healthcare System, Pittsburgh, Pennsylvania, USA
²University of Pittsburgh Medical Center: Heart and Vascular Institute, Pittsburgh, Pennsylvania, USA
³University of Pittsburgh Medical Center: Division of Radiology, Pittsburgh, Pennsylvania, USA

Correspondence to
 Dr Alaa Shalaby,
 alaa.shalaby@va.gov

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SUMMARY

A 67-year-old man underwent left atrial appendage (LAA) exclusion concomitant with mitral valve surgery and radiofrequency ablation maze procedure. On transoesophageal echocardiography anticipating ablation for left atrial tachycardia, an echodense thrombus was visualised in the LAA location with apparent intracavitary extension into the left atrium. Based on CT imaging findings, the echo represented thrombosis of a large left atrial appendage with probable extension into the left atrium.

BACKGROUND

Increasingly, left atrial appendage (LAA) occlusion has been considered as a means of reducing thromboembolic risk in patients with atrial fibrillation, particularly when intolerant of anticoagulation.¹ Increased utilisation, however, requires better understanding of pathophysiology associated with LAA occlusion. The LAA is a structure of variable sizes, extent and anatomic disposition that clinicians, particularly interventionalists, need to appreciate.^{2–4} Such knowledge will not only be necessary for the deployment of occlusion devices but also for anticipating subsequent changes that may affect the conduct of interventional procedures.

CASE PRESENTATION

A 67-year-old man with severe mitral regurgitation and atrial fibrillation underwent mitral valve replacement with a tissue bioprosthetic valve and Maze radiofrequency ablation. The LAA was over sewn at the neck in two layers with non-absorbable suture and left in situ. Transoesophageal echocardiography (TOE) obtained immediately after surgery demonstrated complete occlusion with no Doppler flow into or out of the LAA. Postoperatively,

warfarin was continued with therapeutic international normalised ratio. Four months after surgery the patient presented for left atrial tachycardia ablation. TOE obtained immediately prior to the procedure (videos 1 and 2) revealed LAA to be excluded, with an empty residual stump. On colour Doppler interrogation there was no flow into the LAA. A mounded echodensity related to the anterior atrial wall and apposing the aortic root could be seen (figure 1). This was noted to be fixed, homogeneous and well defined. However, it could not be clearly separated from the atrial wall. A contrast CT with three-dimensional reconstruction was obtained and revealed a large density anterior to the left atrium that was visualised to extend between the left atrial body and aortic root (figure 1C). Contrast dye trapped between the sutures occluding LAA were seen at the base of this mass (figure 1D). The findings were compared to a CT study obtained prior to surgery (figure 1E, F) where a large LAA could be seen in the same location. Thus the current findings corresponded to a swollen thrombosed LAA. Owing to uncertainty over the extent of thrombus formation and whether the left atrium was indeed clear of thrombus, the ablative procedure was postponed for 2 months. TOE immediately before the procedure excluded the presence of thrombus within the left atrial cavity. As per our standard practice, radial intracardiac echocardiography (UltraIce 9 MHz, Boston Scientific, Natick, Massachusetts, USA) was employed intraoperatively to help define anatomy and guide ablation. Possible layered thrombus could be seen with this modality (figure 1G). However, dynamic images revealed this to be external to the left atrial wall that was contracting well. Specifically, the LAA demonstrated intracavitary thrombus and lucency consistent with fluid likely

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Videos 1 and 2 TOE demonstrating relationship of LA thrombus to LAA stump and LA wall opposite aortic valve and anterior mitral annulus.

Figure 1 (A and B) Transoesophageal echocardiography images showing mounded thrombus in left atrium against the anterior wall apposed to the aortic root. (C and D) Concurrent CT scan with contrast demonstrating ill-defined density between the left atrium and aortic root outlined by contrast in both chambers. Contrast trapped between the sutures at the base of the atrial appendage is also visible. (E and F) Prior CT scan obtained prior to cardiac surgery demonstrating large-sized left atrial appendage. (G and H) Intracardiac echocardiography images 2 months later demonstrating layered echodensity outside the left atrial wall (H), and within the left atrial appendage cavity (G) (Ao, aortic root, LA, left atrium, LAA, left atrial appendage, LSPV, left superior pulmonary vein, LV, left ventricle).

corresponding to liquefactive necrosis as well as thickening of the free wall of the LAA (figure 1H). Ablation lesions at break points in the line of block around the left antrum and away from the LAA were successful in terminating the tachycardia. Anticoagulation was continued long term and at 1 year follow-up there was no evidence of stroke.

DISCUSSION

In this case we found a preoperatively enlarged LAA to have thrombosed after surgical exclusion, despite concurrent anticoagulation. TEE immediately after surgery, and at 4 months, did not demonstrate flow into the LAA. However, the trapped contrast dye on CT scan may suggest that the LAA exclusion may have become incomplete at some point possibly allowing thrombus extension into the left atrium.

In appropriate cases, LAA exclusion or removal at the time of surgery may be opportune. LAA removal may require inversion and suture of the stump to avoid bleeding from the raw surface. However, the inverted stump in the left atrium may then provide a nidus for thrombus formation.

Since intracavitary extension of LAA thrombosis cannot be excluded, anticoagulation after LAA occlusion should be continued for such a period that may be necessary for all postoperative thrombosis to resolve and may need to be extended when thrombus or residual flow is demonstrated on follow-up TOE. Experience with the Watchman percutaneous LAA occlusion device is relevant. TOE was performed at 45 days, 6 months and 12 months where Coumadin was discontinued only if no residual flow was evident. At 12-month follow-up, 32% of patients were found to have residual flow. However, there was no increase in outcome events probably as a result of the continued anticoagulation in such cases.⁵

In our case, 4 months after the operation and despite anticoagulation there was still evidence of thrombus formation in the LAA with extension in the left atrium. While this might suggest underlying thrombotic tendency, in absence of previous thromboembolic events this was felt to be unlikely. It is intriguing to consider whether the addition of antiplatelet agents or use of novel anticoagulants would yield a different outcome.

Learning points

- ▶ Left atrial appendage thrombosis occurs after occlusion.
- ▶ Left atrial appendage thrombosis can extend into the left atrium.
- ▶ Anticoagulation after left atrial occlusion should be continued for several weeks to months.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Holmes DR, Reddy VY, Turi ZG, *et al.* PROTECT AF investigators percutaneous closure of the left atrial appendage versus warfarin therapy for prevention of stroke in patients with atrial fibrillation: a randomised non-inferiority trial. *Lancet* 2009;374:534–42.
- 2 Lacomis JM, Goitein O, Deible C, *et al.* Dynamic multidimensional imaging of the human left atrial appendage. *Europace* 2007;9:1134–40.
- 3 Heist EK, Refaat M, Danik SB, *et al.* Analysis of the left atrial appendage by magnetic resonance angiography in patients with atrial fibrillation. *Heart Rhythm* 2006;3:1313–18.
- 4 Di Biase L, Santangeli P, Anselmino M, *et al.* Does the left atrial appendage morphology correlate with the risk of stroke in patients with atrial fibrillation? Results from a multicenter study. *J Am Coll Cardiol* 2012;60:531–8.
- 5 Viles-Gonzalez JF, Kar S, Douglas P, *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;59:923–9.

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