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CASE REPORT
Electrophysiology

Percutaneous left atrial appendage occlusion following successful treatment of large bi-atrial thrombi in a patient with atrial fibrillation: a case report

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Background Atrial fibrillation (AF) is a well-established risk factor for intracardiac thrombosis. Left atrial appendage occlusion (LAAO) is emerging as a viable alternative to oral anticoagulation (OAC) for high-risk AF patients who are contraindicated to long-term OAC.

Case summary A 74-year-old man with a history of permanent AF and subdural haemorrhage on warfarin therapy was referred to our facility for further management. Cardiac CT imaging revealed large bi-atrial thrombi for which apixaban therapy was initiated. Serial imaging over nine months showed gradual shrinkage and then resolution of the thrombi. In line with the patient's preference to avoid lifelong OAC, he received LAAO using an Amplatzer™ Amulet™ device. Follow-up transoesophageal echocardiography showed a well-seated device with no leak and no thrombus.

Discussion We discussed the key issues surrounding management of bi-atrial thrombi and the decision to perform LAAO in these circumstances, relying on shared decision making and multi-disciplinary team input.

Keywords Bi-atrial thrombi • Atrial fibrillation • Left atrial appendage occlusion • Anticoagulation • Apixaban • Case report

ESC Curriculum 5.3 Atrial fibrillation • 2.2 Echocardiography • 2.1 Imaging modalities • 2.4 Cardiac computed tomography

Learning points

- Apixaban is effective in aiding resolution of large left and right atrial thrombi.
- Apixaban was safely used for this indication even with a prior history of intracranial haemorrhage on warfarin.
- Left atrial appendage occlusion is an option for avoiding long-term oral anticoagulation in high-risk patients—this may be the preferred option by some patients if their concern about bleeding is high.

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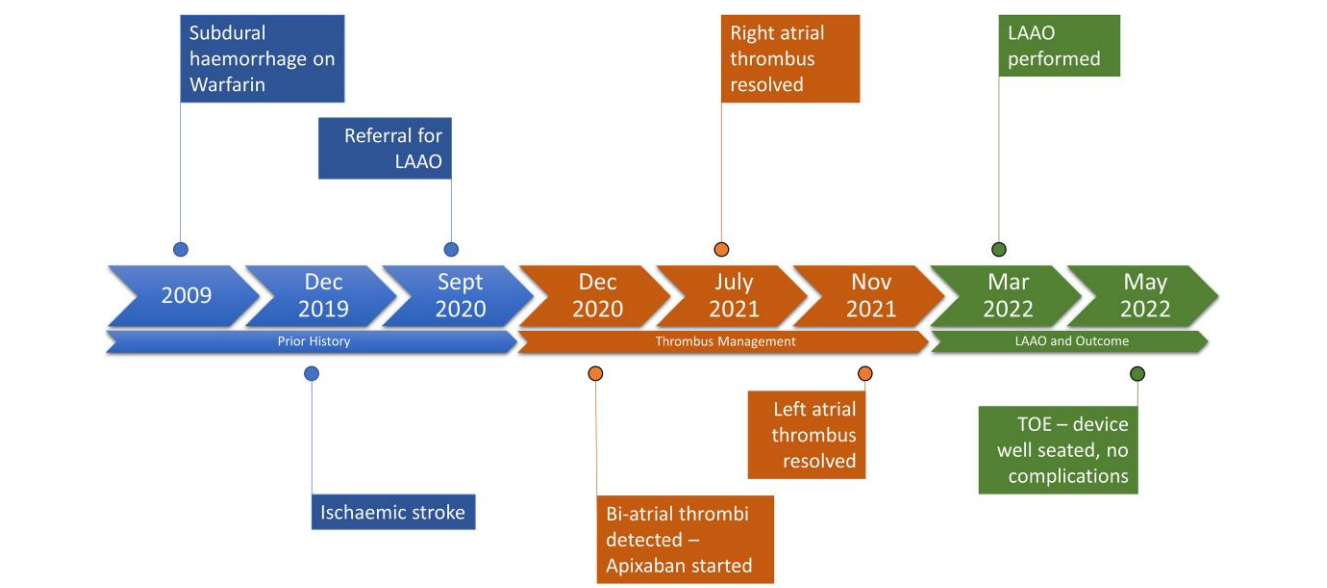
Introduction

It is well recognized that atrial fibrillation (AF) predisposes to intracardiac thrombosis. For this reason, life-long oral anticoagulation (OAC) therapy is recommended in appropriate patients.[1] In some patients, however, long-term OAC is contraindicated, and left atrial appendage occlusion (LAAO) provides an alternative option to reduce the risk of systemic thromboembolism.[2]

We present a complex case where life-long OAC was contraindicated by a prior history of intracranial bleeding, and in whom large bi-atrial thrombi were managed safely with oral anticoagulation followed by successful LAAO.

Timeline



Case summary

A 74-year-old gentleman with permanent asymptomatic AF was referred for consideration of LAAO. His medical history included hypertension, heart failure (left ventricular ejection fraction 42%), and two prior transient ischaemic attacks. His CHA_2DS_2-VASc score of 5 correlated with an annual stroke risk of 6.7%.[3] He had previously been managed with warfarin; however, following a spontaneous subdural haemorrhage, warfarin was discontinued and replaced with clopidogrel. He then suffered an ischaemic stroke and was referred to our facility for consideration of LAAO.

As part of the work-up, a cardiac computed tomography (CT) scan was performed, which revealed large bi-atrial thrombi (*Figure 1*). The left atrial (LA) thrombus originated from the LA appendage (LAA) and measured 18 × 16 mm (*Figure 1A*). The right atrial (RA) thrombus, measuring 25 × 13 mm, was located laterally (*Figure 1B and C*). There was no evidence of pulmonary embolism. A cardiac magnetic resonance imaging (MRI) was performed to exclude myxoma, further characterise the thrombi (*Figure 1D*) and exclude an underlying cardiomyopathy. The maximum dimensions of the thrombi on MRI were even larger (LA 23 mm, RA 30 mm). Left ventricular function was mildly reduced (ejection fraction 53%), however, there was no overt evidence of cardiomyopathy.

At this stage, LAAO was not feasible due to prohibitively high risk of thrombus dislodgement. The risks of thromboembolism vs. bleeding on OAC were discussed with the patient, and based on our prior published experience, he was commenced on apixaban 5 mg twice daily.[4]

The patient tolerated OAC well, and a follow-up cardiac CT scan 6 months later showed partial resolution of the LA thrombus (*Figure 2A and B*) and complete resolution of the RA thrombus (*Figure 2C and D*). Apixaban was continued for a further three months, and imaging demonstrated complete resolution of the LA thrombus (*Figure 2E and F*).

At this stage, the patient was reconsidered for LAAO in view of his history of intracranial bleeding on warfarin and very high overall bleeding risk (HAS-BLED score 6). It was recognised that LAAO would not entirely mitigate his risk of thromboembolism, especially that arising from subsequent RA thrombus. However, as the LA thrombus originated from the LAA, it was felt that LAAO would reduce his long-term risk of stroke and systemic embolism. The patient expressed a strong preference to avoid long-term OAC, and after considering the risks and benefits, opted for LAAO.

The LAAO procedure was performed under general anaesthesia, with transoesophageal echocardiographic (TOE) guidance as per our standard protocol.[5] Transoesophageal echocardiogram demonstrated massively enlarged atria with no visible thrombus (*Figure 3A*). Access was gained via the right femoral vein, and a 25 mm Amplatzer™ Amulet™ device (Abbott Vascular, Chicago, IL, USA) was successfully deployed without complication (*Figure 3B and C*). Overnight hospital stay was uneventful, and the patient was discharged on apixaban and clopidogrel for three months to prevent early device-related thrombosis. Follow-up TOE, performed six weeks post-procedure, showed a well seated device with no thrombus or leak (*Figure 3D*). The patient was scheduled for annual follow-up TOE.

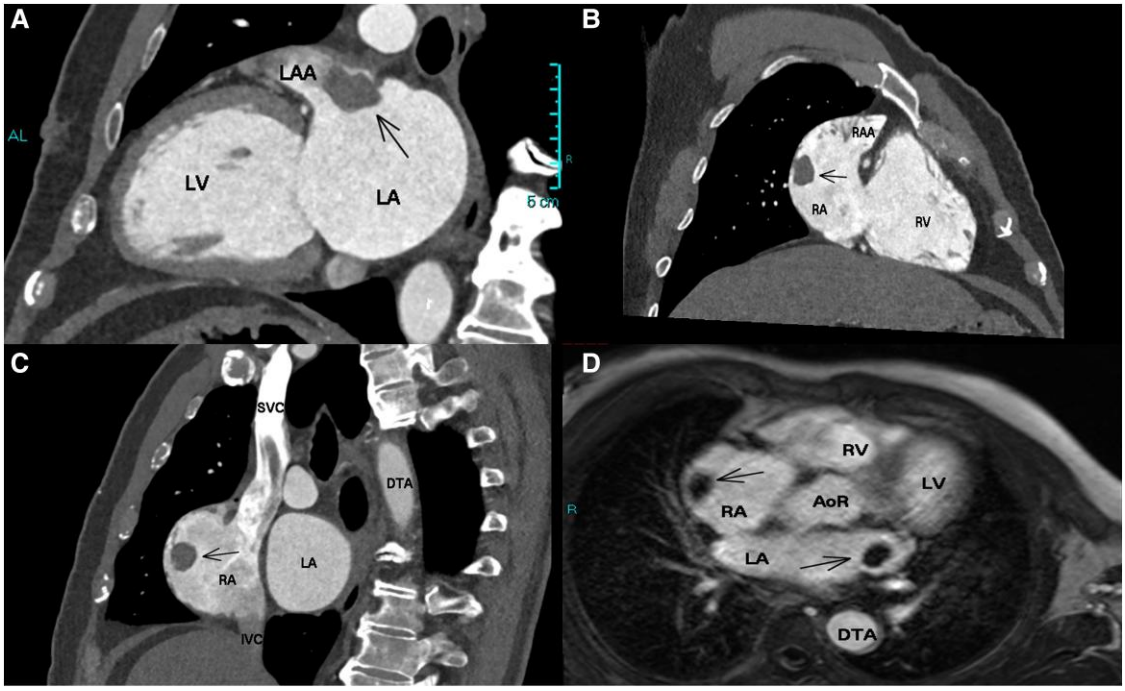


Figure 1 Images obtained from cardiac computed tomography (*A*–*C*) and magnetic resonance (*D*). (*A*) A large thrombus (arrow) at the orifice of the left atrial appendage in two cardiac planes: 2-chamber. (*B*, *C*) A large thrombus (arrow) in the right atrium in two different cardiac planes: (*B*) right ventricular 2-chamber and (*C*) bi-caval. (*D*) The presence of thrombi in the atria (arrows). AoR, aortic root; DTA, descending thoracic aorta; IVC, inferior vena cava; LA, left atrium; LAA, left atrial appendage; LV, left ventricle; RA, right atrium; RAA, right atrial appendage; RV, right ventricle; SVC, superior vena cava.

Discussion

Intracardiac thrombosis is a well-known complication of AF. The underlying mechanisms involve a complex interplay of factors relating to Virchow's triad of hypercoagulability, endothelial dysfunction, and blood stasis.[6] The LAA is the predominant site for >90% of thrombi in patients with AF.[7] Left atrial thrombosis is present in 10% of AF patients,[7] whereas RA thrombus is less common, ranging from 3–6%.[8] Most RA thrombi are considered 'thrombi-in-transit' (Type A) and carry a high risk of pulmonary embolism.[8] However, the RA thrombus in our patient most likely represents a primary thrombus associated with AF (Type B). It is rare to find thrombi in both atria simultaneously.

There is absence of guideline recommendations on the management of RA thrombus. Treatment options include anticoagulation, thrombolysis, and thrombectomy.[9] Thrombolysis is a life-saving intervention which is best reserved for emergencies. In our patient, there was no emergent indication for thrombolysis and, indeed, this would be contraindicated by the history of previous intracranial bleeding. Surgical thrombectomy may be warranted for high-risk patients, however, this was inadvisable in our case due to high operative risk and lack of haemodynamic instability.

The presence of intracardiac thrombus is considered a contraindication to LAAO.[10] We have shown previously that short-term OAC with apixaban facilitates resolution of LA thrombi in high-risk patients who are ineligible for life-long OAC, allowing LAAO to be performed safely.[4] Apixaban was our antithrombotic drug of choice as it is well tolerated in patients who have previously failed treatment with warfarin and carries a lower risk of intracranial bleeding.[11] Indeed, apixaban successfully treated the bi-atrial thrombi in our patient without complications. To the best of our knowledge, this is the first reported case of resolution of bi-atrial thrombi on OAC, allowing safe and successful LAAO.

The long-term risks of stroke and thromboembolism in our patient without OAC therapy are considerable, however, his bleeding risk is also significant. The options for treatment were: (i) leave him off OAC given the risk of bleeding and accept the risk of future thromboembolism; (ii) continue apixaban in the longer term, given its superior safety profile compared to warfarin, accepting the potential risk of bleeding; and (iii) proceed with LAAO, allowing discontinuation of OAC whilst accepting that this will not entirely mitigate his thromboembolic risk. Individualised, shared decision making is critical in such situations. The options were discussed in detail with our patient. We attempted to assuage his fear of recurrent major bleeding with long-term OAC by reassuring him that apixaban carries a superior safety profile in patients with a history of intracranial haemorrhage.[12] Despite this, our patient expressed a strong preference to avoid long-term OAC therapy and preferred to proceed with LAAO. Recurrent RA thrombus formation remains a concern, however, to date, no recurrence has been observed, and annual follow-up is planned.

Left atrial appendage occlusion carries an up-front risk of procedural complications. This may be offset by longer-term discontinuation of OAC and reduction in bleeding risk. Whilst there will be no impact on RA thrombosis, the LA thrombus clearly originated from the LAA in our patient. Hence, LAAO is an appealing option in this patient that will significantly reduce the risk of recurrence. Indeed, LAAO is non-inferior to warfarin and to NOACs in reducing the risk of ischaemic stroke, cardiovascular death, all-cause mortality, and major bleeding.[2,13]

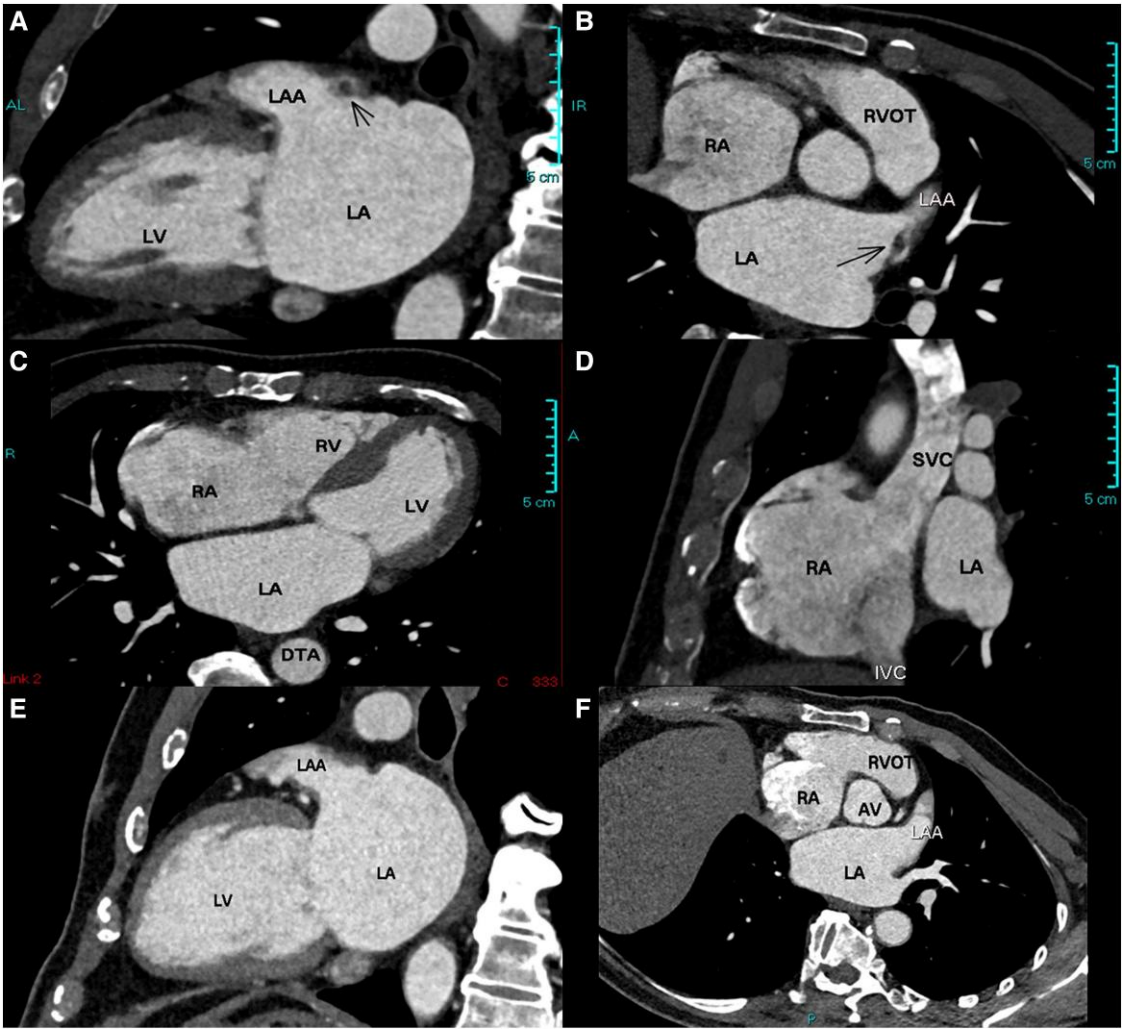


Figure 2 Images obtained from cardiac computed tomography show outcome after anticoagulation therapy. (*A*, *B*) A significant reduction in the size of the left atrial thrombus (arrow) after six months. (*C*, *D*) Complete resolution of the right atrial thrombus after six months. (*E*, *F*) Complete resolution of the thrombus at the orifice of left atrial appendage after nine months. AV, aortic valve; DTA, descending thoracic aorta; IVC, inferior vena cava; LA, left atrium; LAA, left atrial appendage; LV, left ventricle; RA, right atrium; RVOT, right ventricular outflow tract; SVC, superior vena cava.

The optimal post-implantation antithrombotic drug regimen and treatment duration post-LAAO remain controversial. In our case, given the recent resolution of bi-atrial thrombi and high risk of early recurrence, short-term continuation of OAC was felt to be important. The device requires at least one antiplatelet, and we wished to avoid triple therapy given the bleeding risk. Hence, our post-procedural regimen consisted of apixaban and clopidogrel. The Amplatzer™ device is associated with low thrombogenicity,[14] rendering short-term dual antiplatelet therapy an option when there is a preference to avoid OAC.[10,14] A satisfactory result on follow-up TOE allows for continuation of antiplatelet monotherapy, or no therapy at all, in the longer-term.[10,14]

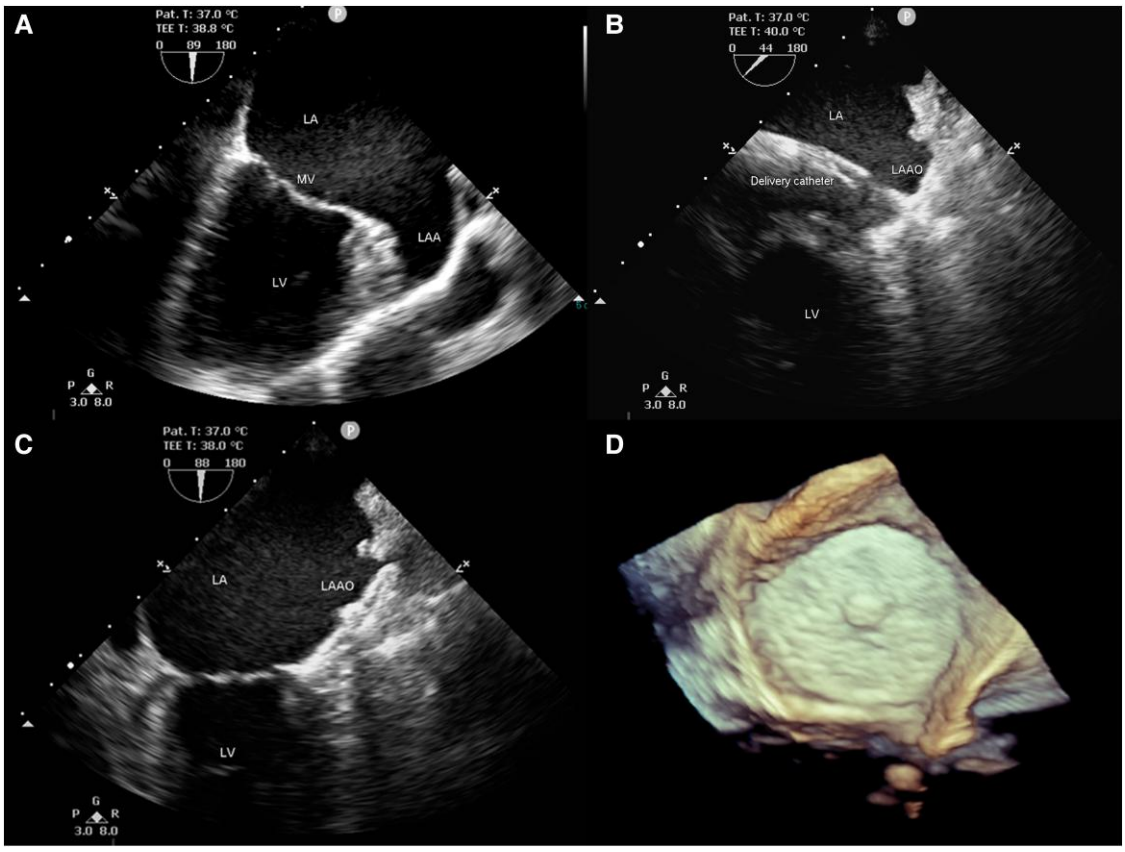


Figure 3 (*A–C*) Periprocedural transoesophageal echocardiogram. (*A*) Dilated left atrium and large left atrial appendage are seen with no residual thrombus. (*B*) The delivery catheter is seen in the left atrium pushing the occluder device (LAAO) into the left atrial appendage. (*C*) Final position of the LAAO at the end of the procedure. (*D*) Follow-up transoesophageal echocardiogram 6 weeks after the implantation of the LAAO. An enface 3D image of the LAAO and confirms that there is no thrombus on the device disk. LA, left atrium; LAA, left atrial appendage; LAAO, left atrial appendage occlusion; LV, left ventricle; MV, mitral valve. See also supplementary videos 1–3.

Conclusion

We report an unusual case where large bi-atrial thrombi were successfully treated with apixaban allowing LAAO to be performed successfully and safely.

Lead author biography

Kim Fong Ng is a Clinical Fellow in Electrophysiology at Liverpool Heart and Chest Hospital. He received MBBS from Melaka Manipal College and Doctor of Internal Medicine from Universiti Kebangsaan Malaysia. He was recently awarded FRCP from London and Edinburgh.

Supplementary material

Supplementary material is available at *European Heart Journal—Case Reports*.

Slide sets: A fully edited slide set detailing this case and suitable for local presentation is available online as Supplementary data.

Consent: Written patient consent was received towards publishing this article in accordance with COPE guidelines.

Conflict of interest: D.G. reports: institutional research grants from Biosense Webster, Boston Scientific, and Medtronic, and speaker fees from Boston Scientific. G.Y.H.L. reports: consultant and speaker for BMS/Pfizer, Boehringer Ingelheim, and Daiichi-Sankyo. No fees are received personally. The other authors report no conflicts of interest.

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Data availability

The data underlying this article are available in the article and in its online supplementary material.

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