Triple percutaneous patent foramen ovale closure

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Summary

Percutaneous patent foramen ovale (PFO) closure is mainly performed for secondary prevention of presumed paradoxical embolism. Since a residual shunt has been associated with recurrent events, complete PFO closure is desirable. We report the first case of ultimately successful percutaneous PFO closure using successively 3 Amplatzer PFO devices.

Key words: atrial septal aneurysm; patent foramen ovale; paradoxical embolism; cerebral ischaemia; secondary stroke prevention

Introduction

Secondary prevention of presumed paradoxical embolism constitutes the main indication for percutaneous closure of the patent foramen ovale (PFO) [1–4]. A residual shunt has been associated with recurrent events [5]. Complete occlusion was reported in 51 to 100% of patients [5–7], depending on device type and on the methodology used for assessment of a residual shunt. It was >90% with a single Amplatzer PFO Occluder (APFO, St. Jude Medical Corporation, Plymouth, Minnesota) [6].

We report a case of percutaneous closure of a large PFO associated with an atrial septal aneurysm for secondary stroke prevention using successively 3 Amplatzer PFO Occluder devices.

Case report

A 40-year-old previously healthy male farmer, known for dyslipidaemia (total cholesterol 8.1 mmol/l; LDL 5.6 mmol/l; HDL 1.67 mmol/l) and former smoker (10 pack-years) suffered a minor stroke with transient hemiparesis of the right arm and transient motor aphasia. The patient reported no other similar symptoms in

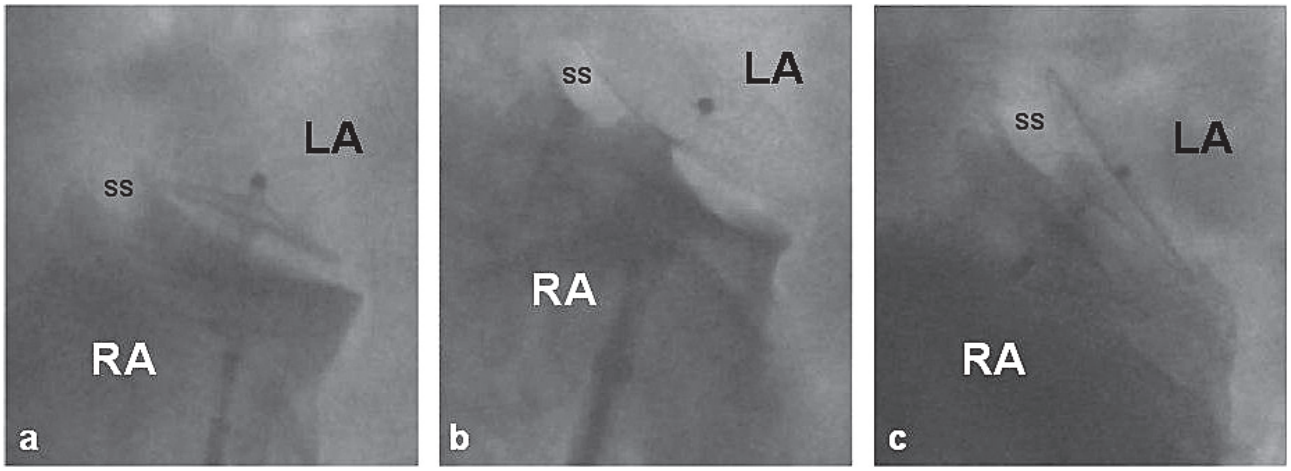

Figure 1
A Undersized 25-mm Amplatzer PFO Occluder.
B 30-mm Amplatzer PFO Occluder before release.
C After release. Angiography through the sidearm of the delivery sheath delineates the septum secundum (SS) which has to be sandwiched between the cranial disk parts (Pacman sign).
LA = left atrium; RA = right atrium.

Funding / potential competing interests:
B. Meier: research grant and speaker bureau for St. Jude Medical.

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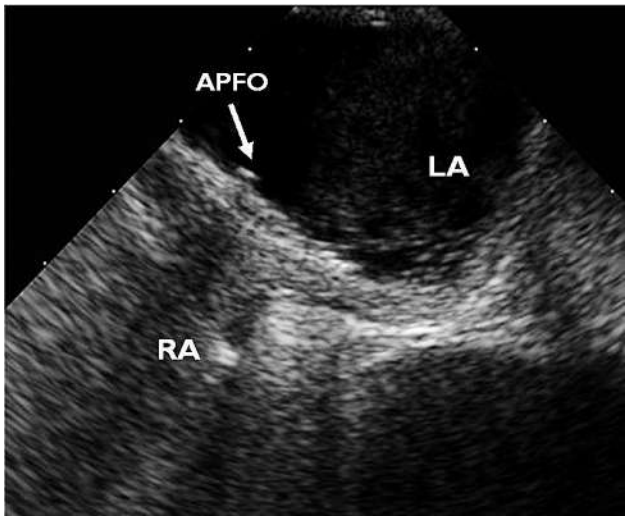

Figure 2
Contrast TEE 6 months after implantation with residual shunt grade III. APFO = 30-mm Amplatzer PFO Occluder; LA = left atrium; RA = right atrium.

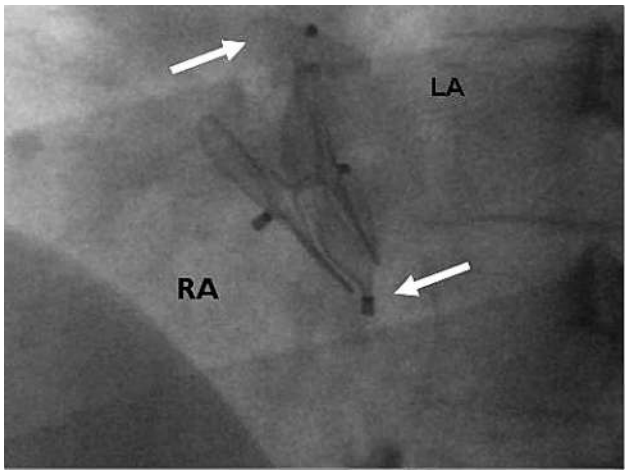

Figure 3
Placement of a second 25-mm Amplatzer PFO Occluder (arrows), with the right disk sandwiched like a banana by the initial 30-mm Amplatzer PFO Occluder.
LA = left atrium; RA = right atrium.

the past and had no current medication. Brain magnetic resonance imaging demonstrated a recent lesion of the left insular cortex as well as several other older bilateral ischaemic sequelae suggesting previous asymptomatic events possibly related to the PFO. Holter-ECG, computed tomography including contrast-enhanced angiography of the intra- and extracerebral vessels, as well as screening for thrombophilia were normal. Contrast transoesophageal echocardiography (TOE) revealed the presence of a PFO grade III [2] (>20 bubbles of aerated colloid solution crossing the interatrial septum after a sustained Valsalva manoeuvre) with spontaneous right-to-left shunt and a large atrial septal aneurysm. The patient was referred for percutaneous PFO closure. The intervention was performed under local anaesthesia without intraprocedural echocardiographic guidance or balloon sizing [7]. A 9 French sheath was placed in the right femoral vein and the PFO was crossed under fluoroscopic guidance in the anteroposterior view. After a first attempt with an obviously undersized 25-mm, a 30-mm APFO was correctly implanted (fig. 1). A contrast transthoracic echocardiogram (TTE) performed the next day confirmed a stable device position and failed to detect any residual shunt. The patient was discharged and instructed to continue clopidogrel 75 mg for 1 month and acetylsalicylic acid 100 mg for 5 months.

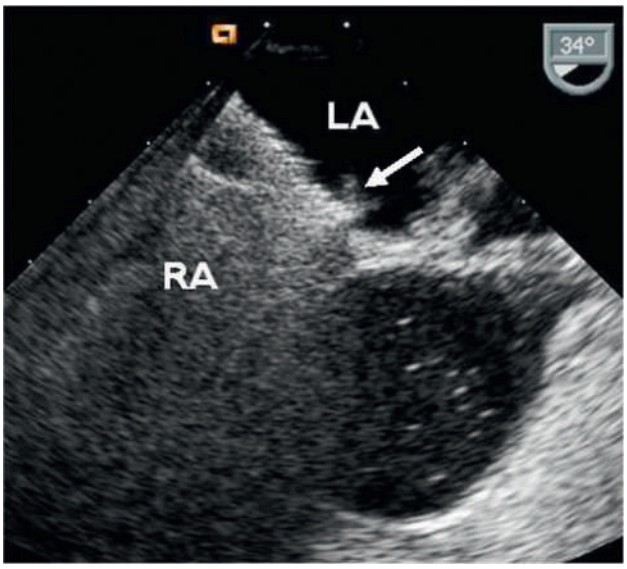

Figure 4
Contrast TEE 6 months after implantation of the second device with residual shunt grade 2 (arrow).
LA = left atrium; RA = right atrium.

Six months later, follow-up contrast TOE documented a residual shunt grade III (fig. 2). Using the same technique, a second 25-mm APFO was implanted (fig. 3). Contrast TTE performed the next day did not detect any residual shunt. Clopidogrel 75 mg was again prescribed for 1 month and acetylsalicylic acid 100 mg for 5 months.

Six months after implantation of the second device, contrast TOE revealed correct position of both devices but a persisting shunt grade II (fig. 4). A third APFO (18-mm) was implanted using the same technique (fig. 5). Contrast TTE at discharge the same day assessed good position of the device without any residual shunt. Clopidogrel 75 mg was again prescribed for 1 month and acetylsalicylic acid 100 mg for 5 months. Six months after implantation of the third device, contrast TOE finally showed complete occlusion (fig. 6) and both platelet inhibitors were stopped.

The patient has been regularly followed during 3 years and remained asymptomatic. There were no complications related to the 3 interventions nor any recurrent ischaemic events.

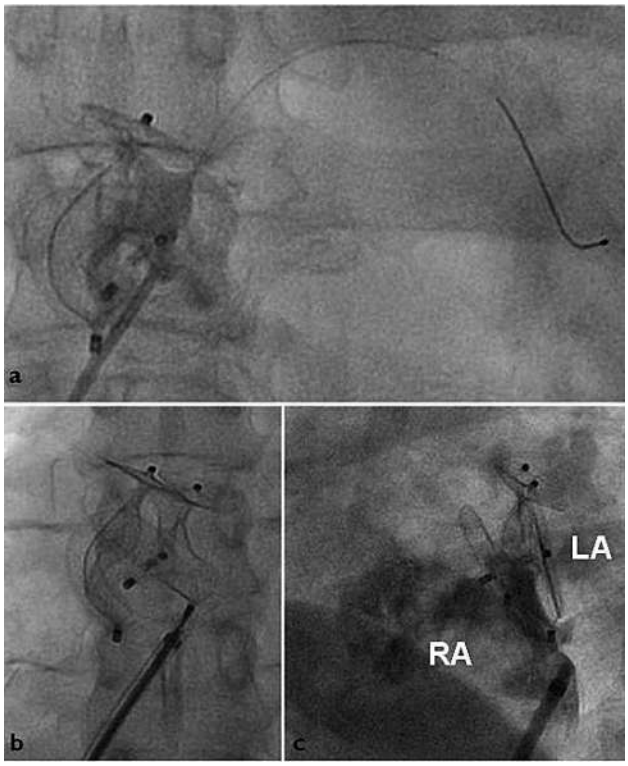

Figure 5

A Third intervention Residual PFO passed with a 0.014 inch Magnum coronary guidewire.

B Deployment of an 18-mm Amplatzer PFO Occluder.

C Final angiographic result with 3 Amplatzer PFO Occluder in place.

LA = left atrium; RA = right atrium.

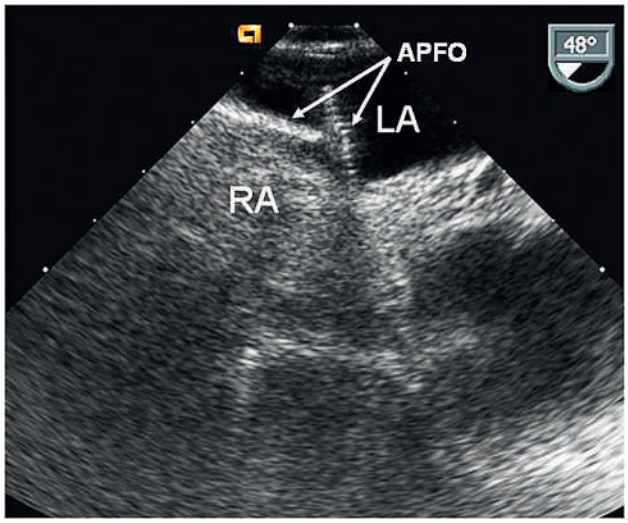

Figure 6

Final contrast TEE showing complete occlusion 6 months after the third intervention.

APFO = left disks of first (left) and third (right) PFO Occluders; LA = left atrium; RA = right atrium.

Discussion

To our knowledge this is the first report of successful percutaneous PFO closure using successively 3 APFO devices.

Several nonrandomised long-term data suggest superiority of transcatheter PFO closure over medical treatment [8–11]. However, the recently published randomised CLOSURE I trial failed to confirm the benefits of device closure [12]. This fact may be related to the short follow-up (2 years) and to the use of a suboptimal device (STARFlex occluder) prone to incomplete closure and thrombus formation. It is of note that residual shunt has been identified as a predicting cause of recurrence [5]. Using the Amplatzer technique, implantation of a second device is required in about 3% of the cases, and complete PFO closure can be expected in 80% of these patients [5, 6]. Hence, the question of a third device arises in about 0.6% of all cases. The subjective component of a patient wanting the hole that menaces his brain completely closed represents an asset in the indication for repeat PFO closure.

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