Transesophageal echocardiographic diagnosis of left atrial appendage occluder device infection

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The safety and efficacy of a left atrial appendage closure device is currently under evaluation in a large-scale multi-center clinical trial. We report an initial case of left atrial appendage occluder device infection with Staphylococcus aureus; transesophageal echocardiography played a pivotal role in diagnosis and treatment.

The left atrial appendage (LAA) has been identified as the site of thrombus formation in $\sim 90\%$ of patients with atrial fibrillation (AF).$^1$ and percutaneous LAA device closure is currently under evaluation as a method for reducing stroke risk in patients with AF.$^2,3$

Placement of all intracardiac devices is associated with risk of endovascular thrombosis and infection. We report an initial case of LAA closure device infection, which required explantation of the device followed by a prolonged course of intravenous antibiotics.

Case report

A 75-year-old woman with paroxysmal atrial fibrillation was enrolled in the PROTECT AF$^2$ study and underwent uncomplicated percutaneous placement via a transseptal approach of a 24 mm WATCHMAN left atrial appendage system (Atritech, Plymouth, MN) using a 14 French access sheath (Figure 1). Prior to hospital dismissal and 1 day following device implant, a limited echocardiogram demonstrated no pericardial effusion. No peri-procedure antibiotics were administered and the patient was receiving adequate systemic anticoagulation with warfarin at the time of dismissal.

Two days later, the patient presented with chest pain and lightheadedness. A transthoracic echocardiogram demonstrated a large circumferential pericardial effusion with a dilated and non-reactive inferior vena cava. Three hundred milliliters of serosanguinous fluid was evacuated via urgent pericardiocentesis. Fluid analysis revealed no evidence for infection, and systemic anticoagulation was withheld.

The following morning, the patient complained of pleuritic chest pain and diffuse ST segment changes consistent with pericarditis were noted on an electrocardiogram. High dose indomethacin was administered which led to transient renal insufficiency. Subsequent repeat echocardiograms showed resolution of the pericardial effusion, with no recurrence.

On hospital day 6, a set of blood cultures obtained in evaluation of new leukocytosis grew methicillin sensitive Staphylococcus aureus. Initially, intravenous vancomycin was initiated which was switched to nafcillin when results of bacterial sensitivity became available. However, persistent bacteremia was subsequently noted on 3 consecutive days while on intravenous antibiotics.

The patient underwent a transesophageal echocardiogram which revealed a 5 mm thick echo density along the atrial aspect of the LAA device, extending to the mitral annulus suspicious for vegetation (see Multimedia file 1). Surgical explantation of the LAA closure device along with a Maze procedure and LAA ligation was subsequently performed.

All blood cultures drawn post-operatively were sterile. Post-operatively the patient developed severe left-sided weakness, which was thought consistent with a brain stem stroke; however, the neurologic changes resolved within 24 h.

Microbiologic evaluation of the explanted device and associated mass was negative for bacterial growth; however, the patient had received 7 days of intravenous antibiotics prior to the operation. The presenting pericardial...
effusion was sterile and non-hemorrhagic, and hence most likely reactive in etiology.

The patient was discharged home from hospital on day 20, and subsequently completed 6 weeks of intravenous antibiotics. At 6-month follow-up the patient continues to complain of generalized weakness and debilitation. She has been admitted twice to the hospital for AF with rapid ventricular rate, and has since been treated with flecainide and has continued to receive adequate systemic anticoagulation.

Discussion

Permanent cardiac devices are increasingly implanted by cardiologists; device related thrombosis and infection is an uncommon but serious complication. Permanent cardiac pacemakers and implantable cardioverter defibrillators are associated with a 0.5–2% risk of device related infection.4–6 There have been 5 reported cases of infection related to atrial septal defect/persistent foramen ovale closure systems.7 This is the first case of device infection related to an LAA closure system.

Device related endovascular infections are associated with significant morbidity and mortality; current recommendations are to practice standard antibiotic prophylaxis until the device is completely endothelialized. Given the time course in this case, infection likely was due to peri-implantation bacteremia, or lack of sterile conditions during performance of the procedure. This case underscores the importance of surgical operating room sterile technique during all percutaneous procedures, and illustrates the utility of transesophageal echocardiography in diagnosing cardiac device related infections.

Supplementary data

Supplementary data are available at European Journal of Echocardiography online.

References


Figure 1 Transesophageal echocardiographic view of the left atrial appendage occluder device immediately following implantation.