Left-sided migration of Sideris button atrial septal occluder device

Angela Jerath1*, Amer Jaura1, Jacek Karski1, Christopher Feindel2, Jagdish Butany3, and Annette Vegas1

1Department of Anesthesia and Pain Medicine, Toronto General Hospital, 200 Elizabeth Street, Toronto, Ontario, Canada M5G 2C4; 2Department of Cardiac Surgery, Toronto General Hospital, 200 Elizabeth Street, Toronto, Ontario, Canada M5G 2C4; and 3Department of Pathology, Toronto General Hospital, 200 Elizabeth Street, Toronto, Ontario, Canada M5G 2C4

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We report the case of a left-sided migrated ‘Sideris button’ atrial septal defect occlusion device 6 years post-implantation with a residual secundum atrial septal defect and left atrial mass. The aims of this case report are to highlight an uncommonly seen atrial septal occlusion device, the importance of a complete echocardiographic examination of the path traversed by the device to assess for local trauma to structures, and the additional anatomical information gained and diagnostic use of intraoperative 3D transoesophageal echocardiography.

Keywords
Sideris button • Atrial septal defect occlusion device • Embolization • 3D transoesophageal echocardiography

Introduction

Transcatheter closure of secundum atrial septal defects using a variety of occlusion devices (ASDOD) has become a common intervention for the management of this intracardiac shunt, thus avoiding surgical sternotomy and use of cardiopulmonary bypass. Risks of the procedure include, arrhythmias, thrombus formation, cardiac perforation, pericardial effusions, and device embolization or malposition with an overall incidence of 8.6% for various devices. This case report describes the left-sided migration of the less commonly seen ‘Sideris button’ occlusion device and emphasizes the importance and utility of 2D and 3D echocardiography to view and assess the path traversed by the device, examining for trauma to local structures and evaluating associated masses.

Case report

A 38-year-old man presented for surgical removal of a migrated ‘Sideris button’ atrial septal defect occlusion device (ASDOD) into the left atrium (LA), closure of atrial septal defect (ASD), and possible mitral valve (MV) replacement for mitral regurgitation (MR). His past history included closure of a secundum ASD in 1993 using the Sideris button device at an overseas institution. He had suffered a thromboembolic stroke in 2001 and tuberculous endocarditis in 2006 but was currently asymptomatic. A transthoracic echocardiogram and cardiac CT confirmed that the device had migrated into the LA with a possible adherent of 3 × 2 mm thrombus. Time of migration, insertion details and whether echocardiography was utilized at the time of device deployment are lacking and compounded by the patient being lost to follow-up.

Intraoperative 2D and 3D transoesophageal echocardiography (TEE) confirmed that the device had migrated to the anterior wall of the LA. Midesophageal 2D views identified an echo dense mass located superior to the A2 MV leaflet, with mild eccentric anteriorly directed MR emanating from the P3/A3 junction and a residual 8 mm secundum ASD, Figure 1. The MV and the subchordal apparatus appeared structurally normal with a nondilated annulus measuring 26 mm at end diastole. Right ventricular (RV) size and function were preserved with mild tricuspid regurgitation. A 3D full-volume image viewed from the LA revealed an X-shaped wire device with one of the arms straddling the interatrial septum (IAS) creating a complex ASD with left to right shunting on either side of this arm, Figure 2. Further interrogation of the LA mass using 3D imaging revealed a smooth, homogeneous, immobile mass with adherent mobile thrombus located within the LA just above the anterior commissure of the MV but below one of the opposing arms of this device, see Supplementary data online, Movies 1 and 2. Below another device arm, 3D imaging identified a secondary area of thickening near P3 and the posterior commissure with a bright echogenic P2/P3 annulus consistent with
calcification, see Supplementary data online, Movie 1. These features appeared consistent with a localized thrombosed fibrotic reaction secondary to chronic irritation created by the device arms rather than vegetation. The remaining valves and left ventricular function were normal with no thrombus identified within the other intracardiac chambers or inflow, outflow vasculature. Surgical exploration confirmed the above findings and revealed one of the arms had also perforated the right atrium. The MR jet was secondary to calcium deposition at the P2/P3 junction. Surgical management entailed removal of this device, pericardial patch closure of the ASD, and removal of the thrombotic inflammatory mass above the anterior commissure. The posterior fibrotic tissue and annular calcification was left untouched, as its removal would most likely result in mitral annular disruption. The post-cardiopulmonary bypass TEE confirmed that the MR jet remained unchanged in severity with no residual atrial shunt.

Written consent has been successfully obtained from the patient regarding the publication of this case report.

**Discussion**

Secundum atrial septal defects have an incidence of 3.8 per 10 000 live births with an increasing number being managed using transcatheter ASDOD. The FDA has approved two devices, the Amplatzer double disc nitinol mesh (AGA Medical Corporation, MN, USA) and Gore Helex expandable polytetrafluoroethylene patch supported on a nitinol wire frame (W.L. Gore & Ass, Inc., AZ, USA). The Sideris button occluding device was introduced during 1990s and is no longer widely used in clinical practice. The device has two components, an ‘occluder’ and ‘counter-occluder’. The occluder is an X-shaped wire frame covered with 1/16-inch polyurethane foam with a central radiopaque loop and knot placed on the left side of the IAS. The ‘counter-occluder’ is placed on the right side of the IAS and possesses a single-strand Teflon-coated skeleton with a rubber centre, which acts as the ‘buttonhole’, Figure 3. Early debuttoning of this device has been reduced from 7.2 to 0.9% with the fourth generation model, which incorporated two spring buttons on the occluder component. Late device failure (1 month to 5-year follow-up) occurs in 5–8%, which is manifested by residual shunt, late debuttoning, device embolization, fracture of the wire arms, and MV perforation. Embolization of ASDOD has been documented in up to 3.5% of a series of 417 patients using the Amplatzer and CardioSEAL/STARflex devices. Risk factors for embolization include a large ASD, inadequate and thin atrial rim, under or oversizing of the device, mobile device, and atrial rim post-implantation. Most devices embolize within 12–24 h after placement but migration up to 6 years later has been reported. Commonly, devices migrate to the narrow main or branched pulmonary artery (PA) with risks of tricuspid and pulmonic valve damage. Depending on the device position and lie, variable degrees of PA obstruction may be seen with dilated proximal vasculature, RV pressure overload causing right to left shunting, which will maintain cardiac output and decompress the RV but at the expense of mild hypoxia. Rarely, devices migrate to the peripheral venous system and left side of the heart. Devices have been retrieved from the LA associated with MV obstruction, left ventricular outflow tract obstruction, and deep venous thrombosis.
and have caused fatalities secondary to LV rupture. Devices are commonly deployed using fluoroscopy, which may be assisted by intracardiac echocardiography. Recently, real-time 3D TEE has been successfully utilized to position and accurately deploy an ASDOD with the advantage of minimizing radiation exposure. A full intraoperative TEE must include identification of the ASDOD and assessment of the path traversed by the migrated device for local complications, including trauma to local structures, cardiac erosions, and formation of intracardiac fistulae or haemopericardium. The IAS should be interrogated to assess the size of the residual ASD, shunt direction, and ventricular volume overload effects. Presence of additional masses including thrombus, vegetations, and inflammatory fibrotic tissue should be identified either adherent to or within close proximity of the device. This case illustrates the use of 3D TEE as a complementary tool to standard 2D imaging to aid the differential aetiologies of the associated masses and to enhance our understanding of the anatomical and structure–function detail of this uncommonly seen device.

**Supplementary data**

Supplementary data are available at *European Journal of Echocardiography* online.

**Conflict of interest:** none declared.

**References**