Surgical Approach To An Unsuccessful Device Closure of Atrial Septal Defect

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INTRODUCTION

Secundum atrial septal defect (ASD) is a common congenital heart disease and accounts for approximately 6% to 10% of all congenital cardiac defects(1,2). Since 1976, when King and associates attempted the first transcatheter closure of a secundum ASD in humans, device closure has evolved significantly(3). Surgical closure of ASD has a low perioperative mortality and morbidity, it is still associated with a cosmetic disadvantage and a longer hospital stay compared with device closure(4,5). The alleged advantages of percutaneous closure over surgical closure as shown by some studies in older children and adults include avoidance of cardiopulmonary bypass, decreased complication rates, shorter hospital stays and greater cost-effectiveness(6,7). The Amplatzer Septal Occluder (ASO) is the first and only device to receive full approval for clinical use in patients with secundum atrial septal defect (ASD) from the United States Food and Drug Administration(5). Interventional ASD closure is now widely practised and has replaced surgical ASD closure in many centres(6). Improvements in design have made the devices retrievable, and reduction in the size of the introduction systems allows interventional treatment even in young patients(5).

CASE PRESENTATION

Our case was a 37-years-old woman. She was admitted to our Cardiology Outpatient Clinic with complaints of dyspnea, tachycardia and increasing fatigue. The transthoracic echocardiography (TTE) which was performed in admittance to our institution, showed a dropout image in the interatrial septum compatible with ASD and dilatation of the right-sided structures of the heart (diameter of right atrium: 52 millimeters, diameter of right ventricle: 44 millimeters). Transesophageal echocardiography (TEE) revealed a secundum ASD of 2.3 centimeters in diameter at the region corresponding to foramen ovale. She was then hospitalized by Department of Cardiology for percutaneous closure of ASD. Before the attempt for closure, the defect's diameter was measured as 2.5 centimeters by the sizing balloon (Figure 1).
Afterwards, the procedure was continued with a 26-mm ASO. But, the device was then removed since it did not catch the rim and it was considered that the defect could be larger than 25 millimeters. Therefore, a 32-mm ASO device was inserted into left atrium under the guidance of TEE. Due to the tendency to coagulation, routine dose of 5000 IU of unfractioned heparin was completed to 12500 IU. Nevertheless, during TEE examination a suspicious image compatible with thrombus material was seen. Therefore, the device was then removed carefully and a thrombus material was observed on the tip of the device (Figure 2).

She was then transferred to our clinic for surgical repair after this unsuccessful attempt. She was operated under endotracheal general anesthesia and in supine position. Following a median sternotomy, pericardium was opened longitudinally. After heparinization, extra-corporeal circulation is established between the venae cavae and the ascending aorta. A cross clamp was placed on aorta and by antegrade intermittent isothermic blood cardioplegia from aortic root, cardiac arrest was established. Hypothermia was moderate (30°C). A vent was placed via the right superior pulmonary vein. Standard right atriotomy was made. ASD was evaluated regarding its localization, size, other related cardiac structures and possible associated abnormalities (Figure 3).
It was determined that primary closure of the defect would not have caused any tension on the septum and the defect was closed primarily by 4/0 polyprolene suture material. Right atriotomy was closed in a standard fashion.

Postoperative rhythm was sinusal. She didn't required inotropic support during weaning from cardiopulmonary bypass and early postoperative period. The volume of blood transfused was one unit. The quantity of mediastinal drainage was 300 cc. She was extubated after an intubation duration of 7 hours and stayed in the intensive care for 2 days. The hospital stay was 7 days. Postoperatively an echocardiographic investigation was revealed no residual shunt for the repaired ASD. She was followed at our outpatient clinic without additional problem.

**DISCUSSION**

ASD transcatheter occlusion techniques have become alternative to surgical procedures. A number of different devices are available for transcatheter ASD closure. In study of Lisignoli et al., for 98 consecutive patients (mean age 52.5 +/- 13 years, 61 women), indications of percutaneous closure of a patent foramen ovale (PFO) included recurrent transient ischaemic attack (47%), cryptogenic stroke (34%), peripheral embolism (11%), disabling migraine with aura (4%), professional scuba diving (1 pt) and severe platypnea-orthodeoxia syndrome (1 patient). In same study; major complications included heparin-induced thrombocytopenia in 1 patient and device dislodgement in 1 patient; minor complications were mostly related to the catheter introduction site (2 patients) and mild immediate shunt (2 patients). In conclusion; although atrial septal defects are mostly asymptomatic, they should be occluded with appropriate techniques due to such potentially morbid and mortal late complications as arrhythmias, heart failure and paradox embolism if remained open.

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