Percutaneous device closure of secundum atrial septal defect (ASD) has become a definite therapy in selected patients. However the more transcatheter device was implanted, the more complications were developed. Especially, the device embolization remains a major complication requiring immediate intervention. We report a case of a displaced ASD occluder in the ascending aorta. We were successfully removed the device through a total circulatory arrest and closed the ASD.

Key Words: Atrial septal defect, Device embolization, Percutaneous septal occlusion

Introduction

Secundum atrial septal defect (ASD) form 6% to 10% of all cardiovascular malformations. The incidence of early device embolization after transcatheter ASD closure with Amplatzer septal occluder is approximately 0.5% [1]. The more transcatheter device was implanted, the more complications were developed.

Case Report

A four-year-old girl was admitted with known ASD that was diagnosed 2 years ago.

Transthoracic echocardiography demonstrated a 8 mm-sized secundum ASD with a large left-to-right shunt (Qp/Qs = 2.2) seen by color flow doppler. Percutaneous transcatheter septal closure was then scheduled. In the cardiac catheterization laboratory, the ASD was measured to be 8 mm in diameter with a balloon under fluoroscopic
guidance after induction of general anesthesia. A 9 mm Amplatzer septal occluder (AGA Medical, Golden Valley, MN, USA) was delivered through delivery sheath to the left atrium, and deployed. During the implantation of the device, it detached from its screw and embolized into the left atrium. The patient was emergently taken to the operating room. Cardiopulmonary bypass was initiated with aortic and bi-caval cannulation. Aorta was cross-clamped and the heart was arrested with antegrade cardioplegia. Right atriotomy was performed and the secundum ASD was found to be 7 × 8 mm in size. The rim of the ASD was well marginated. The Amplatzer septal occluder device was not located in left atrium and ventricle. After portable chest X-ray, we found the Amplatzer septal occlude at ascending aorta between aortic cross clamp and aortic cannula (Fig. 1). After total circulatory arrest, the device was successfully retrieved through aortotomy and the retrieved specimen showed structural integrity of the device (Fig. 2). The ASD was closed with direct. The patient was weaned from cardiopulmonary bypass without difficulty. The patient was then discharged in good condition.

Discussion

Surgical repair was the primary treatment of ASD until 1976, when King and Mills reported the first
transcatheter ASD closure [2]. Since the report of first successful implantation of Amplatzer septal occluder (ASO) in 1995, this ASO is current device of the most commonly used for percutaneous closure of ASD [3]. Although low morbidity and mortality and recent improvements of surgical techniques with smaller incisions and reduced both length of hospital stay and costs in surgical repair of ASD, the advantages of the percutaneous transcatheter device closure have led device closure to become the major treatment option for most secundum ASD [4].

Transcatheter implantation of the ASO is becoming the primary method of closing secundum ASD when the anatomy is suitable (including location of defect and width of rim, ASD size). The advantages of percutaneous transcatheter septal occlusion are less or no wound, avoidance of cardiopulmonary bypass, reducing blood transfusion, shortening intensive care unit and hospital stay, and early discharge.

In spite of progressive improvement of techniques and devices, the ASO procedure has concomitant failure and complications. The reported complications of the ASD device are including atrial arrhythmias, transient ST-T elevation in the inferior leads, hemolysis, thrombus formation, infective endocarditis, device impingement on caval veins (or on the right upper pulmonary vein or on the mitral and tricuspid valves), atrioventricular valve regurgitation, device embolization into the left atrium (or right atrium, right ventricle and pulmonary arterial tree), thromboembolization (into the central nervous system or extremities), malpositions and dislocations of device, injury of groin vessels at the place of a puncture, left atrial thrombus formation and systemic embolism due to late device dislocation, erosion and perforation of the heart, failure to retrieve a misplaced device necessitating surgery, residual shunt due to incomplete closure of the ASD and sudden death have been reported [5].

Device dislocation or embolism was the most frequently reported complication of transcatheter closure, with rates ranging from 4% to 21%, requiring surgery in approximately 70% to 100% of cases. The most important reasons of acute failure were poor case selection or inappropriate device selection. The other suggested mechanisms were operator-related failure resulting from inadequate experience, inadequate defect rim to hold the device, anatomic features of the ASD (size and quality of the rim, an ASD with a large diameter). The most frequent indication for surgery was device malposition or embolism (80%), occurring in 8 (6.5%) of 124 patients [5].

Several authors insisted that the embolized
devices should be retrieved by percutaneously [6]. However most of authors believe that an embolized device should always be retrieved surgically because it allows inspection of intracardiac structures that may have become damaged [7]. Also, the device of our case was retrieved surgically as soon as we knew the device dislocation. At operation field, we did inspect an intracardiac structure which was not damaged.

Short-term and mid-term studies have shown the device to be safe and effective. But, information on long-term complications is being collected now [8]. The more transcatheter device was implanted, the more complications were developed. Our experience suggests that this device should only be inserted in hospitals, where cardiac surgical support is immediately available.

References