Short-term outcomes of transcatheter closure of secundum atrial septal defect in children and adolescents: An experience of two centers in Upper Egypt

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Background: **The aim of this study was to evaluate the acute and short-term outcomes of transcatheter closure of secundum atrial septal defect (ASD) in children and adolescents in the first 4-year experience in two institutional centers in Upper Egypt.**

Methods: **This was a retrospective cohort study including 135 children and adolescents who underwent ASD closure between April 2012 and May 2016. A review of the acute and short-term outcomes and adverse events was performed.**

Results: **The patients had a median age of 5 years (interquartile range: 3–9 years), 71% of patients were ≤5 years, and median weight was 17 kg (interquartile range: 13–30 kg). Single defects were observed in 113 patients (84%). The remainder had multiple or multifenestrated defects that were closed by a single device. The mean defect size of single defects and the mean interatrial septum length were 15.24 ± 5.16 mm and 38.13 ± 6.3 mm, respectively. The ratio of device to TEE (Transoesophageal echocardiography) size of ASD was 1.19 ± 0.12. The devices were implanted successfully in 98.5% of patients. Six cases had concordant PS (Pulmonary stenosis), patent ductus arteriosus or perimembranous ventricular septal defect and were treated with balloon dilation, or closure. No residual flow was seen after device placement except in one patient with multiple fenestrations. There were five high-severity adverse events (3.7%) with no mortality. Device erosion was confirmed in one of two patients with massive haemopericardium; embolization of the device with retrieval in one patient; and heart block was detected in two cases. No cardiac perforation, device erosion, embolization, thrombus formation, or clinical evidence of bacterial endocarditis was observed during follow-up.**

Conclusions: **Transcatheter closure of ASDs in children and adolescents was feasible and safe in the first 4 years experience in our centers, with good short-term outcome. Balloon sizing is not necessary for transcatheter closure of secundum ASD. Multiple defects can be safety closed by a single device.**

Keywords: Adverse events, Atrial septal defect closure, Heart block, Short-term outcomes

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Introduction

Atrial septal defects (ASDs) have a reported prevalence of 10% among congenital heart defects and if left untreated, although recognized as a benign disease, can contribute to significant morbidity and mortality [1,2].

For many decades, surgical intervention for ASD has been accepted as the standard treatment with excellent outcomes. However, although surgical treatment is safe, it is associated with morbidity and thoracotomy scars [3]. Successful nonsurgical closure of ASD was first described in 1974 by King and Mills [4]. Many studies have demonstrated that individual devices provide safe and efficacious alternatives to surgical closure of secundum ASD [5–7]. In developing countries, obstacles to surgical procedures include the limited number of intensive care unit beds, cardiac surgeons, intensivists, and other resources. Therefore, current advances in nonsurgical treatment of ASD with devices have become the treatment of choice in countries with limited resources [8]. In this study, we evaluated the acute and short-term outcomes of transcatheter closure of ASD in children and adolescents during the first 4-years experience in two centers in Egypt at Sohag and Assiut University Hospitals.

Methods

Study design

The present study was designed as a retrospective cohort study that included 135 patients in two referral centers in Egypt. Informed consent was obtained from parents of children and adolescents. The local ethics committees approved this study.

Inclusion criteria included children and adolescents with a clinical diagnosis of single or multiple ASDs with left-to-right shunt and right ventricular volume overload on echocardiography.

Occluders

The amplatzer septal occluder (ASO), cribriform ASD occluder and delivery system (AGA Medical, Golden Valley, MN, USA) have been used in most patients. The Figulla–Occlutech Device (FOD; Occlutech, Jena, Germany) was implanted only in three patients. The reason for the choice of ASO in most of the cases of this series in the intial experience of these centers is due to its ease of use and relatively short learning curve for practitioners' training.

Abbreviations

ASD	Atrial Septal Defect
IAS	Interatrial Septum
PDA	Patent Ductus Arteriosus
PM VSD	Perimemberanous Ventricular Septal Defect
HB	Heart Block
ASO	Atrial Septal Occluder
AE	Adverse Event
CP	Cardiac Perforation

Preimplantation protocol

All patients were evaluated with transthoracic two-dimensional and color Doppler echocardiography with multiple subxyphoid and precordial windows. Each of the following criteria had to be fulfilled prior to inclusion: (1) the presence of a single or multiple ostium secundum ASDs with left-to-right shunt and right ventricular volume overload on echocardiography; (2) a

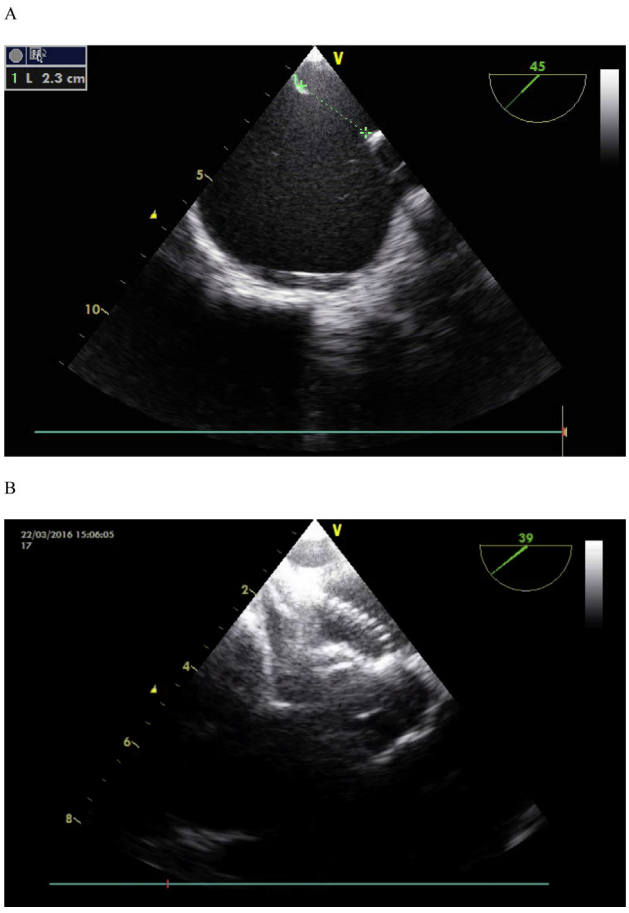

Figure 1. Large atrial septal defect using TEE monitoring: (A) Short axis view showing the diameter of defect was 2.3 mm. (B) Short axis view showing good position of device after its deployment. TEE = transesophageal echocardiography.

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