# EXPERIENCE OF ATRIAL SEPTAL DEFECT DEVICE CLOSURE IN PATIENTS MORE THAN FIFTY YEARS OF AGE

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## ABSTRACT

***Objective:*** To share our experience of percutaneous device closure of secundum type ASD in elderly patients (more than fifty years of age) with review of success, technical issues and immediate complications encountered during the procedure at AFIC & NIHD.

***Study Design:*** Case series, retrospective study.

***Place and Duration of Study:*** Department of Paediatric Cardiology, Armed Forces Institute of Cardiology and National Institute of Heart Diseases (AFIC-NIHD), Rawalpindi, from Jan 2017 to Aug 2018.

***Material and Methods:*** Consecutive sixteen patients (age more than fifty years), who underwent attempted ASD device closure was included in the study.

***Results:*** Total 16 patients (14 females & 2 males) were attempted ASD device closure with mean age of 58 years. In all cases (100%) ASD were successfully occluded with appropriate size device and the mean diameter of ASD was 26 mm. Mean procedural & fluoroscopy times were 31 and 7 minutes respectively. There was no mortality, device embolization, thrombosis, residual leak or peripheral vascular injuries in the study population.

***Conclusion:*** Transcatheter occlusion of ASD by various Occluder devices is safe and very effective therapeutic option in elderly patients.

**Keywords:** Atrial septal defect, Device closure, Occluder device.



## INTRODUCTION

Atrial septal defect (ASD) is common acyanotic congenital heart disease with reported incidence of about 10% of congenital heart diseases and secundum type ASDs are most common, accounting for about 70%[1,2]. Device closure is considered as first line of treatment in suitable ASD secundum in paediatric patients and is generally offered at around four to five years of age or at time of diagnosis in older children[3,4]. Device closure of ASD is safe and effective procedure with few complication and short hospital stay in comparison to surgical closure[5,6].

The first transcatheter device closure of ASD was reported by King and Mills in 1976. Due to its effectiveness, it's been also offered to elderly patients as well[3]. However, the elderly patients can have left or right ventricular dysfunctions & pulmonary hypertension and potentially complicate the results of percutaneous ASD device closure[3,7]. Pre-procedural transesophageal echocardiography and thorough cardiac evaluation is necessary in these patients before considering device closure. Risks associated with ASD device closure include device embolization, residual leak, thromboembolism, arrhythmias, cardiac erosion and vascular injuries.

The aim of this audit is to share our experience regarding device closure of ASDin elderly patients in last twenty monthsat AFIC/ NIHD, with especial emphasis on immediate complications and problems encountered during these procedures.

## MATERIAL AND METHODS

This retrospective case series report analyzed the ASD device closure in elderly patients (defined as age more than fifty years of age) done from January 2017 to August 2018 by reviewing the clinical records including catheterization data,

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echocardiography reports and follow-up record. Total 16 elderly patients with attempted percutaneous ASD device closure were included in the study. Device closure was only attempted in isolated ASDs considered suitable after pre procedural transthoracic echo, transesophageal echocardiography, ECGs and other relevant investigations. Cases with significant RV or LV dysfunction or pulmonary hypertension were not offered device closure at first place and rather treated for underlying co-morbidities first.

All patients were underwent detailed pre procedural assessment including detailed history & physical examination, ECG, Chest x-ray, blood complete picture and detailed trans-thoracic & transesophageal echocardiography. After taking informed consent, patients were taken to the catheterization lab. Both femoral vein and artery entered with short sheaths, if coronary angiography also planned. After coronary angiography & hemodynamic study, right upper pulmonary vein angiogram was done to define the anatomy of defect and a super stiff exchange wire was parked in left/right pulmonary vein depending upon the technique for device deploymentand operator preference. After intravenous dose of heparin, appropriate delivery system introduced and the ASD device loaded. The left atrial disc was opened first and whole assembly pulled toward the atrial septum and then right atrial disc deployed. A constant monitoring was done during the placement of ASD device with 2D Echocardiography (either trans-thoracic or transesophageal) and fluoroscopy. The Minnesotamaneuver was performed before detaching the device. After release of device, detailed echocardiography was performed to confirm satisfactory closure of ASD (fig-1). Post procedural care included two doses of intra venous antibiotics, heparin, vital signs monitoring, examination & echocardiography after 4 hours and before discharge next day. All patients were recommended six months of oral Aspirin and regular follow up. Data was systematically entered in SPSS 23 and descriptive analysis done; student's t-test or Chi-square tests were used as appropriate.

## RESULTS

During study period, total 16 patients (14 females & 2 males) were attempted percutaneous ASD device closure with mean age of 58 ± 5.4 years and mean weight was 66 ± 13 Kgs and mean height was 159 ± 13 cms.

In all cases (100%) ASD were successfully occluded with appropriate size device. The mean diameter of ASD was 26 ± 7.2mm. The size of defect ranged from 14 to 39 mm, whereas devices used ranged from 16 to 42 mm. In ten cases, 12F delivery sheath used, whereas in five cases it was 14F sheath and in one case it was 8F. During procedure, trans-esophageal echo was used in four cases only while all other cases were done with trans-thoracic echo guidance. One ASD closed with balloon assistance technique. The mean procedural & fluoroscopy times were 31 ± 12 and 7 ± 4.6 minutes respectively. Mean dose of radiation in study population was 22441 $mGycm^2$.

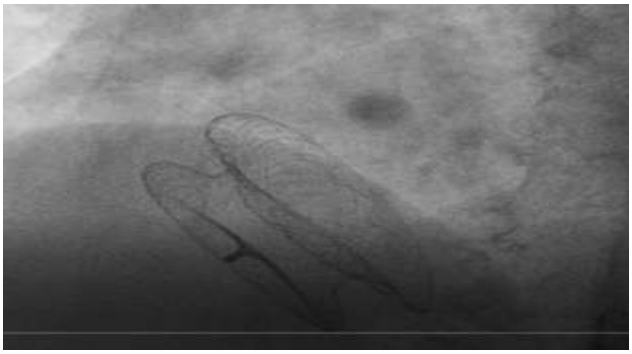

**Figure: ASD Device closure in 60-year-old lady, 39 mm ASD device in place.**

There was no mortality, device embolization, cardiac arrhythmias, thrombosis, residual leak or peripheral vascular injuries in the study population. During early follow-up there were no complications reported.

## DISCUSSION

ASD is one of the common acyanotic congenital heart diseases, usually remains asymptomatic in most young patients but carries potential

for complications, usually with large defects after second decade[8]. Percutaneous trans-catheter device closure is well recognized worldwide as substitute to surgical treatment in selected patients including children and adult. In comparison to surgery, ASD device closure is safe and equally effective but with less morbidity & hospital stay and avoids complications of sternotomy and cardiac bypass[5,9-11].

In adult patients, the coexistence of left ventricular or right ventricular dysfunctions and pulmonary hypertension can complicate the device closure and it is advisable to treat these issues before offering ASD device closure. Thus, it's important to document left ventricular end diastolic and pulmonary artery pressures before and after ASD device closure in elderly patients. If selected carefully, ASD device closure improves functional class in older patients[7,12,13].

Device closure of secundum ASD was established more than three decades ago and being increasingly used in recent years[14]. In our study the success rate was 100% as supported by many other studies reported procedural success rate around 94-98%[6,15,16]. The choice of Occluder size depends on size of defect, which can be assessed by trans-thoracic or trans-esophageal echocardiography or sizing balloon during cardiac catheterization and more recentlyby intra cardiac echo[4,17,18]. We used only echocardiography to size the ASD and to select appropriate device with 100% success. Various studies have reported that balloon sizing of ASD is not absolutely necessary for transcatheter closure[19,20]. We are using transthoracic echo as routine during ASD device closure and trans-esophageal echo only if transthoracic echo is suboptimal for the last ten years and now also being reported in literature[21].

Potential complications of the ASD device closure includes device embolization, thrombus formation & embolism, arrhythmias, peripheral vascular injury, injury to mitral or tricuspid valves or cardiac erosion[22-24]. Cardiac erosion is a rare, approximately 0.1% but carries a high risk of mortality resulting in pericardial effusion, frequently with cardiac tamponade[22]. Most reported cases of erosion occur within 72 hours of device placement, although late erosion also has been documented.

Transcatheter ASD closure offers number of advantages over surgical ASD closure including shorter hospital stay (as documented in our study of less than 24 hours), avoidance of mechanical ventilation, surgical scar and cardiopulmonary bypass.

## CONCLUSION

Trans-catheter device closure of the ASD secundum in elderly patients is a safe and effective percutaneous intervention with high success rate and good safety profile. It is of paramount importance to exclude RV/LV dysfunctions and significant pulmonary hypertension before attempting device closure in elderly patients.

## CONFLICT OF INTEREST

This study has no confict of interest to be declared by any author.

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