

# ASD device closure in elderly adults



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## ABSTRACT

**Background:** Closure of ASDs in elderly patients caused significant clinical and hemodynamic improvement after device closure. **Aims and Objective:** We aim to share our experience of ASD device closure in elderly adults. **Materials and Methods:** It was a prospective single center study done at Shahid Gagalal National Heart Centre. All elderly patients (> 50years) who underwent ASD device closure from Feb 2016 to July 2018 and completed three months of device closure were prospectively follow up for the symptoms, RA and RV dimension, Tricuspid Regurgitation and Tricuspid Regurgitation pressure gradient (TRPG). **Results:** During the study period 48 elderly adults underwent successful ASD device closure. Except one patient we could follow up all patients. Among the patient's 33 were female, Age ranged from 50years to 72years with the mean age of 55 years. Shortness of breath was the most common symptom during presentation. ASD size ranged from 10mm to 33mm with the mean of 23mm. Device size ranged from 14mm to 40mm with the mean of 29mm. Amplatzer septal occluder was used in 47 patients. RA and RV were dilated in all patients. Mild TR was present in 26 patients, Moderate TR in 17 patients, Severe TR in 5 patients. Mean follow-up time was 12 months. Symptoms reduced in all patients expect one. RA and RV size reduced in all patients. Tricuspid regurgitation pressure gradient reduced from mean of 56 mmHg to Mean of 16 mmHg. During the follow up level of tricuspid regurgitation reduced, 11 patients had mild TR, Trace TR in 15 patients. **Conclusion:** ASD device closure can result in improvement in clinical and hemodynamic in elderly adults.

**Key words:** ASD; Trans catheter closure; Amplatzer Septaloccluder

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## INTRODUCTION

Closure of an ASD in patients with a hemodynamically significant shunt has become the standard of care in recent years. Correction of ASDs prevents the development of pulmonary hypertension, cardiac arrhythmia, and heart failure.<sup>1,2</sup> Closure of ASDs in elderly patients remains controversial.<sup>3</sup> The aim of this study is to evaluate the outcomes of transcatheter closure of secundum ASDs in elderly patients.

## MATERIALS AND METHOD

It was a prospective single center study done at Shahid Gagalal National Heart Centre. All elderly patients (>50years) who underwent ASD from 2016 Feb to July 2018 and

completed three months of device closure were prospectively follow up about the symptom, Right atrium and Right ventricle size, tricuspid regurgitation (TR) and tricuspid regurgitation pressure gradient (TRPG). Patient's co-morbid condition was also recorded. Catheterization laboratory record were reviewed for the ASD size, device size any complications. Hospital record book were reviewed for any in-hospital complications. Patient symptoms, Right atrium and Right ventricle size, TR and TRPG before and after the device closure were compared. This study was approved by the institutional review committee of Shahid Gagalal National Heart Center.

## RESULTS

During the study period 425 patients underwent successful device closure in the Shahid Gagalal National Heart

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Centre. Among them 48 were elderly adults ( $\geq 50$  years) underwent successful ASD device closure. Except one patient all could be followed up. Among the patient's 33 were female, Age ranged from 50 years to 72 years with the mean age of 55 years. Shortness of breath was the most common symptom before device closure followed by chest pain. ASD size ranged from 10 mm to 33 mm with the mean of 23 mm. Device size ranged from 14 mm to 40 mm with the mean of 29 mm. Amplatzer septal occluder was used in 47 patients with Amplatzer septal occluder was used in 47 patients as shown in Table 1. One patient underwent ASD device closure with memo part ASD device. Except one patient all patient underwent ASD device closure under local anesthesia with transthoracic echocardiogram guidance. RA and RV were dilated in all patients. Mild TR was present in 26 patients, Moderate TR in 17 patients, Severe TR in 5 patients. Sinus rhythm was present in 47 patients, RBBB was present in 44 patients, and one patient had LBBB in ECG. Two patients had coronary artery disease, two had chronic obstructive pulmonary disease (COPD), three had hypertension and two had diabetes mellitus. One patient underwent PCI of RCA during the device closure. One patient had history of Coronary artery bypass graft (CABG). During the procedure one patient had pseudo aneurysm which required surgical repair. One patient developed pneumonia and in one patient device embolized but underwent device closure with another device. Mean follow-up time was 12 months. Symptoms reduced in all patients except one. RA and RV size reduced in all patients. Pulmonary artery reduced from mean of 56 mmHg to Mean of 16 mmHg. During the follow up level of tricuspid regurgitation reduced, 11 patients had mild TR, Trace TR in 15 patients as shown in Table 2.

## DISCUSSION

The benefits from ASD closure in the elderly population has been documented in fewer reports compared to the younger population. Recent randomized study in a large population confirmed that anatomical closure is superior to medical treatment in preventing major events.<sup>4</sup> Moreover, the realistic benefits of ASD closure include symptomatic relief, improvements of functional status as well as the quality of life.<sup>5,6</sup> These favorable clinical changes are supported by the immediate and substantial reverse remodeling of the heart after closure from many studies.<sup>7-11</sup>

Our study showed that ASD device closure in elderly is safe. ASD device closure can decrease in symptom. Decrease in symptom (breathlessness and palpitation) and improved functional class after device closure was observed in many studies.<sup>3,12-15</sup> Khan et al. reported that significant improvement in functional class and echocardiographic

**Table 1: Demographic features (n=48)**

Clinical characteristics	n(%)
Male	15 (31.2%)
Female	33 (68.8%)
Mean age	55.6 $\pm$ 4.6 years
Age range	50-72 years
ASD size	Mean 23.0 $\pm$ 6.0 mm (10 to 33)
ASD device size	Mean 29.8 $\pm$ 6.7mm (14 to 40)
ASD device type	Amplatzer 47 (97.9%), Memo part 1 (2.1%)
Follow up	47 (97.9%) patients
Lost follow up	One (2.1%) patient
Mean Follow up time	12 months
Comorbid issues	Coronary artery disease 2 (5.5%), Diabetes 1 (2.1%) Hypertension 2 (4.1%), COPD 2 (4.1%) One (2.1%) underwent PCI One (2.1%) had undergone CABG
Complications	Device embolization 1 (2.1%) Groin Hematoma 1 (2.1%)

**Table 2: Comparison before and after the ASD device closure**

Clinical characteristics	Before device closure	After device closure
Symptoms		
Dyspnea	47 (100%)	Improved 46 (97.8%)
Palpitation	7 (16.5%)	Improved 7 (100%)
Chest pain	12 (27.7%)	Improved 12 (100%)
ECG		
RBBB	44 (93.6%)	44 (93.6%)
LBBB	1 (2.1%)	1 (2.1%)
Echocardiography		
Dilated RA	47 (100%)	0
Dilated RV	47 (100%)	0
Tricuspid regurgitation		
Nil	0 (0%)	21 (44.6%)
Trace	1 (2.1%)	15 (31.9%)
Mild	25 (53.1%)	11 (23.4%)
Moderate	16 (34.1%)	0
Severe	5 (10.6%)	0
TRPG (mmHg)	56.9 $\pm$ 19.2	16.1 $\pm$ 13.2

parameters as early as 6 weeks post device closure. There was correlation of functional class and 6-min walk test.<sup>15</sup> In a study done Among middle-aged adults ( $\geq 40$  years old), ASD closure has been shown to improve functional capacity, right ventricular chamber dimensions, heart failure progression, and overall survival.<sup>16-18</sup> In a study in patients above age 60 showed, ASD device closure in the elderly improved functional capacity, with a decrease, but not a normalization of RV dimensions and PASP, and an increase in LV dimensions, EF and mitral E/A-ratio.<sup>19</sup>

In our study we noticed that normalization of RA and RV size and decrease in pulmonary artery pressure significant after the device closure. Right ventricular dilation reduction has been found to decrease overall after closure.<sup>20</sup> Ghosh et al<sup>21</sup> also found a size reduction in RV

in the elderly, but not as pronounced as in the young. In another study, no difference in the reduction of RV size between age groups and that substantial RV reduction is possible even in the elderly patients. It was observed that despite longstanding RV dilation from volume overload, there is still potential for improvement in RV size and possible improvement in function even in those over 40 years.<sup>13</sup> Altinag et al. reported 58% patients with severe RV dilatation prior to intervention had no or mild dilatation at last follow-up. Reduction of RV dilatation was not related to age.<sup>14</sup> There was statistically highly significant reduction in Pulmonary artery pressure from the baseline. The reduction in pulmonary artery pressure was observed in multiple studies in elderly.<sup>13-15</sup>

One of the most discussed subjects regarding closing an ASD in the elderly is the impact on AF. Several studies find no or only very little effect on the development of AF when treated late in life.<sup>22,23</sup> In a recent study on elderly patients with ASD and chronic atrial fibrillation, reported that the outcome of device closure was as good as the outcome from patients without atrial fibrillation in terms of safety, improvement of functional status and reverse remodeling of the heart.<sup>24</sup>

In the setting of mounting comorbid illnesses and reduced life expectancy in older patients, quality over quantity of life has been observed to have an increasingly important role.<sup>25</sup> After device closure most elderly experience subjective improvement of symptoms. The elderly has no increased hospitalization, complications or mortality compared with the young. Elderly patients should therefore not be withheld from closure of a significant ASD.<sup>12</sup>

## CONCLUSION

ASD device closure in elderly results in decrease in symptoms, improve functional class, decrease RV dilation and decrease in pulmonary pressure.

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**CMA-** Concept and design of the study, manuscript preparation, statistically analyzed and interpreted, Critical revision of the manuscript; **SD-** Concept and design of the study, critical revision of manuscript and review of the study; **AB-** reviewed the literature, helped in preparing first draft of manuscript, collected data; **JA-** collected data, statistically analyzed and interpreted, helped in preparing first draft of manuscript; **MS-** reviewed the literature, helped in preparing first draft of manuscript; **KPA-** collected data, statistically analyzed and interpreted, helped in preparing first draft of manuscript.

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