

# Transcatheter Closure of Atrial Septal Defects with $\geq 40$ mm Septal Occluder in Shahid Gangalal National Heart Centre, Nepal

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## Abstract

**Background and Aims:** Transcatheter closure of Atrial septal defect (ASD) is one of important modality of treatment these days for ASD secundum. However, there is a paucity of data on transcatheter closure of ASDs with  $\geq 40$  septal occluder. We aim to study the outcome of ASD device closure with  $\geq 40$  mm septal occluder in Shahid Gangalal National Heart Centre, Nepal.

**Methods:** It was a prospective single center study conducted at Shahid Gangalal National Heart Centre, Nepal. Among the 27 patient who underwent successful device closure with  $\geq 40$  mm devices from January 2016 till December 2019, twenty-six patients could be prospectively followed up during May 2020 till December 2020. A Performa was designed to collect information about age, gender, ASD size, ASD device type and size. Right atrium(RA) and right ventricle(RV) dimension, level of tricuspid regurgitation (TR) and tricuspid regurgitation pressure gradient before the procedure and at the time of follow up were also recorded.

**Results:** Amplatzer septal occluder (40mm) was used in 25 (96.1%) patients and Memopart device (42mm) was used in 1 (3.9%) patient. Before the procedure all patients had dilated RA and RV, Mild TR, moderate TR and severe TR was present in 14 (53.8%), 10 (38.4%) and 2 (7.7%) patients respectively. At follow up, only one (3.9%) patient had dilated RA and RV. Mean Tricuspid regurgitation pressure gradient decreased from mean 44.4 mmHg to 18.9 mmHg.

**Conclusion:** Transcatheter Closure of Atrial Septal Defects with  $\geq 40$  mm septal occluder is safe and effective in short term follow up.

**Keywords:** Large ASD Secundum, Septal occluder, Transcatheter Closure

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## Introduction

Atrial septal defects (ASDs) account for 10% of all congenital heart lesions and represents the third most common congenital cardiac defect seen in adults<sup>1</sup>. Transcatheter closure of isolated secundum ASD has become the preferred treatment strategy in most cases<sup>2,3</sup>. Large ASDs in adult patients may result in complications, which includes arrhythmias, cardiac failure, and pulmonary hypertension. Device closure of large ASD can avoid surgery, cardiopulmonary bypass and its complications. It does not cause scar, results in lower rate of complication and hospital stay when compared to surgical closure. Long-term follow-up are necessary to determine the long-term safety of device closure with large device. However, there is a paucity of data on transcatheter closure of large ASDs, especially with  $\geq 40$  septal occluder.<sup>4</sup> We aim to study the outcome of large

secundum atrial septal defects with  $\geq 40$  mm septal occluder in Shahid Gangalal National Heart Center, Kathmandu, Nepal.

## Methods

It was a prospective single center study conducted at Shahid Gangalal National Heart Centre, Nepal. All patients who underwent ASD device closure with  $\geq 40$  septal occluder from January 2016 till December 2019 were prospectively followed up from May 2020 till December 2020. A performa was designed to collect information about age, gender, ASD size, ASD device type and size. Right atrium (RA) and right ventricle (RV) dimension, tricuspid regurgitation (TR), tricuspid regurgitation pressure gradient (TRPG), before and after the procedure were also recorded. The study protocol was approved by institutional review committee of Shahid Gangalal National Heart Centre, Kathmandu, Nepal.

All the variables were entered into the Statistical Package for Social Sciences software, version 20 (SPSS Inc., Chicago, IL, USA) for data analysis.

## Results

During the study period of 4 years (January 2016 to December 2019), a total of 27 patients underwent successful ASD device closure with  $\geq 40$  mm septal occluder. Among them, one patient was lost to follow up.

Of the remaining 26 patients who were followed up during the study period 15 (57.6%) were female. Age ranged from 18 to 56 years with the mean of 35.9 years. One patient (3.9%) had sinus rhythm with left bundle branch block while 25 (96.1%) had sinus rhythm and right bundle branch block. ASD size ranged from 32mm to 36 mm in size with the mean of 33.8mm. Two different devices were used; Amplatzer septal occluder in 25 (96.1%) patients and Memopart (Lepu) device in one patient. Memopart device was of 42 mm size while all Amplatzer devices were of 40mm size. Follow up period ranged from 12 month to 54 months with the mean of 32.6 months. The demographic profile and device type is shown in table 1.

**Table 1:** Demographic profile and type of device

Variable	Frequency	Percentage (%)
Male	11	42.4
Female	15	57.6
Sinus Rhythm RBBB	25	96.1
Sinus Rhythm LBBB	1	3.9
Device type		
Amplatzer (40mm)	25	96.1
Memopart(42mm)	1	3.9

In our study, all patients had dilated RA and RV before the procedure. Mild TR, moderate TR and severe TR was present in 14 (53.8%), 10(38.4%) and 2 (7.6%) patients respectively. At the time of follow up, 16 (61.5%) patients had normal RA and RV, nine (34.6%) patients had mildly dilated RA and RV, while one (3.9%) patient had dilated RA and RV. At the time of follow up none of the patients had severe TR. Trace TR and mild TR was present in 6 (23%) and 17(65.3%) patients respectively during the follow up as shown in Table 2.

TRPG ranged from 20mmHg to 70mmHg with the mean of 44.4 mmHg before the procedure. TRPG ranged from 12 to 32 with the mean of 18.9 mmHg at the time of follow up as shown in Table 3. No device erosion was noted during the follow up.

**Table 2:** Comparison before the procedure and at the time of follow up

Variable	Pre	Post
Dilated RA and RV	26	1
Mildly dilated RA and RV	0	9
Normal RA and RV	0	16
Mild TR	14	17
Moderate TR	10	0
Severe TR	2	0
No TR/Trace TR	0	9

**Table 3:** TRPG before and after closure.

	TRPG		
	Minimum	Maximum	Mean
TRPG before procedure	20mmHg	70mmHg	44.4mmHg
TRPG during follow up	12mmHg	32mmHg	18.9mmHg

## Discussion

Transcatheter closure has become the first-line strategy for adult patients with secundum ASDs in whom the defect anatomy is suitable for transcatheter closure. Transcatheter closure has many advantages over surgical closure. Avoidance of scar, postoperative pain, general anesthesia and a very short hospital stay are few of the advantages<sup>5</sup>.

In adults who have large ASDs, a significant left-to right shunt can lead to substantial morbidity and mortality and is an indication for closure. Device closure of large ASD with larger device is one of the attractive options. Our study suggests that ASD device closure with  $\geq 40$  mm septal occluder is safe and effective. Keila Lopez et al suggested that the use of the 40 mm ASO is safe and effective and should be considered an alternative to surgical closure in patients with large and appropriate ASDs measuring larger than 32 mm by 2D TEE/ICE and a stretched diameter up to 43 mm<sup>4</sup>. They even found that the 40 mm device did not result in an increased incidence of atrial arrhythmias or thrombus formation. As in our study we found no device erosion with the use of the 40 mm device<sup>4</sup>.

Fraisse A. et al. concluded that large ASDs (>38 mm) and defects with deficient rims did not influence the results of the transcatheter device closure, but these patients were referred for surgical closure<sup>6</sup>. Lopez K reported a series of patients with large secundum atrial septal defects who underwent attempted transcatheter closure using the larger occluder (maximum diameter of 40 mm). They emphasized that the failure of the procedure and the device embolization were related to the large size of ASD<sup>4</sup>.

In our study during the mean follow up of 32 month, there was a significant reduction in level of TR, TRPG after ASD closure with  $\geq 40$  mm septal occluder. There was a decrease in the size of RA and RV in most of the patients. This clearly suggest that transcatheter closure of large ASD with  $\geq 40$  mm septal occluder can results same outcome as in small ASD closure. Single center study and short term follow up are the major limitations of our study.

## Conclusion

Our study demonstrated that Transcatheter Closure of Large Secundum Atrial Septal Defects with  $\geq 40$  mm septal occluder is safe and effective in short term follow up. Close long-term follow-up is needed to determine the safety and feasibility of this procedure.

## References

- Du ZD, Cao QL, Rhodes J, Heitschmidt M, Hijazi ZM. Choice of size and results of transcatheter closure of atrial septal defect using the Amplatzer septal occluder. *J Interv Cardiol* 2002; 15:287–292. DOI: 10.1111/j.1540-8183.2002.tb01105.x
- Moore J, Hegde S, El-Said H, Beekman R III, Benson L, Bergersen L, Holzer R, Jenkins K, Ringel R, Rome J, Vincent R, Martin G; ACC IMPACT Steering Committee. Transcatheter device closure of atrial septal defects: a safety review. *JACC Cardiovasc Interv*. 2013;6:433–442. DOI: 10.1016/j.jcin.2013.02.005
- Tobis J, Shenoda M. Percutaneous treatment of patent foramen ovale and atrial septal defects. *J Am Coll Cardiol*. 2012;60:1722–1732. DOI: 10.1016/j.jacc.2012.01.086

4. Lopez K, Dalvi BV, Balzer D, Bass JL, Momenah T, Cao QL, Hijazi ZM. Transcatheter closure of large secundum atrial septal defects using the 40 mm Amplatzer septal occluder: results of an international registry. *Catheter Cardiovasc Interv.* 2005;66:580–584. DOI: 10.1002/ccd.20468
5. Sedigheh Saedi<sup>1</sup>, Maryam Aliramezany<sup>1</sup>, Zahra Khajali<sup>1</sup>, Hamid Reza Sanati<sup>1</sup> Transcatheter Closure of Large Atrial Septal Defects: A Single-Center Experience. *Res Cardiovasc Med* 2018;7:148-51. DOI: 10.4103/rcm.rcm\_7\_18
6. Fraisse A, Trivedi KR. Transcatheter closure of atrial septal defects: how large is too large? *Cardiovasc Diagn Ther.* 2014;4(3):213–4. DOI:10.3978/j.issn.2223-3652.2014.04.02