

Original Article

Prevalence of Atrial Septal Aneurysm in Bangladeshi Subjects: Analysis of 2598 Subjects by Echocardiography

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Abstract:

Keywords:
Atrial septum,
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Background: An atrial septal aneurysm (ASA) is a redundancy or saccular deformity of the atrial septum. This itself is usually of no clinical significance and is often diagnosed incidentally. However, it may be associated with significant cardiac and non-cardiac diagnoses, the most important of which are intracardiac shunts, arrhythmias, embolic stroke, and migraine. ASA may be present in 1 to 3% of general population. However, the prevalence of ASA in Bangladeshi subjects is not known.

Methods: The study was carried out in a private consultation centre of Dhaka City during February 2018 to July 2019. All the patients who are referred for TTE were included in the study, the study has been carried out to find out the prevalence of this often-overlooked anatomical structure by trans-thoracic echocardiography

Results: Out of 2598 echo studies, ASA was found in 111 subjects giving a prevalence of 4.27%. Majority of the patients with ASA belonged to 40-79-year age group; 42.3% were 40-59 years of age while 32.4% were of 60-79 years. More than half (59.5%) had otherwise normal heart, 20.7% had ischaemic heart disease, 13.5% had left ventricular hypertrophy, 5.4% congenital heart disease, while 4.5% had chronic rheumatic heart disease.

Conclusion: The ASA is often an incidental diagnosis, though it may not be so rare. Once diagnosed, other associations should be sought for.

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Introduction:

An atrial septal aneurysm (ASA) is a redundancy or saccular deformity of the atrial septum and is associated with increased mobility of the atrial septal tissue.¹ This is often diagnosed incidentally during echocardiographic examination. It may be an isolated entity, or may be accompanied by atrial septal defect (ASD), or patent foramen ovale (PFO). ASA may be an innocuous bystander, or may be associated with systemic and pulmonary thromboembolism and atrial arrhythmias. The pathophysiology underlying its formation may involve congenital malformation of the atrial

septum, or interatrial pressure difference secondary to some other condition.^{2,3} The prevalence of ASA has been described between 2% to 3%;^{4,5} higher prevalence is found by transesophageal echocardiography (TEE) than by transthoracic echocardiography (TTE). The prevalence of as high as 18% TTE and 28% by TEE were observed in patients with ischaemic stroke.⁶

The prevalence of ASA in Bangladeshi subjects is not known. Here, the study has been carried out to find out the prevalence of this often-overlooked anatomical structure by TTE in an outpatient

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population, and associated conditions have also been studied.

Methods:

The study was carried out in a private consultation centre of Dhaka City during February 2018 to July 2019. All patients sent for TTE were included. Echocardiographic examination was carried out by Vivid E95 (GE Healthcare, 9900 Innovation Drive, Wauwatosa, WI 53226, USA). The examination was carried out as per the recommendation of American Society of Echocardiography. ASA was sought for in all the standard views and also the modified views as needed. The ASA was defined as any redundant portion or whole of interatrial septum having bulging on either side of the midline of more than 10 mm, or total excursion of both sides of more than 15 mm.¹

Results:

In this study, 2598 subjects were examined. Majority of the patients with ASA belonged to 40-79-year age group; 42.3% were 40-59 years of age while 32.4% were of 60-79 years. Male female ratio was almost equal (49.5% vs. 50.5%). (Table I) Out of 2598 echo studies, ASA was found in 111 subjects giving a prevalence of 4.27%. Out of 111 ASAs, 59.5% involved the fossa ovalis, while 40.5% involved the whole septum. (Fig 1) More than half (59.5%) had otherwise normal heart, 20.7% had ischaemic heart disease, 13.5% had left ventricular hypertrophy, 5.4% congenital heart disease, while 4.5% had chronic rheumatic heart disease. (Table II)

Table-I

Age and sex distribution of study subjects with ASA. (N= 111).

	Age group (years)	Frequency	Percent
Age	<40	26	23.4
	40-59	47	42.3
	60-79	36	32.4
	80-above	2	1.8
	Mean ± SD	52.33 ± 15.47	
Sex	Male	55	49.5
	Female	56	50.5

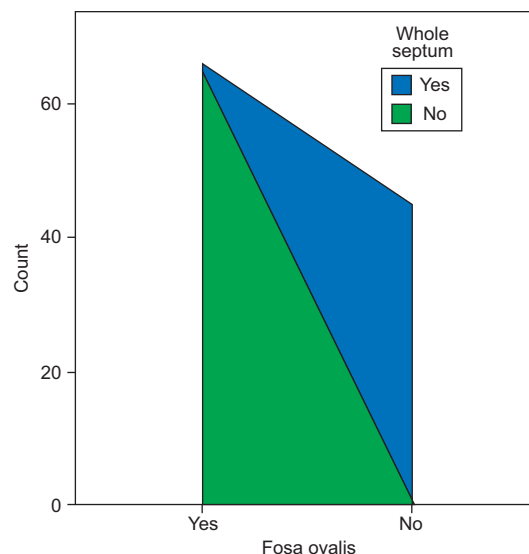


Fig.-1: Pattern of involvement of interatrial septum. (N= 111)

Table II

Distribution of study subjects with ASA by echocardiographic findings and pattern of involvement of IAS (N= 111).

	Trait	Frequency	Percentage
Echo findings	Normal	66	59.5
	Ischaemic heart disease	23	20.7
	Left ventricular hypertrophy	15	13.5
	Congenital heart disease	6	5.4
	Chronic rheumatic heart disease	5	4.5
	Involvement of IAS	Fossa ovalis	66
Whole septum		45	40.5



Fig.-1: 2-dimensional echocardiography parasternal short axis view showing atrial septal aneurysm (yellow arrow) in association with Chiari network (white arrow).

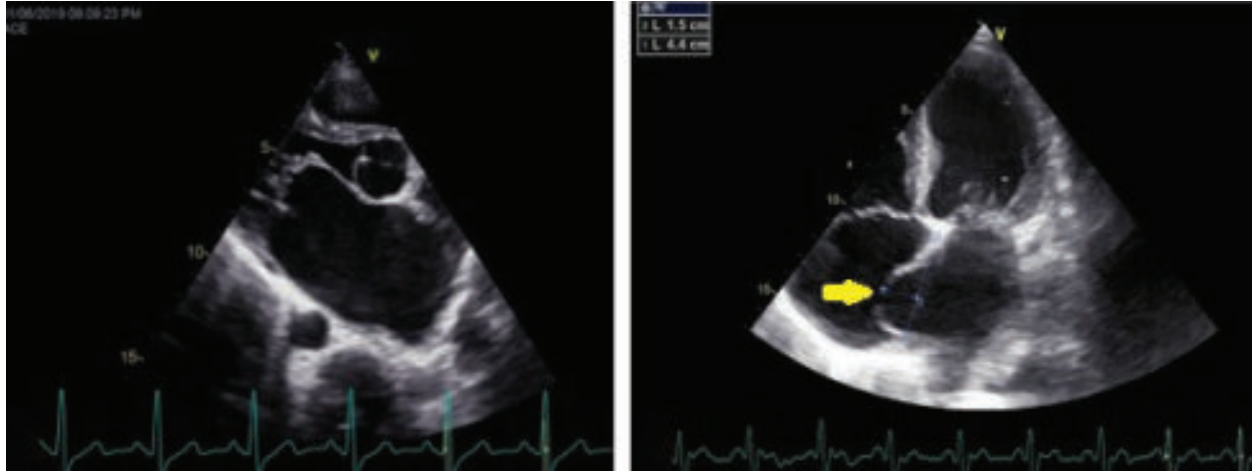


Fig.-2: 2-dimensional echocardiography parasternal long axis view (panel A) showing features of mitral stenosis, and apical 4-chamber view (panel B) showing atrial septal aneurysm (yellow arrow).

Discussion:

An ASA is a redundancy or saccular deformity of the atrial septum and is associated with increased mobility of the atrial septal tissue; ASA is defined as excursion of the septal tissue (typically the fossa ovalis) of greater than 10 mm from the plane of the atrial septum into the right atrium or left atrium or a combined total excursion right and left of 15 mm.¹ It is often diagnosed incidentally during routine echocardiography or during evaluation of ischemic stroke. It occurs more commonly as an isolated abnormality than in association with other cardiac malformations.³ Atrial septal aneurysm may be isolated or associated with another anomaly. Reported associations include patent foramen ovale (PFO),⁷ atrial septal defect,³ mitral valve prolapse,^{8,9} mitral and aortic valvular regurgitations, sinus of Valsalva aneurysm and ascending aortic aneurysm, aortic dissection, and Marfan syndrome.^{2,10} Familial clustering of ASA has also been reported.¹¹ Recently, genetic defect involving the Alpha-1 antitrypsin (A1AT) gene has been described in patients with ASA; presence of higher homozygote A1AT rs1303 (PiM3M3) variant may be associated with ASA development.¹²

ASA may result from congenital malformation of the atrial septum involving the fossa ovalis region or the entire septum, inherent deficiency in connective tissue, or may be secondary to interatrial pressure difference.^{2,3,13} ASA may be asymptomatic, or may show increased predisposition to migraine,^{14,15} arrhythmias

including atrial fibrillation,¹⁶ thrombus formation within the aneurysmal sac,^{2,17} and embolic stroke.^{6,18,19}

Prevalence of ASA shows considerable variation. In the present study, the prevalence in adult subjects was 4.27% by TTE. In the Stroke Prevention: Assessment of Risk in a Community study, the prevalence of ASA was 2.2% in control subjects, and 7.9% in patients with stroke, using TEE.⁵ Mattioli et al. by TEE found the prevalence of ASA 9.9% in non-stroke control group versus 27.7% in patients with stroke.⁶ In their study of 18631 subjects based on TTE and TEE, Serafini et al. reported the overall prevalence of 1.6%; the prevalence was higher by TEE (10.2%) than by TTE (0.7%).²⁰ Yetkin et al., in their more recent retrospective observational analysis of 16,570 patients, found the prevalence of 2.4%.¹⁶ The prevalence was much lower among paediatric population, e.g., 1.04% by Giannopoulos et al.²¹

The variation in prevalence of ASA may be due to the differences in definitions used for ASA, and the exclusion criteria used for the study. In the present study, the definition recommended by the American Society of Echocardiography (ASE) has been used, i.e., excursion of the septal tissue of > 10 mm from the plane of the atrial septum into the RA or LA or a combined total excursion right and left of 15 mm.¹ Mügge et al. defined ASA as a protrusion of the aneurysm > 10 mm beyond the plane of the atrial septum as measured by TEE. They excluded patients with mitral stenosis or prosthesis or after cardiothoracic surgery involving

the atrial septum.² In their study, Yetkin et al. defined the ASA as the protrusion of interatrial septum >15mm into the RA or LA with an at least 15mm diameter base of interatrial septum.¹⁶ Atrial septal aneurysm was defined as a protrusion of the interatrial septum or part of it >15 mm beyond the plane of the atrial septum or phasic excursion of the interatrial septum during the cardiorespiratory cycle of at least 15 mm in total amplitude and a diameter of the base of the aneurysm of at least 15 mm by Giannopoulos et al.²¹

In our study, out of 111 ASAs, 59.5% involved the fossa ovalis, while 40.5% involved the whole septum. Again the previously reported studies show variable results. ASA was limited to the fossa ovalis in 49% patients, and involved the entire septum in 51% patients in the study by Mügge et al.² Giannopoulos et al.'s study found ASA involving almost the entire septum in 28.89% and limited to the fossa ovalis in 71.11%.²¹

In the present study, more than half (59.5%) of the study subjects had otherwise normal heart, 20.7% had ischaemic heart disease, 13.5% had left ventricular hypertrophy, 5.4% congenital heart disease, while 4.5% had chronic rheumatic heart disease. ASA was an isolated structural defect in 35.56% of study subjects in the study by Giannopoulos et al.²¹, whereas the figure was 32% in the study by Mügge et al.² In our study, chronic rheumatic heart disease was associate with ASA in 4.5% of the subjects. This association has not been commonly reported in previous studies. Chronic rheumatic heart disease though prevalent in developing countries like ours, is rare now-a-days in the developed world. The interatrial pressure difference caused by persistently raised LA pressure might lead to formation of ASA in patients with mitral stenosis.

The study has got some limitations. Echocardiographic evaluation was done on the referred adult patients which may not be representative of the general population. Also, only TTE was done in this study; the prevalence of ASA may differ from that we have found if TEE and 3-dimensional modalities would have been used. We did not see the prevalence of PFO and ASD in our patient population, which are well-recognized associations of ASA. However, to the best of our

knowledge, this is the first attempt to find out the prevalence of ASA in Bangladeshi population.

Conclusion:

The ASA is often an incidental diagnosis, though it may not be so rare. This apparently innocuous bystander may be associated with significant cardiac and non-cardiac conditions having therapeutic implications. Clinicians should have preparedness while doing echocardiography to make the appropriate diagnosis. Once diagnosed, other associations should be sought for.

Conflict of Interest - None.

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