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"Atrial Septal Defect With Pregnancy - A Study Of Outcome Of Pregnancy."

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Abstract
Introduction: *Atrial Septal defect are the third common type of congenital heart disease. The risk of development of pulmonary vascular disease, a potentially lethal complication, is higher in female patients and in older adults with untreated defects. ASD with severe pulmonary hypertension pregnancy is contraindicated because morbidity and mortality is more and sometimes fetal complication is more, even intrauterine fetal death occurs.*
Aim of the study: *The aim of the study was on the outcome of pregnancy in women with atrial septal defect (ASD).*
Methods: *This was a retrospective study was done in female who is suffering from ASD and was conducted in Anwer Khan Modern Medical College and Hospital, Nari Medical Center, Dhaka, Bangladesh during the period from Jan, 2014 to Jun, 2014. 20 Female patients with pregnancy were included in the study groups according to inclusion and the exclusion criteria.*
Result: *20 Female pregnant patients with ASD were studied. Minimum age was 20 & maximum age was 28 years old. Majority (45.0%) were 22 to 25 years. There was no severe pulmonary hypertension among them. Fetal death was only 2 (10.0%). Most of the patient were asymptomatic so there severe pulmonary hypertension, pregnancy outcome is also not so fetal. Another cause of absent severe pulmonary hypertension was because pregnancy with Eissenmenger's syndrome were excluded in this study.*
Conclusion: *Current evidence would suggest that all types of ASDs with right heart dilation should be considered for timely closure once the diagnosis is established, irrespective of age. If remains untreated specially in case of pregnancy with ASD creates problem both for mother and fetus.*
Key words: *Atrial septal defect (ASD), pulmonary hypertension, pregnancy outcome, interatrial septum*

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I. Introduction

Atrial septal defects belong to a group of congenital cardiac anomalies that allow communication between the left and right sides of the heart. These interatrial communications include several distinct in the cardiac terminations of the systemic and pulmonary veins (sinus venous and coronary sinus defects) and in the interatrial septum communication during fetal life and commonly anatomy, pathophysiology, and recent developments in the management of interatrial septum. Defects of the atrial septum are the common type of congenital heart disease, with and estimated incidence of 56 per 100000 live births [1]. Recent estimates are about 100 per 100000 live births [2]. About 65-75% of patient with a secundum defect, roughly 50% of those with a premium atrial septal defect, and 40-50% of those with a sinus venosus defect are female. Secundum defects are often encountered in genetic syndromes such as Holt-Oram, Ellis van Creveld, Noonan, Down, Budd-Chiari, and Jarcho-Levine, to mention only a few [3-10]. In patients with trisomy 21, secundum and primum defects are the most frequent lesions [11]. In the most patients an atrial septal defect results in left to right shunt. The direction and magnitude of blood flow through an atrial communication are determined by the size of defect and by the relative atrial pressures, which relate to the compliances of the left and right ventricles. Both the size of the defect and the compliances of the ventricles can change over time [12]. At birth pulmonary vascular resistance is high and right ventricular compliance is low, changing gradually to a high compliance – low resistance circulation. The initially predominant volume overload and later pressure overload on the right heart leads to chamber enlargement with diastolic septal shift towards the left ventricle and adverse interventricular interaction resulting in decreased left ventricular compliance and a shift from a circular to a D-

shape short – axis geometry [13]. These changes result in decreased left ventricular diastolic filling, increased pulmonary to systemic flow ratio through the defect, and diminished systemic output. Left ventricular systolic dysfunction can develop late in patients with a large atrial septal defect [14]. A long standing shunt result in impaired right atrial reservoir and pump functions [15], right ventricular dilatation, myocardial cell hypertrophy and fibrosis, and cellular injury manifesting as increased serum concentrations of cardiac troponin –I [16]. The pulmonary vascular bed remodels with myointimal cell proliferation increased medial smooth muscle, and increased collagen leading to arteriolar narrowing and pulmonary hypertension. Mild increase in pulmonary artery pressure is common in young patients with a large atrial septal defect, but a few, mostly female patients, will develop pulmonary vascular disease over time [17-18]. The right ventricle will be forced to generate higher pressures to try the overcome pulmonary hypertension. This may lead to right ventricle failure or evaluations of the right sided pressures to levels greater than the left sided pressures. When the pressure in the right atrium rises to the level in the left atrium, there will no longer be a pressure gradient between these heart chambers, and the left-to-right shunt will diminish or cease. If left uncorrected, the pressure in the right side of the heart will be greater than the left side of the heart. This will reverse the pressure gradient across the ASD, and the shunt will reverse; a right-to-left shunt will exist. This phenomenon is known as Eisenmenger's syndrome. The natural history of secundum defects vary widely. Spotaneous closure occurs frequently in young patients with small defects. Hansilk and colleagues [19], "in a study of 200 consecutive patients, reported spontaneous closure in 56% of patients with an initial defect size of 4-5 mm, 30% in 6-7 mm defects, 12% in 8-10 mm defects, and in none of those with a larger defect. In that study, 39% of patients diagnosed at younger than 1 year had spontaneous closure by contrast with only 19% of those diagnosed later. In patients whose secundum defect does not close spontaneously, defect size can increase or decrease with age [19-22].

Objective of the study

The main objective of the study was to evaluate the outcome of pregnancy in women with atrial septal defect (ASD).

II. Methodology & Materials

This was a retrospective study was done in female who is suffering from ASD and was conducted in Anwer Khan Modern Medical College and Hospital, Nari Medical Center, Dhaka, Bangladesh during the period from Jan, 2014 to Jun, 2014. 20 Female patients with pregnancy were included in the study groups according to inclusion and the exclusion criteria. The age group ranges from 20-28 years. Physical examination, evaluation of pulmonary hypertension and outcome of pregnancy was evaluated.

Study design: Retrospective multi-center study.

Study population: 20 female patients were identified who had pregnancy with ASD.

Inclusion Criteria:

1. Pregnancy with ASD.

Exclusion Criteria:

1. Pregnancy with other Congenital Heart disease.
2. Pregnancy with Dilated Cardiomyopathy (DCM).
3. Pregnancy with Coronary Artery disease (CAD).
4. Pregnancy with Eissenmenger syndrome.
5. Pregnancy with COPD.

Statistical Analysis: All data were recorded systematically in preformed data collection form and quantitative data was expressed as mean and standard deviation and qualitative data was expressed as frequency distribution and percentage. Statistical analysis was performed using SPSS 17.0 (Statistical Package for Social Sciences) for windows 7.

III. Result

Table 1: Age distribution of our study patients

Age	n	%
<22 years	7	35.0
22 to 25 years	9	45.0
>25 years	4	20.0
Mean ± SD	23.65 ± 2.1	

Table 1 shows that majority 9 (45.0%) of our patients were aged between 22 to 25 years old, followed by 7 (35.0%) were aged <22 years & 4 (20.0%) were aged >25 years old. And the Mean ± SD were 23.65 ± 2.1 respectively.

Table 2: Distribution of our study patients by severity of pulmonary hypertension

Age	No Pulmonary Hypertension (n=5)	Mild Pulmonary Hypertension(n=10)	Moderate Pulmonary Hypertension (n=5)
<22 years	3 (60.0%)	3 (30.0%)	1 (20.0%)
22 to 25 years	0(0%)	5 (50.0%)	4 (80.0%)
>25 years	2 (40.0%)	2 (20.0%)	0 (0%)
Total	5(25.0%)	10 (50.0%)	5 (25.0%)

In table 2 we found the severity of pulmonary hypertension in age group. 20 to 25 years patients were found mostly in No Pulmonary Hypertension group compared to Mild & Moderate Pulmonary Hypertension group. Less than 22 years was found (60.0%), (30.0%) & (20.0%) in No, Mild & Moderate Pulmonary Hypertension group. 20 to 25 years was found (0%), (50.0%) & (80.0%) in No, Mild & Moderate Pulmonary Hypertension group. Great than 25 years was found (40.0%), (20.0%) & (0%) in No, Mild & Moderate Pulmonary Hypertension group respectively.

Figure 1: Pregnancy outcome of our study patients

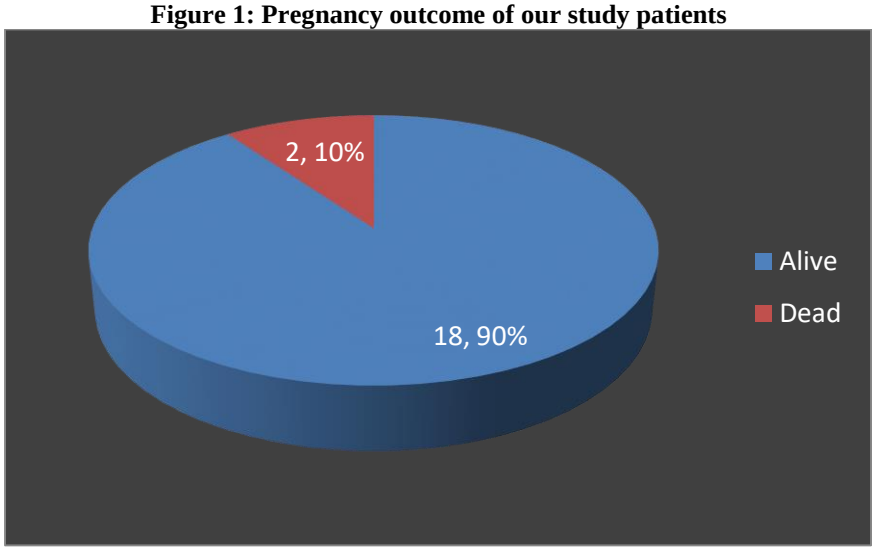

Figure 1 shows the pregnancy outcome of our study patients. Majority 18 (90%) patients were alive and 2 (10%) were dead.

Table 3: Pregnancy outcome in relation to age group

Age	Alive (n=18)	Dead (n=2)
<22 years	6 (33.3%)	1 (50.0%)
22 to 25 years	8 (44.4%)	1 (50.0%)
>25 years	4 (22.3%)	0 (0%)

Table 3 shows the pregnancy outcome in relation to age group. Six (33.3%) were <22 years in alive group and 1 (50.0%) in dead group. Then 8 (44.4%) were 22 to 25 years in alive group and 1 (50.0%) in dead group. Four (22.3%) patients were 25 years in alive group and 0% in dead group respectively.

Table 4: Pregnancy outcome in relation to severity

Severity of pulmonary hypertension	Alive	Dead
No pulmonary (n=5)	5 (100%)	0 (0%)
Mild (n=10)	9 (90.0%)	1 (10.0%)
Moderate (n=5)	4 (80.0%)	1 (20.0%)

In table 4 we found the pregnancy outcome in relation to severity. Five (100%) patients had no pulmonary hypertension in alive group & 0% in dead group. Then 9 (90.0%) patients had mild pulmonary

hypertension in alive group & 1 (10.0%) in dead group. Four (80.0%) patients had moderate pulmonary hypertension & 1 (20.0%) in dead group respectively.

IV. Discussion

Women should be offered appropriate pre-pregnancy counseling regarding the risk of pregnancy and the incidence of recurrence of congenital heart disease in their offspring. In this multicenter study, we report the outcome of pregnancy in women with ASD. It is found that more the age of patient more is the complication both for mother and fetus. Pregnancy should be avoided in women with an atrial septal defect and severe pulmonary hypertension. In a contemporary study maternal mortality was prohibitively high (28%) in women with congenital heart disease and pulmonary hypertension, despite use of pulmonary vasodilator therapy in more than half of the patients [23].

Maternal complication is a heart failure, thromboembolism, pulmonary hypertensive crisis, and sudden cardiac death. More the age, more the patient is symptomatic and if the patients remain unrepaired – complication of the pregnancy is more like miscarriage, small for age and still birth. Severe pulmonary hypertension is not found in this study. Although there are very few number of death of the fetus are found in this study. Most of the patient who are asymptomatic they have no complication both in case of mother and fetus. Pregnancy should be avoided in women with an atrial septal defect and severe pulmonary hypertension.

In our study we found that majority 9 (45.0%) of our patients were aged between 22 to 25 years old, followed by 7 (35.0%) were aged <22 years & 4 (20.0%) were aged >25 years old. And the Mean ± SD were 23.65 ± 2.1 respectively. In a similar study found that postoperative pregnant women in the 31–40 years of age and the second or third pregnancy groups had higher scores than those in the 20–30 years of age and the first pregnancy groups in some dimensions (SF, RE) [24]. This was consistent with previous reports in the literature. For example, Garc´ıa-Blanco et al. have reported that social functioning (family functioning, maternal attitudes, and social support) improves with age [25]. McHorney et al. have reported that advanced maternal-age women were associated with a six or more point increase in the SF or RE QoL domains of QoL compared to younger women [26]. Further, Berryman et al. showed that older pregnant women possessed a greater sense of preparedness, and more flexible problem-solving capacity [27].

This study tried to find out the severity of pulmonary hypertension. We showed the severity of pulmonary hypertension in age group. 20 to 25 years patients were found mostly in No Pulmonary Hypertension group compared to Mild & Moderate Pulmonary Hypertension group. Less than 22 years was found 60.0%, 30.0% & 20.0% in No, Mild & Moderate Pulmonary Hypertension group. Twenty to twenty five years was found 0%, 50.0% & 80.0% in No, Mild & Moderate Pulmonary Hypertension group. Great than 25 years was found 40.0%, 20.0% & 0% in No, Mild & Moderate Pulmonary Hypertension group respectively. Bredy et al. [28] found the impaired ability to adapt to vascular changes further contributes to poor maternal and fetal outcomes when pulmonary hypertension is present in women with congenital heart disease. In the late 1990s, studies reported maternal and fetal mortality rates up to 50% and 60%, respectively [29]. Pulmonary arterial hypertension is considered a late complication of an uncorrected ASD and uncommonly occurs before the age of 40. The prevalence has been estimated to be 10–35% in adults with secundum ASDs [30-32].

In our study we found majority 18 (90%) patients were alive and 2 (10%) were dead. In a similar study Rosas et al. [33] found the overall mortality rate was low (5.5%). In our study we found the pregnancy outcome in relation to age group. Six (33.3%) were <22 years in alive group and 1 (50.0%) in dead group. Then 8 (44.4%) were 22 to 25 years in alive group and 1 (50.0%) in dead group. Four (22.3%) patients were 25 years in alive group and 0% in dead group respectively.

Women with coexisting severe pulmonary hypertension should be counseled against pregnancy due to high incidence of maternal and fetal morbidity and mortality. We found 5 (100%) patients had no pulmonary hypertension in alive group & 0% in dead group. Then 9 (90.0%) patients had mild pulmonary hypertension in alive group & 1 (10.0%) in dead group. Four (80.0%) patients had moderate pulmonary hypertension & 1 (20.0%) in dead group respectively. Thus, based on such reports, patients with ASD and pulmonary hypertension should be counseled against pregnancy [34]. The rare concomitant occurrence of pulmonary arterial hypertension or ventricular dysfunction is an important reason to discourage pregnancy [35].

V. Limitations of the study

It is short term study. Small number of cases are included. More variables should be under consideration. Frequent follow up of the patient were not done. Prospective study should be done with performed data sheet.

VI. Conclusion and recommendations

Sizeable ASDs with right heart dilation are associated with important age-related morbidity and mortality. Advanced diagnostic modalities, earlier closure, and the advent of catheter intervention (for

secundum ASDs) are all likely to improve long-term prospects for these patients. Women with ASD who are asymptomatic are likely to have uneventful pregnancy. However, incidence of miscarriage, preterm delivery and cardiac symptoms during pregnancy (pre-eclampsia) were higher who had unrepaired ASD.

Every patient with symptomatic ASD must be repaired surgically or implantation of intra cardiac device by cardiac catheterization which is non surgical interventional technique.

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