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Adult Atrial Septal Defect Closure – Are We Doing Justice! -a retrospective study

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ABSTRACT To analyses the outcome in patients with atrial septal defect (ASD), who are undergoing open heart surgery i.e. pericardial patch closure in the adult age group. The patient age below 18 years are excluded in this study. To study postoperative results, like pre-operative symptoms, status of pulmonary arterial hypertension, morbidity & mortality. A retrospective study of all the patients admitted in our hospital, who underwent isolated pericardial patch closure above the age of 18 were included. These patients were followed up postoperatively.

KEYWORDS : atrial septal defect, pericardial patch closure, pulmonary arterial hypertension

Back ground:
To analyses the outcome in patients with atrial septal defect (ASD), who are undergoing open heart surgery i.e. pericardial patch closure in the adult age group. The patient age below 18 years are excluded in this study. To study postoperative results, like pre-operative symptoms, status of pulmonary arterial hypertension, morbidity & mortality. A retrospective study of patients admitted in our hospital from September 2010 to September 2016. Total number of patients with ASD admitted is 109, out of which 86 patients were included in our study.

Objectives:
To study postoperative results of all atrial septal defect, who underwent pericardial patch closure above the age of eighteen in our hospital for the period of six years. To assess the pre-operative signs & symptoms, status of pulmonary arterial hypertension, morbidity & mortality following open heart procedures in this group of patients.

Materials and Methods:
A retrospective study of patients admitted in our hospital from September 2010 to September 2016. All uncomplicated ASD patients with age more than 18 years are taking into the study group. Total number of patients with ASD admitted is 109, out of which 86 patients were included in our study.

Observations and Results:
There was no major difference in survival presentation in the group, preoperative presenting symptoms & post-operative complications following surgical closure of ASD were significantly high compared with the closure of ASD in younger age group patients. Total number of ASD patients admitted during our study period was 109 and 86 patients met with the criteria were included in our study, remaining 23 were excluded. One out of 86 patients two died (2.32%) following surgery closure, due to post-operative pulmonary hypertension crisis.

Out of 109 patient admitted in our hospital during 2010 to 2016, eighty six patients were adult i.e. age 18 years or more. The male female ratio was 2.7 (Table 1.) & mortality following patch closure was two due to post operative hypertensive crisis. When compared to younger age i.e. below 18 years, the male female ratio was1.5 & mortality was one due to same reason. The P value is .511087, hence not significant.

Table 1. ATRIAL SEPTAL DEFECT – AGE / SEX DISTRIBUTION
The chi-square statistic is 1.3424. The *p*-value is .511087. The result is not significant at $p < .05$.

AGE	AGE	MALE	FEMALE
> 18 years	86 (86.00) [0.00]	63 (60.75) [0.08]	23 (25.25) [0.20]
< 18 years	23 (23.00) [0.00]	14 (16.25) [0.31]	9 (6.75) [0.75]
Total	109	77	32

The symptoms on presentation were breathlessness (p 0.11), chest pain (p 0.08), pulmonary hypertension (0.09) and death following closure (p 0.06). P value is < .05 and not significant difference when compared with younger age group. (table 2.)

Table 2. Adult ASD, Patch closure done compared with younger age group of patients.

AGE	Breathlessness	Chest pain	PHT (severe)	Diabetes	Outcome (death)
> 18 years	67 (69.82) [0.11]	24 (25.39) [0.08]	57 (54.75) [0.09]	19 (16.66) [0.33]	2 (2.38) [0.06]
< 18 years	21 (18.18) [0.44]	8 (6.61) [0.29]	12 (14.25) [0.36]	2 (4.34) [1.26]	1 (0.62) [0.23]
Total	88	32	69	21	3

The chi-square statistic is 3.2515. The p-value is .516648. The result is not significant at $p < .05$.

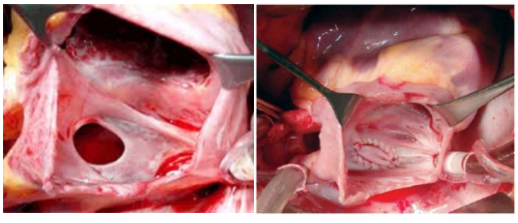
Discussion:
Many patients with ASDs are free of overt symptoms, although most will become symptomatic at some point in their lives. The age at which symptoms appear is highly variable and is not exclusively related to the size of the shunt. Exercise intolerance in the form of exertional dyspnea or fatigue is the most common initial presenting symptom. Atrial fibrillation or flutter is an age-related reflection of atrial dilation and stretch that seldom occurs at 40 years of age (7); its arrival usually causes substantial symptoms because of both the tachycardia and the underlying hemodynamics (governed by impaired left ventricular filling and reduced systemic cardiac output). Less commonly, decompensated right heart failure may occur, almost always in the older patient, often in the context of substantial tricuspid regurgitation (secondary to severe right heart and tricuspid annular dilation) and often with coexistent pulmonary arterial hypertension of variable severity (developing slowly in response to excessive pulmonary blood flow over a long period of time). Occasionally, a paradoxical embolus or transient ischemic attack may be the first clue to the presence of an ASD. Even less commonly, the discovery of cyanosis may lead to the diagnosis of an intraatrial communication, cyanosis being more common in inferior sinus venosus defects. As a general rule, patients with a significant ASD as defined above (with signs of right heart dilation) should be offered elective closure soon after the diagnosis is established, irrespective of age (13). There can be, however, several reasons for not closing an ASD:

1. The defect may be too small to be "hemodynamically important"; such patients should be kept under periodic

review, because some of them may go on to develop right heart dilation later in life due to a relative increase of left ventricular diastolic pressures and consequent increase of left-to-right shunting (this does not apply to persistent foramen ovale).
2. Pulmonary arterial hypertension may be too advanced, contraindicating ASD closure; the ASD may be physiologically needed by the patient (eg, as a "pop-off" valve in a patient with severe pulmonary hypertension). Such patients are often cyanotic at rest and become more cyanosed during exercise.
3. In most instances, in pregnant women diagnosed with an ASD during pregnancy, closure can be deferred for 6 months after delivery.
4. When severe left ventricular dysfunction is present and the ASD is functioning as a pop-off valve for the systemic ventricle, closure should not be performed.

Surgical closure is required for patients with ostium primum and sinus venosus ASDs, as well as for patients with secundum ASDs whose anatomy is unsuitable for device closure. In some settings, surgical closure of secundum defects is still preferred or required. (18) A secundum ASD may be closed with direct sutures ("primary closure") or with a patch using pericardium or synthetic material. Ostium primum defects require patch closure and repair of the "cleft" AV valve. The repair of sinus venosus defects with anomalous pulmonary venous return can be technically challenging, and several approaches are used to achieve this.(1,10,16) Care must be taken to see that the lower end of the SVC is large enough to accommodate both the SVC and the pulmonary venous return being baffled to the left atrium. Alternatively, 2 separate channels may be created to ensure these 2 sources of venous return are unobstructed.

Figure 1. Adult ASD – before and after patch closure



In most centers in the developed world, device closure has become the treatment of choice for secundum ASDs. The procedure is supported by transesophageal or intracar-diac echocardiography. (12) Catheter closure minimizes hospital stay and recovery, avoids surgical wounds and their potential complications, and conveys the same hemodynamic benefits as does surgery. Indications for catheter closure are the same as for surgical closure, but patient selection criteria are more narrowly defined. Patients with stretched secundum ASD 36 mm, those with inadequate atrial septal rims to permit stable device deployment, or those with proximity of the defect to the AV valves, the coronary sinus, or the vena cavae are usually referred for surgical repair. Device closure is a safe and effective procedure in experienced hands, with major complications such as cardiac perforation or device embolization occurring in less than 1% of patients. (4,9,11,14,15) Successful closure is achieved in up to 95% of patients, (5) although small residual shunts are often seen on echocardiography at the end of the procedure; these are not hemodynamically important, and most will close spontaneously within 1 year.

Significant ASDs are associated with increased morbidity and mortality. (2) An important study that examined the long term outcomes of surgical repair of secundum ASDs showed normal long-term survival among hospital survivors of ASD closure when patients were operated on before 18 years of age. In contrast, patients having surgical repair after age 18 years experienced increased mortality compared with healthy controls. Kaplan-Meier estimates of survival of the 119 patients included in the survival analysis from this study were 97% at 5 years, 90% at 10 years, 83% at 20 years, and 74% to 30 years compared with 99%, 98%, 94%, and 85%, respectively, in an age- and sex-matched control population. There were 27 late deaths in this series, of which 18 were cardiovascular in nature (13 cardiac and 5 stroke deaths). All patients who died of stroke had been in atrial fibrillation during follow-up. Of 104 patients in sinus rhythm preoperatively, 80 (77%) remained in sinus rhythm during long-term follow-up.

Pulmonary arterial hypertension occurs to a mild-to-moderate degree in many patients as a reflection of aging and altitude of residence. (3,8,19) Pulmonary vascular disease may occur in up to 5% to 10% of patients with untreated ASDs, predominantly in females. The pathogenesis of the pulmonary arterial hypertension in such patients is unknown, but it does not appear to be caused solely by the magnitude of the shunt persisting for decades. As a rule, patients should be considered to have Eisenmenger syndrome when ASDs are large and unrestrictive and when there is resting cyanosis. If a smaller ASD is present in a patient with pulmonary hypertension, other causes should be sought. There are some ASD patients in whom repair is not possible because of high pulmonary arterial pressures and pulmonary vascular resistance, usually when the left-to-right shunt is reversed. There have been case reports of such patients being managed with intravenous epoprostenol or oral bosentan with such success that ASD closure subsequently became possible. (6,17)

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. 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.

Conclusion:

ASD is one of the most common simple congenital heart diseases with the increased detection rate in adults, which results from more and more medical camps conducted in public interest and availability of echocardiography even in primary health care centre. It has become even more important to know the age by which ASD must be closed without any delay to avoid complications. The patients presenting with breathlessness and chest pain in second or third decade of life. Surgical intervention in people with few or no symptoms is proved to be of beneficial in later development of pulmonary hypertension and heart failure. ASD should of course be detected and closed during childhood as it is believed and proved beyond doubt that delayed closure impairs the growth and remodeling of the heart, which subsequently improves the long term outcome for retention of sinus rhythm and prevents development of heart failure.

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