

## TWENTY-TWO YEARS OF REPAIR OF ATRIAL SEPTAL DEFECTS IN GHANA

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### Abstract

**Introduction:** Atrial septal defects (ASDs) are one of the most common types of congenital heart disease. Repair is often necessary to forestall the various complications associated with the natural history. Surgical repair under cardiopulmonary bypass has been one of the standard modes of treatment. Much of the data available is from the rest of the world. There is not much data from the West African sub region. The purpose of this study is therefore to provide data from this sub region, guide both referring and operating clinicians in their decisions, and also to serve as comparative data for future studies. We analysed our institutional data to determine the age and sex distribution, the types of ASD and the outcome of surgical repair.

**Subjects and Methods:** A retrospective study was done for all patients who had surgical repair of ASD from January 1992 to December 2013 in the National Cardiothoracic Centre. The data was analysed using Microsoft excel 2010 software.

**Results:** There were 129 patients, 2 in the first year and 9 in the last year of the study. There were 53 (41.0%) males and 76 (59.0%) females. The mean age was

17.6 ± 14.9 years (1 – 70), The commonest age group was 1 – 10 years; 53 (41.0%), followed by 11 – 20 years; 36 (27.9%). Secundum ASDs were the commonest, 104 (80.6%), followed by primum ASDs 14 (10.9%), and sinus venosus ASDs 6 (4.7%). Large defects described as common atrium were 5 (3.9%). Autologous pericardium was used in repairing 125 (96.9%) and GORETEX® patch was used in the remaining 4 (3.1%). Thirty-three (25.7%) cases had associated cardiac anomalies that needed concomitant surgical intervention. The commonest was cleft in the anterior mitral leaflet causing severe mitral regurgitation 12 (9.3%), followed by pulmonary stenosis (PS) 11 (8.5%). There was an early mortality of 2 (1.6%). No other significant complication was encountered.

**Conclusion:** Surgical repair of ASDs in this sub region has been going on for over two decades now, with excellent outcomes. Patients with ASDs must be offered repair as soon as possible to forestall the serious complications that may follow unrepaired ASDs

**Key Words:** Atrial septal defect, surgical repair, outcome

### Introduction

Atrial septal defects (ASDs) are one of the most common types of congenital heart disease. Though they commonly occur as isolated lesions, they may also occur as part of other major cardiovascular anomalies. Atrial septal defects are commonly classified according to their anatomic location in the interatrial septum into four main types. The commonest type is the ostium secundum ASD, comprising about 80%. The remaining 20% comprises the ostium primum, sinus venosus and coronary sinus ASDs. Occasionally, when the septal defect is so wide that there is just a thin rim of tissue between the two atria, the condition is called a common atrium. Repair of ASDs is often necessary to forestall the various complications associated with it,

like chronic flooding of the lungs leading to frequent chest infections, pulmonary hypertension and

Eisenmenger's syndrome. After the age of 2 years, ASDs rarely close spontaneously. The recommended age for repair therefore is 3 – 5 years<sup>1</sup>. Surgical repair under cardiopulmonary bypass has been one of the standard modes of treatment, with a very good outcome<sup>1-4</sup>. The other modes of treatment currently are the minimally invasive thoracoscopic approach and the transcatheter percutaneous device approach. Much of the data available is from the rest of the world. And since there is not much data on these from the West African sub region, we analysed our institutional data to determine the age and sex distribution, types of ASD and the outcome of surgical repair. This data covers a 22-year period.

### Subjects and Methods

We carried out a retrospective study of all the patients who had surgical repair of ASDs from January 1992 to December 2013. The setting was the National Cardiothoracic Centre, Korle-Bu Teaching Hospital, Accra. The source of the data was the theatre records and the patients' case notes. The data was analysed using Microsoft excel 2010 software.

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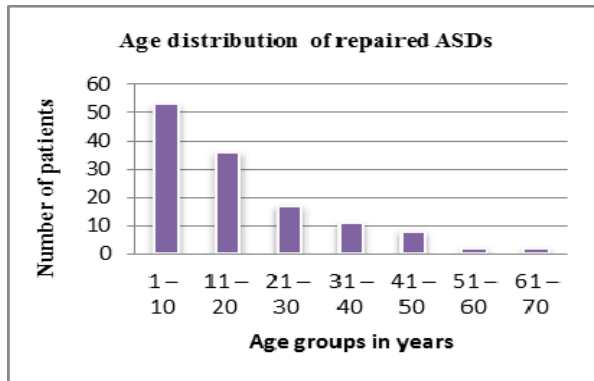
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**Conflict of Interest:** None declared

## Results

A total of 129 patients were enlisted in the study, 2 in the first year of the study and 9 in the last year. There were 53 (41.0%) males and 76 (59.0%) females. The mean age was  $17.6 \pm 14.9$  years (1 – 70), with a median of 12 years and a mode of 6 years. The commonest age group was 1 – 10 years; 53 (41.0%), followed by 11 – 20 years; 36 (27.9%). The age distribution is shown in Fig. 1.



**Figure 1.** Age distribution of repaired ASDs

Most of the ASDs were secundum type 104 (80.6%), followed by the primum type 14 (10.9%), then the sinus venosus type 6 (4.7%). Large defects described as common atrium were 5 (3.9%). Autologous pericardium was used in repairing 125 (96.9%) and GORETEX® patch was used in the remaining 4 (3.1%). Thirty-three (25.7%) cases had associated cardiac anomalies that needed concomitant surgical intervention. The commonest was cleft in the anterior mitral leaflet causing mitral regurgitation 12 (9.3%), followed by pulmonary stenosis (PS) 11 (8.5%), shown in Table 1. There were 2 (1.6%) early mortalities. No other significant complication was encountered.

**Table 1.** Associated cardiac conditions that needed concomitant surgery

Associated condition	No.	Percentage	Surgery performed for it
MR 2 <sup>o</sup> cleft AML	12	9.3%	Mitral valve repair
PS	11	8.5%	RVOT Widening
PDA	4	3.1%	Ligation
PS+PDA	2	1.6%	Ligation + RVOT Widening
PAPVC	2	1.6%	Baffle of PVs into the LA
Cor triatriatum	1	0.8%	Excision of the septating membrane
Constrictive pericarditis	1	0.8%	Pericardiectomy
<b>Total</b>	<b>33</b>	<b>25.7%</b>	

MR: Mitral Regurgitation. AML: Anterior Mitral Leaflet. PS: Pulmonary Stenosis. PAPVC: Partial Anomalous Pulmonary Venous Connection. RVOT: Right ventricular outflow tract. PV: Pulmonary vein. LA: Left Atrium.

## Discussion

There has been a gradual increase in the number of patients who have had surgical repair over the years. There were 2 in the first year of the study, and 9 in the last year. This is probably due to the increase in the population of the nation and also due to the increased awareness of the referring doctors of the existence of such a facility. The male: female ratio was 1: 1.4, confirming that ASD is slightly more common in females<sup>1</sup>. The commonest age group was 1 – 10 years, followed by the 11 – 20 years age group (Fig. 1). These two groups comprise 68.9%. The age distribution gradually tapers until the 61 – 70 age group. It is not surprising to see adults with ASDs since the pathophysiology is slightly more favourable than other congenital lesions like VSDs, for example, thereby allowing surgical repair even at those older ages. The oldest patient was 70 years old and the youngest was 1 year old. Both were females with secundum ASDs. Not surprisingly, most of the ASDs were the secundum type 104 (80.6%), followed by the primum type 14 (10.9%), and the sinus venosus type 6 (4.7%). The common atriums were 5 (3.9%). This finding is very similar to other reported series in the literature where secundum ASDs comprise the majority, followed by primum, sinus venosus, and rarely the unroofed coronary sinus types<sup>1,2,5,6</sup>. All the ASDs were repaired through a median sternotomy, except one which was performed through a right anterolateral thoracotomy. They were all performed under cardiopulmonary bypass. Most of them 125 (96.9%) were repaired with 0.6% glutaraldehyde treated autologous pericardium. The remaining 4 (3.1%) were repaired with GORETEX® patch. This was when the pericardium did not look healthy or was inadequate due to a very large defect. Newer methods of repairing ASDs such as the minimally invasive thoracoscopic approach<sup>4,7-12</sup> and transcatheter percutaneous device closure have also been described recently with very good outcomes<sup>13,14</sup>. The minimally invasive thoracoscopic approach also requires cardiopulmonary bypass, but uses a much smaller incision. This is a 6 – 8 cm anterior thoracotomy incision below the right breast in the 5<sup>th</sup> or 6<sup>th</sup> intercostal space. It has superior cosmesis and less morbidity but it is technically more difficult to do. The transcatheter percutaneous device closure is the latest approach in ASD closure. It is done in the catheterization laboratory by the interventional cardiologist. It involves making a needle puncture in the groin to get access to the femoral vein, inserting a catheter through it, advancing it through the inferior

vena cava to the right atrium where the occluding device is deployed across the defect to close it. Its advantage is that it does not need general anaesthesia, a big incision, nor cardiopulmonary bypass. Its disadvantage is that not all ASDs can be closed safely through the transcatheter approach. These are secundum ASDs without a good septal margin, primum ASDs, sinus venosus ASDs and coronary sinus ASDs.

In this study, the associated conditions that had the respective surgeries is shown in Table 1. The commonest associated lesion was a cleft in the anterior mitral leaflet 12 (9.3%). These were in primum ASDs. The second commonest associated lesion was pulmonary stenosis 11 (8.5%). Pulmonary stenosis as the commonest associated finding has been reported as 10%<sup>1</sup>. There were 2 (1.6%) early mortalities. The first was in a 1½ -year old syndromic child who died intra-operatively. The cause could not be determined. The other was a 6-year old child with pulmonary hypertension. Echocardiography estimated a pulmonary artery systolic pressure of 65mmHg. Right heart catheterisation was not done at the time. She did well intra-operatively but had sudden cardiac arrest on the 5<sup>th</sup> post-operative day, and cardiopulmonary resuscitation was not successful. Long term complications after ASD repair in adults like atrial fibrillation, pulmonary hypertension and heart failure have not been analysed in this study because of the limitations of this study.

### Limitations of the Study

Not all of the patients' case notes were available. This made it difficult to reliably estimate the medium and long term outcomes.

### Conclusion

Surgical repair of ASDs in this sub region has been on-going for over two decades now, with excellent outcomes. Patients with ASDs must be offered surgical repair as soon as possible to forestall the serious complications that may follow unrepaired ASDs.

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