Secundum type atrial septal defect in adult patients: operative results and mid-term follow-up


Citation


Abstract

Background: Secundum type atrial septal defect is the most commonly congenital heart disease which has been detected in adults. It is relatively common to observe atrial fibrillation in these patients after the age of forty. Our study includes the mid-term follow-up results of patients who were operated due to secundum type ASD.

Methods: 52 adult patients were operated in our clinic between January 2001 and December 2007 due to secundum type atrial septal defect. Mean age was 35.63±12.4 (range 18-60 years) where 37 (71.2%) were female and 15 (28.8%) were male. The patients were grouped into two with respect to age: Group I included patients aged between 18-40 and Group II included those between 40-60 years of age. 11 patients presented preoperative atrial fibrillation (21.1%). Preoperative mean pulmonary/systemic flow ratio was 2.39 ± 0.59 and mean pulmonary artery pressure was 36.80±9.48. Before the operation 36 patients were in New York Heart Association functional class II (69.2%), 13 were in class III (25%) and three was in class I (5.8%).

Results: Preoperative atrial fibrillation converted to sinus rhythm in 4 of 11 patients in the postoperative period. Postoperative atrial fibrillation continued in five patients in the follow-up period despite the medical treatment. In the follow up period 42 patients were in New York Heart Association functional class I (80.8%) and 10 were in class II (19.2%). Mean follow up period was 36.67±23.12 months. No mortality was observed neither in intraoperative nor in the post operative or follow-up periods.

Conclusion: Surgical closure of secundum type atrial septal defect in adult patients and antiarrhythmic therapy in those with atrial fibrillation is an effective method in decreasing morbidity and mortality rates.

INTRODUCTION

Atrial Septal Defect (ASD) is the most commonly observed congenital heart disease in adult, where most of such defects present themselves as the secundum type ASD (1). Dyspnea, decreased exercise tolerance, right ventricular disfunction, pulmonary hypertension, atrial arrhythmias, and especially atrial fibrillation (AF) are the main symptoms and findings. Atrial fibrillation may result in complications such as stroke and transient ischemic attack (2). Non-surgical closure of ASD may result in early deaths due to congestive heart failure and nonreversible pulmonary hypertension (3). 50% of ASD patients without closure can live up to 40 years of age where only 10% can reach the age of 60 (4).

The aim of this study was to identify the factors affecting the incidence of AF in adult patients with secundum type ASD and to determine the role of ASD surgical closure and antiarrhythmic treatment in adult patients AF detected in decreasing morbidity and mortality rates.

METHODS

52 adult patients with secundum type ASD were operated in our clinic between January 2001 and December 2007. Mean age was 35.63±12.4 (range 18-60 years) where 37 were female (71.2%) and 15 were male (33.3%). 11 patients (21.4%) had preoperative AF. All patients were evaluated with history of patients history, physical examination, counting complete blood, routine biochemical examination, electrocardiography (ECG), echocardiography, thoracic roentgenography, New York Heart Association (NYHA) functional classification and cardiac catheterization.
preoperatively. Coronary angiography was performed in males elder than 35 and females elder than 40 years of age. The patients were divided into two groups with respect to age.

Group I included 37 patients (71.2%) between the age of 18-40 and Group II included 15 patients (28.8%) between the age of 40-60, where the mean age was 29.30±7.3 years in the former and 51.27±7.45 years in the latter. Dyspnea was the most common complaint in the patients.

Preoperative NYHA functional class was I in three patients (5.8%) of the patients, II in 36 (69.2%) and III in 13 (25%) (Table I).

**Figure 1**

Table 1: Patients characteristics.

<table>
<thead>
<tr>
<th></th>
<th>Group I (18-40 years)</th>
<th>Group II (40-60 years)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. patients (%)</td>
<td>37 (71.2%)</td>
<td>15 (28.8%)</td>
<td>52</td>
</tr>
<tr>
<td>Male</td>
<td>12</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Female</td>
<td>25</td>
<td>12</td>
<td>37</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>29.30±7.3</td>
<td>51.27±7.45</td>
<td>29.30±7.3</td>
</tr>
<tr>
<td>Preoperative NYHA</td>
<td>I</td>
<td>II</td>
<td>III</td>
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<tr>
<td>Preoperative NYHA</td>
<td>I</td>
<td>II</td>
<td>III</td>
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<tr>
<td>Functional class</td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>35.63±2.4</td>
<td>35.63±2.4</td>
<td>35.63±2.4</td>
</tr>
<tr>
<td>Preoperative mean</td>
<td>Qp/Qs ratio:</td>
<td></td>
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<tr>
<td>Preoperative mean</td>
<td>Qp/Qs ratio:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAP (mmHg)</td>
<td>34.23±10.65</td>
<td>42.87±10.22</td>
<td>34.23±10.65</td>
</tr>
</tbody>
</table>

| Abbriviations: AF=atrial fibrillation, NYHA=New York Heart Association, PAP=pulmonary artery pressure, Qp/Qs ratio=Pulmonary/systemic flow ratio |

Before the operation 3 of (8.1%) Group I patients had functional status of NYHA class I, 30 (81.1%) had functional status of class II and 4 (10.8%) had functional status of class III whereas 6 (40%) of Group II patients had functional status of class II and 9 (%60) had functional status of class III. Preoperative NYHA functional capacity was statistically meaningful between Group I and Group II (p<0.001).

Preoperative mean pulmonary/systemic flow ratio (Qp/Qs) was 2.39±0.59, (range 1.5 to 3.6) which was 2.9±0.56 (range 1.5 to 3.6) in Group I and 2.64±0.6 (range 1.6 to 3.5) in Group II and preoperative Qp/Qs ratio wasn’t statistically significant between Group I and Group II.

In the preoperative period 41 (78.9%) patients had sinus rhythm and 11 (21.1%) had AF. Preoperative AF was observed in 2 patients in Group I (5.4%) and in 9 (60%) patients in Group II and it was statistically significant incidence of the AF between Group I and Group II (p=0.001).

Preoperative mean PAP was 34.23±10.65 mmHg (range 20 to 62 mmHg). Preoperative mean PAP in Group I was 30.73±8.74 mmHg (range 20 to 62 mmHg) whereas it was 42.87±10.22 mmHg (range 25 to 60 mmHg) in Group II and it was statistically significant difference of PAP between Group I and Group II (p=0.001). Mean age of 38 patients with a preoperative PAP lower than 40 mmHg was 31.95±10.05 years (range 18 to 59 years), whereas it was 45.64±12.97 years (range 18 to 60 years) for 14 patients with a preoperative PAP higher than 40 mmHg, and this age difference between patients who had PAP lower than 40 mmHg and PAP higher than 40 mmHg was statistically significant (p=0.002).

3 patients suffered from preoperative tricuspid valve regurgitation grade 1, 8 from grade 2 and 3 from grade 3. Preoperative mitral valve regurgitation was grade 1 in 3 patients and grade 2 in 2 patients. One patient exhibited grade 1 mitral prolapsus.

Exclusion criteria included operations for atrioventricular valve replacement, coronary artery bypass grafting and other additional operations due to complex congenital heart disorder.

All operations were performed by means of standard cardiopulmonary bypass with the use bicalval venous and ascending aortic cannulation. For myocardial protection moderate systemic hypothermia was used with antergrade potassium enriched isothermic blood cardioplegia. Three of 11 patients who had preoperative atrial arrhythmia were receiving amiodarone, 3 were receiving digoxin and one was receiving calcium channel blocker as the antiarrhythmic drug therapy. The remaining 4 patients weren’t receiving any antiarrhythmic drug.

As the antiarrhythmic treatment in those with AF, amiodarone was administered to patients following cardiopulmonary bypass (CBP) at a loading dose of 5 mg/kg (at 20-30 min.), at a maintenance dose of 10 mg/kg (at 24 hours), at an oral dose of 200-400 mg/ day for the first 3 months and at an oral dose of 200-400 mg/day during follow-up in patients with continued AF.

Patients with continued AF in the postoperative period and in the follow-up received 300 mg acetylsalicylic acid (ASA) as the prophylactic treatment.
Follow-up of all patients were achieved with a hospital office visit or by telephone interview. Patients were evaluated by clinical examination, electrocardiogram, chest roentgenogram, and TTE examination.

Statistical analysis: All analysis were made in a Windows program of statistical analysis package. Descriptive data are presented as mean±standard deviation or as medians with ranges, when appropriate. McNemar test, Fisher's Exact test, Chi-Square test and t-test were used in the statistical analysis. A P-value <0.05 was considered significant.

RESULTS

No mortality was observed neither in intraoperative nor in the postoperative or follow-up periods.

Mean aortic cross-clamping time (CCT) was 21.25±7.75 minute and mean cardiopulmonary bypass (CPB) time was 31.33±8.32 minute. ASD was closed with direct suturing in 34 (%65.3) patients whereas by Goretex patch in 18 (%34.7) patients(Table II).

13 patients who had pulmonary hypertension received intraoperative and postoperative nitroglycerin administration to provide pulmonary vasodilatation and hemodynamic stabilization. Tricuspid regurgitation was preoperatively mild to moderate in 11 patients, hence no surgical intervention was made having considered it to be functional. Tricuspid regurgitauon in these patients regressed following the ASD closure. Since tricuspid regurgitauon was severe in three patients, tricuspid annuloplasty (De-Vega) was also applied in these patients in addition to ASD closure. Since it was mild to moderate, no surgical correction was attempted in six patients with preoperative mitral regurgitation and the findings of mitral regurgitation regressed after the ASD closure. Mean PAP dropped from a preoperative value of 34.23±10.65 mmHg (range 20-62 mmHg) to a postoperative value of 23.60±6.26 mmHg (range 16-41 mmHg) which was statistically significant (p=0.000). Postoperative PAP was 22.05±5.83 mmHg in Group I whereas 27.40±5.82 mmHg in Group II. Pre- and postoperative difference between mean PAP values of Group I and Group II were statistically meaningful (p=0.000).

Postoperative NYHA functional class was I in 42 (80.8%) of the patients, II in 10 (19.2%). Of the 37 patients in Group I, 34 (91.9%) were postoperatively in NYHA class I and 3 (8.1%) were in NYHA class II, whereas of the 15 patients in Group II, 8 (53.5%) were postoperatively in NYHA class I and 7 (46.5%) were in class II. Postoperative functional capacity of Group I improved remarkably which was statistically significant (p=0.000). Of the Group II patients, 6 (%40) were preoperatively in NYHA class II, and 9 were (60 %) class III. Postoperative improvement in the functional capacity of Group II patients was statistically significant(p<0.05). Four (36.3%) of 11 patients with preoperative AF converted to sinus rhythm in the postoperative period. AF continued in the other seven patients 63.7%) in the postoperative period despite the antiarrhythmic therapy. Two of seven patients with postoperative AF converted to sinus rhythm in the follow-up. One patient with postoperative AF had transient ischemic attack. Mean time from operation to discharge was 4.71±0.72 days (range 4 to 7 days). All the patients underwent 24 hour ECG monitoring both preoperatively and 3, 6 and 12 months postoperatively. Mean follow up time was 36.67 ±23.12 months (range 1 to 74 months).

DISCUSSION

In this study we investigated the risk factors affecting the occurrence of AF in patients with secundum type ASD and the incidence of AF, together with the role of surgical closure of ASD and antiarrhythmic therapy in decreasing the rates of morbidity and mortality. In patients with ASD, AF is considered an important cause of morbidity and mortality, and its occurrence as well as continuation depends on multifactorial reasons. These factors are advanced age, long-standing excessive volume load, right atrium dilatation,
electrophysiologic derangement of the right atrial wall, increased pulmonary arterial pressure, increased left ventricular end-diastolic pressure and ventricular dysfunction (5-8).

The group of our patients, who had a PAP higher than 40 mmHg, had a higher mean age and AF was more common in them (p<0001). With the surgical closure of ASD, PAP was significantly decreased in this group (p=0.000).

Patients in higher preoperative NYHA functional class have been reported to exhibit atrial arrhythmia more commonly (9). Since surgical intervention yields more effective results than medical treatment in preventing atrial arrhythmia and associated morbidity and mortality and it provides symptomatic improvement in patients, it has been emphasized that closure of ASD should not be postponed (9,10).

Our patients in Group I and Group II were significant improvement in their postoperative NYHA functional capacity which was statistically significant. AF was more commonly observed in patients in NYHA Class III, and significant improvement was observed in their clinical findings following the ASD closure.

Antiarrhythmic therapy has been showed to produce more effective results in treatment atrial arrhythmia due to removal of the intracardiac shunt and decrease in the right atrium diameter after the surgical closure of ASD (11).

Atrial arrhythmias have been reported to occur at a rate of 14-22 % in patients with unclosed ASD (10). In our study 21.1% of patients exhibited preoperative AF. It is possible that atrial arrhythmias may continue or reoccur following the ASD closure and atrial arrhythmias may result in significant rates of morbidity and mortality (11). It has been showed that more than 22% of late mortality following the closure of ASD occurred due to stroke and that the patients with stroke had also atrial arrhythmia (11). In our study one patient with pre- and postoperative AF had a transient cerebral ischemic attack in the postoperative period.

In conclusion; The risk of atrial fibrillation in adults with ASD is related to the age and the pulmonary arterial pressure. Since surgical closure of ASD in adult patients with secundum type ASD result in regression of clinical symptoms and decrease in morbidity and mortality rates ASD must be closed as soon as possible, hence it appears to be a effective method in decreasing morbidity and mortality rates.

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