

Mid- to Long-term Results of Surgical Treatment of ASD in Patients over 60 Years Old

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Background: There is controversy about the benefit of surgical correction of an atrial septal defect (ASD) in patients over 60 years old. The purpose of this study was to determine whether surgical treatment is beneficial in those 60 years of age or older. **Materials and Methods:** We reviewed the clinical course of 57 patients (mean age: 63.54±5.59 years) diagnosed with an isolated secundum ASD after the age of 60. The 24 patients (group A) who underwent surgical repair were compared with the 33 patients (group B) who were treated non-surgically. The mean follow-up period was 6.8±4.5 years. **Results:** One operative death, 5 late deaths (20.8%) in group A, and 9 deaths (27.3%) in group B occurred in the study period. Symptomatic improvement was noted in 18 patients (75%) of group A after surgery. However 13 patients (39.4%) of group B showed symptomatic improvement during the follow-up period (p=0.012). The incidence of new atrial arrhythmia of the two groups was significantly different (16.7% vs 36.7%, p=0.038). The actuarial 10 year survival rate was 79% in group A and 73% in group B. **Conclusion:** Although surgical correction of ASD did not increase survival in patients over 60 years old, the surgical outcomes of ASD showed low operative mortality and resulted in symptomatic improvement in the majority of these patients. This study has shown the benefits of surgical closure of ASD even in advanced age in comparison to medical treatment.

Key words: 1. Adult
2. Heart septum defect, atrial
3. Heart atrium

INTRODUCTION

An atrial septal defect (ASD) has a relatively milder course than other congenital heart diseases and does not often show definite symptoms. However, most patients with ASD suffer from respiratory difficulty, arrhythmia, heart failure, and strokes over time. Although recently there is an apparent tendency to treat ASD with an interventional method, it is not

always possible depending on the location and size of the ASD. Therefore, the surgical correction of ASD still plays an important role in adult ASDs regardless of the surgical technique. Although the first successful operative treatment for ASD was done 60 years ago, controversy remains about the usefulness of surgical treatment in those over 60 year old with ASDs. This study aimed to identify the benefits of surgery for ASD patients over 60 years old by comparing the

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results of surgery with those of non-surgical treatment.

MATERIALS AND METHODS

1) Patients

We reviewed 57 patients over 60 years old who had been diagnosed with secundum ASDs between January 1993 and December 2008, and divided the groups into the A group, the 24 cases who underwent surgery, and B group, 33 cases who underwent only non-surgical treatment. We reviewed the patients' medical records retrospectively, and identified each patient's age, sex, and symptom improvement, as well as the death rate and incidence of arrhythmia and stroke. Then we analyzed the results of treatment of the two groups. From this study, we excluded the patients who had other heart diseases needing operative corrections, and also excluded the cases which were lost to follow-up.

2) Surgical methods

The surgeries were performed by two different surgeons. According to the preference of the surgeon and the state of the patients, the method of incision technique was chosen among median sternotomy (n=15), partial sternotomy (n=3), and right anterolateral thoracotomy (n=6). We performed the operations along with a cardiopulmonary bypass and total body perfusion by cannulation into the ascending aorta, IVC, and SVC, and protected the myocardium by an antegrade infusion of cold crystalloid cardioplegic solution into the aortic root under moderate hypothermia. After a right atriotomy, we performed a direct closure (n=6) or patch closure (n=18) according to the size and location of the ASDs. Secundum ASDs were divided into foramen ovale type (n=19, 70%), inferior vena caval type (n=3, 20%), and sinus venosus type (n=2, 10%) according to the location. The mean cardiopulmonary bypass time was 63 ± 17.6 minutes and the mean aortic cross clamp time was 39 ± 15.1 minutes.

3) Follow-up

The mean follow-up period was 6.8 ± 4.5 years (1 to 15 years). Follow-up was done by reviews of records during admission and outpatient visits. In the cases lost to follow-up care, we identified whether there was a death, changes in

symptoms, or occurrence of cardiovascular disease during the follow-up period by making telephone calls. We routinely took postoperative chest radiographies, EKGs, and echocardiographies: before discharge, and at postoperative 6 months, one year, 3 years, and 5 years. Recently, we have not been performing cardiac catheterization for adult patients, so we excluded the results of cardiac catheterization in this study. We defined the death related to surgery as death within 30 days of the operation. We classified the deaths during follow-up into death by cardiopulmonary disease and death by other diseases. We identified changes in patients' symptoms by checking the degree of respiratory difficulty before operation, just after operation, and at the last visit to the hospital using NYHA functional classes. We ascertained the occurrence of cardiovascular disease by the occurrence of heart failure, arrhythmia, infective endocarditis, thromboembolism, or stroke.

4) Statistical analysis

We did all statistical analyses with SPSS (14.0KO for Windows). We expressed continuous variables as mean \pm standard deviation, used a chi-square for analysis of categorized variables, and used a Student's t-test for analysis of continuous variables. We used Kaplan-Meier analysis for the survival curve and compared the results to the Log Rank test. We considered a p-value less than 0.05 significant.

RESULTS

The mean age of all 57 patients was 63.5 ± 2.6 years (60 to 77 years) and 55 patients (96.5%) complained of cardiopulmonary symptoms. The mean age was 62.7 ± 2.6 years in group A and 64.5 ± 3.4 years in group B, so there was no significant difference between the two groups statistically. There were no significant differences between two groups in clinical characteristics including NYHA functional class, atrial arrhythmia, respiratory difficulty, palpitation, or stroke at the time when the diagnoses were identified. At the time of diagnosis, echocardiographic Qp/Qs values were significantly higher in group A, but there was no difference in the two groups' pulmonary systolic blood pressure (Table 1). There was no surgically-related death group A. During the fol-

Table 1. Demographics of patients at the time of diagnosis

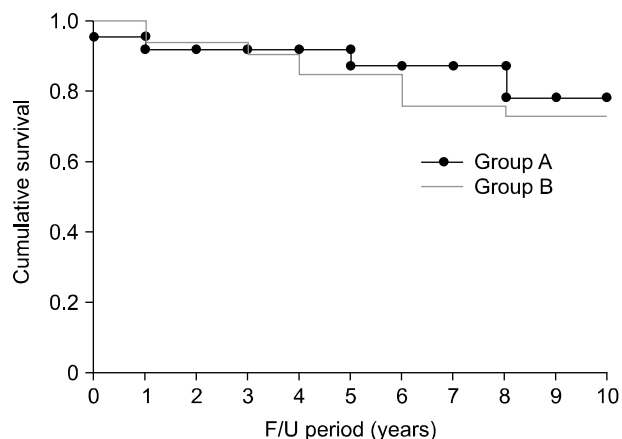
Variables	Group A	Group B	p-value
Age (year)	62.7±2.6	64.5±3.4	0.134
Female	17 (70.8%)	24 (72.7%)	0.438
NYHA Fc III or IV	5 (20.8%)	8 (24.2%)	0.846
Atrial arrhythmia	7 (29.1%)	8 (24.2%)	0.245
Dyspnea	18 (75.0%)	26 (78.8%)	0.176
Palpitation	10 (41.7%)	13 (39.4%)	0.632
Stroke	5 (20.8%)	9 (27.3%)	0.341
Qp/Qs	2.8±1.2	2.2±1.1	0.013
PASP (mmHg)	47.5±15.2	46.9±17.3	0.093

NYHA Fc=New York heart association functional class;
PASP=Pulmonary artery systolic pressure.

Table 2. Clinical outcomes at the last follow up period

Variables	Group A	Group B	p-value
Symptomatic improvement	18 (75.0%)	13 (39.4%)	0.012
New onset of atrial arrhythmia	4 (16.7%)	12 (36.7%)	0.038
New onset of stroke	2 (8.3%)	4 (12.1%)	0.461
Late deaths	5 (20.8%)	9 (27.3%)	0.736
Cardiopulmonary origin deaths	2 (40.0%)	6 (66.7%)	0.036

low-up period, there were 5 deaths (20.8%) in group A, and 9 deaths (27.3%) in group B; however, the difference between the two was not statistically significant. In group A, the causes of death were sudden death, stomach cancer, and complications of diabetes mellitus, and there were 2 deaths (40.0% of group A deaths) due to cardiopulmonary disease. In group B, the causes of death were heart failure, sudden death, pneumonia, intestinal bleeding, stroke, and colon cancer. In addition, there were 6 deaths (66.7%) due to cardiopulmonary disease, which was statistically significant. There were recoveries from symptoms in 18 cases (75%) of group A and in 13 cases (39.4%) of group B during the follow-up period. We found statistical significance in the symptom recoveries in group A ($p=0.012$). New atrial arrhythmia occurred in 4 cases (16.7%) of group A and 12 cases (36.7%) of group B during the follow-up period, which was a statistically significant difference between the two groups ($p=0.38$) (Table 2). The ten-year survival rates were 79% in

**Fig. 1.** Cumulative survival of each group ($p=0.083$, log rank test).

group A and 73% in group B, and there was no statistical significance in the difference between the two groups ($p=0.083$) (Fig. 1).

DISCUSSION

ASD is the third most common congenital heart disease in adults [1]. There have been reports that without operations, heart failure, pulmonary hypertension, and death earlier than normal life expectancy could occur in ASD patients [2]. Campbell et al. [3] reported that the survival rate of ASD patients who had no operations was 75% at the age of 27, 50% at the age of 37, and 10% at the age of 60. Hence, the surgical indications for ASD closure could be less than $Qp/Qs=1.5$, and they recommended operations at preschool age [4]. Nevertheless, controversy remains about the safety and usefulness of operations for ASD patients [5,6]. Perloff [7] reported that increasing pulmonary arterial pressure and accompanying diseases made the risks of operation higher as patients grew older, so the operative outcomes of adults with ASDs were closely related to the age of operation. Murphy et al. [8] reported that ASD corrections during the childhood or adolescent period showed the same survival rates as normal people's, but ASD corrections to those over 40 years old showed a greater possibility of postoperative cardiovascular complications. Owing to these study results, incidental ASD in those over 50 to 60 years old or mild symptoms could

lead physicians to hesitate before performing surgery. We believe our study confirms the usefulness and safety of surgical treatment for those over 60 by comparing patients undergoing operations with those not undergoing operations, who refused operations not because of the medical problems, but because of economic or psychological reasons in more patients over 60 years old than other age groups. Among the patients undergoing medical treatment in this study, there were more patients who refused surgery because of doubt about its effectiveness or vague nervousness than patients who refused surgery because of financial problems. We investigated the usefulness and safety of operating on the ASDs of adults over 60 years old, which is still thought to be too old to undergo this kind of open heart surgery.

Most studies have suggested that the surgical treatment of adults with ASDs could improve survival rates; however, the possibility could decrease with increasing age [8]. In this study, there was no difference in the cumulative survival rate between the two groups according to mid- and long term follow-up. The possibility of death by cardiopulmonary disease was lower significantly in the group undergoing surgery; however, cardiopulmonary diseases were the major causes of death of the medically treated group. The authors concluded that the surgical treatment of adults over 60 years old with ASDs could have a benefit of decreasing deaths from cardiopulmonary diseases, although it would not have a direct influence on survival. When we observe the symptom changes of each group from the first diagnosis to the last follow-up, the surgically treated group had more definite improvement in symptoms, a similar result to those of other studies [9]. The patients in NYHA functional class I in particular had definite symptom improvement: these patients were accustomed to their state of health for a long time, so they felt that they had no symptoms or milder symptoms than before.

If preoperative atrial arrhythmia continues or new atrial arrhythmia occurs, the effectiveness of surgery can decrease and postoperative morbidity can increase [7]. There have been some reports that the causes of postoperative atrial arrhythmia were related to factors such as preoperative right atrial volume overload, pulmonary arterial hypertension, heart failure. In the case of older patients, the long period of left

to right shunting could lead to the above complications and sustained postoperative atrial arrhythmia [7]. For this reason, we cannot increase the success rate of arrhythmia treatment and completely prevent postoperative atrial arrhythmia just by performing the closure of ASDs [10]. In this study, since 2002, we have performed the modified Cox-maze operation to convert atrial arrhythmia with ASDs into a sinus rhythm [11]. There are many studies reporting the usefulness and safety of the Cox-maze operation, and many recommendations for doing a modified Cox-maze operation when the surgical correction of ASDs is needed [12,13]. Recently, the authors performed routine modified Cox-maze operations for adults with ASDs and atrial arrhythmia, which is why the surgically corrected ASD patients had a lower incidence of new arrhythmia than the medically treated ASD patients.

In recent years, many studies have reported satisfactory results for anatomical corrections to ASDs using an interventional method [14,15]. Cowley et al. remarked that when they compared the results of surgical and interventional treatments for the anatomical correction of ASDs, the interventional treatments were able to avoid cardiac arrest, had a shorter period of hospitalization, and decreased patient discomfort and the need for transfusion. Nonetheless, about 5% of complications such as temporary arrhythmia, embolism by an instrument, formation of a thrombus, and incomplete closure have been reported, and interventional treatments were not indicated for ASDs over 27 mm [16]. We refer patients with ASDs over 25 mm to surgical correction in our hospital.

This study had some limitations, such as that it was retrospectively reviewed, the treatments were not randomly chosen, and the study sample was small. Recently, cardiac catheterization for adult patients has been replaced with echocardiography and so on, so the exact evaluations of pulmonary artery pressure and pulmonary vascular resistance for advanced ASDs could not be performed at the time of treatment.

CONCLUSION

The mid- and long term results of surgical treatment for ASD patients over 60 years old showed no operative death and a low incidence of postoperative complications. Most of

the patients who underwent surgical correction showed satisfactory improvement of symptoms postoperatively, and notably, had a significant decrease in the possibility of new arrhythmia, although their survival rate was not higher than that of medically treated patients. In light of all this, we believe that the surgical correction of ASDs for those over 60 years old can be more beneficial than medical treatment, and physicians should not hesitate to perform this surgery due to advanced age.

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