

Surgical treatment of secundum atrial septal defect in patients older than 50 years

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Key words:

Adults; Atrial septal defect; Congenital heart disease; Follow-up; Surgery.

Background. The aim of this study was to verify if surgery is beneficial for patients older than 50 years.

Methods. Sixty-five patients older than 50 years were operated for a secundum atrial septal defect between November 1974 and November 1998. Preoperative data were obtained from hospital records; postoperative data from written questionnaires or direct telephone interviews. A comparison of pre and postoperative data was possible in 53 patients.

Results. The operative mortality was 0%. One patient died of a thromboembolic complication 32 days after surgery. The mean follow-up was 9 ± 6 years. After surgery, clinical improvement occurred in 22 patients (41.5%) with the majority of them (69.8%) being asymptomatic or only mildly symptomatic. The occurrence of atrial fibrillation/flutter did not decrease after surgery (39.6 vs 26.4%). A thromboembolic event occurred in 2 patients before surgery and in 2 patients postoperatively; all of them had supraventricular arrhythmias and were not taking anticoagulants.

Conclusions. Surgical closure of atrial septal defects in patients older than 50 years is feasible. The mortality is low. In this age group, surgery has a beneficial effect on the clinical status of the patients but not on the occurrence of supraventricular arrhythmias that can affect morbidity and mortality in patients who are not treated with anticoagulants.

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Introduction

The closure of atrial septal defects in adult and elderly patients is still a matter of debate. Some authors have shown that, in this age group, operative mortality is higher than in children and young adults¹⁻³ and that furthermore, surgery can neither increase survival^{4,5} nor improve the patients' clinical status^{4,5}. For this reason, they recommend medical treatment alone.

On the other hand, others have found that surgical closure of the atrial septal defect results in both clinical improvement⁶⁻⁸ as well as in longer survival⁷ and that the operative mortality is very similar to that reported in younger patients^{3,7-10}; according to these authors surgery is definitely better than medical therapy and therefore it should be the treatment of choice.

In the present study, we reviewed the results of surgery for secundum atrial septal defect in a population of patients older than 50 years with special reference to operative mortality and to the effects of surgery on the clinical status and on the occurrence of arrhythmias.

Methods

Patients. From November 1974 to November 1998, 65 consecutive patients older than 50 years underwent surgical repair of an isolated secundum atrial septal defect at the Institute of Cardiac Surgery of the University of Bologna.

There were 19 men (29.2%) and 46 females (70.8%). All the patients were aged ≥ 50 years; at the time of surgery, the mean age was 57 ± 5 years (range 50-74 years).

Patients with ostium primum atrial septal defect or with associated anomalies of the pulmonary venous drainage were excluded from the study.

Any information about the clinical status and presence of atrial fibrillation/flutter before surgery, and about the surgical technique and postoperative complications was obtained from the surgical records of the patients which were all reviewed.

Follow-up evaluation. The clinical status of the patients was assessed by means of a written questionnaire or by direct telephone

contact. The patients were questioned about the following:

- functional status as Somerville class (I-IV)¹¹ at the moment of operation and at follow-up;
- occurrence of atrial fibrillation/flutter (whether sustained or paroxysmal);
- occurrence of transient ischemic attacks or strokes.

Three patients did not answer the questionnaire and were lost to follow-up. Nine patients died before the study was started. A comparison of the clinical status and of the occurrence of atrial arrhythmias before and after surgery was possible in 53 patients. The mean age at surgery of patients who were lost to follow-up or who died was not different from that of the 53 patients whose follow-up data were available (57 ± 4 vs 57 ± 5 years, $p = \text{NS}$, and 60 ± 5 vs 57 ± 5 years, $p = \text{NS}$, respectively).

Statistical analysis. All values are expressed as mean \pm SD. Comparison of the patients' age at the time of surgery and of follow-up duration was made using the Student's t-test. The long-term survival was evaluated by means of Kaplan-Meier analysis.

The following possible risk factors for postoperative atrial fibrillation and flutter were analyzed by multiple logistic regression: systemic hypertension, moderate or severe mitral regurgitation, moderate or severe tricuspid regurgitation, coronary artery disease, occurrence of atrial fibrillation and flutter before surgery, length of follow-up.

Results

Preoperative data. The preoperative clinical features of the 53 patients for whom the follow-up information was complete are reported in table I.

At the time of surgery 8 patients (15.1%) were asymptomatic (Somerville class I), 18 (34%) were mildly symptomatic (class II), 22 (41.5%) were moderately symptomatic (class III), and 5 patients (9.4%) were severely symptomatic (class IV).

More common symptoms included dyspnea, fatigue and palpitations. Only 8/53 patients (15.1%) were completely asymptomatic. The patients' history included episodes of atrial fibrillation/flutter in 14 cases (26.4%) and a transient ischemic attack or stroke in 2 (3.7%).

Table I. Clinical features of 53 patients before and after surgical treatment of secundum atrial septal defect.

	Preoperative data*	Follow-up*
Somerville I	8 (15.1%)	13 (24.5%)
Somerville II	18 (34%)	24 (45.3%)
Somerville III	22 (41.5%)	14 (26.4%)
Somerville IV	5 (9.4%)	2 (3.8%)

* $p = \text{NS}$.

All but one of the 9 patients who died before the study was started were moderately or severely symptomatic (classes III-IV).

Surgical data. Atrial septal defect closure was accomplished by patch application in 34 patients (64.2%) and by direct closure in 19 (35.8%). All the patients survived the operation; 1 patient died in hospital of an intestinal infarction 30 days after surgery.

Follow-up. The Kaplan-Meier estimates of survival at 5, 10 and 20 years were 94.6, 80.6 and 76.2% respectively (Fig. 1). For patients who survived surgery, the mean duration of follow-up was 9 ± 6 years (range 2-23 years).

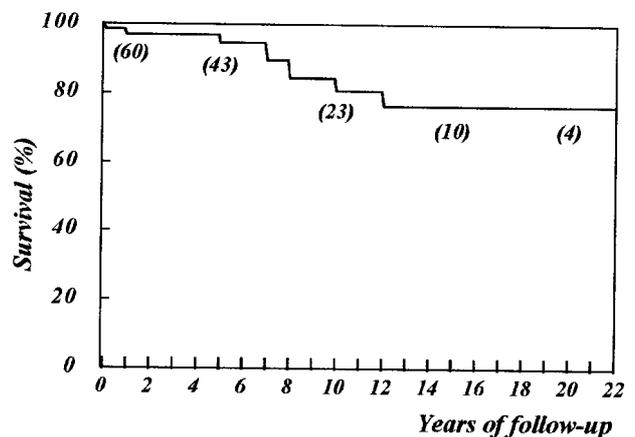


Figure 1. Long-term survival of 62 patients who underwent surgical atrial septal defect closure after 50 years of age. Values in parentheses refer to the number of patients.

Eight delayed deaths occurred (delayed mortality 12.6%). Causes of death included cardiovascular disease in 3 patients (heart failure in 2 and myocardial infarction in 1), stroke in 1 patient and cancer in 1 patient. In 3 patients the cause of death could not be ascertained.

Both patients who died of heart failure were in Somerville class III at the time of surgery and death occurred 8 and 12 years after the operation.

Figure 2 shows the comparison of the clinical status (Somerville class) before surgery and at follow-up.

At the last follow-up 13 patients (24.5%) were completely asymptomatic (class I), 24 (45.3%) were mildly symptomatic (class II), 14 (26.4%) were moderately symptomatic (class III), and only 2 patients (3.8%) were severely symptomatic (class IV).

Following surgery, clinical improvement occurred in 22 patients (41.5%, $p = 0.03$). Only 1 patient (1.8%) (preoperative Somerville class III) deteriorated to class IV postoperatively.

The incidence of atrial arrhythmias before and after surgery is shown in Figure 3. At the last follow-up, 21/53 patients (39.6%) referred episodes of atrial fi-

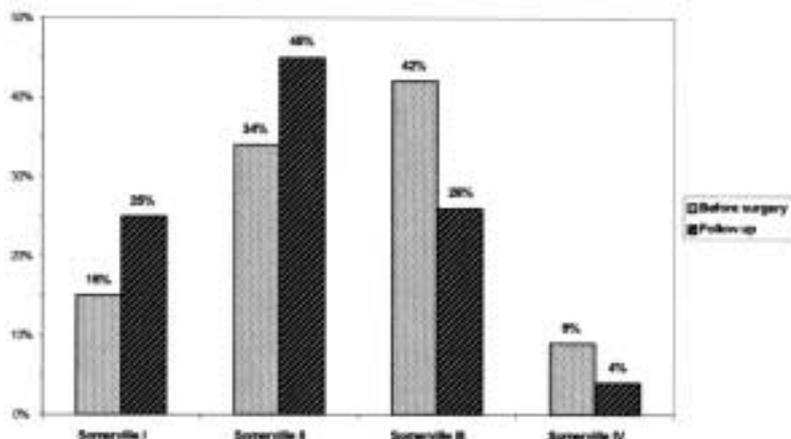


Figure 2. Somerville class distribution before surgery and at follow-up in 53 patients with atrial septal defect. *p* = NS (*p* value for Somerville class distribution before surgery and at follow-up).

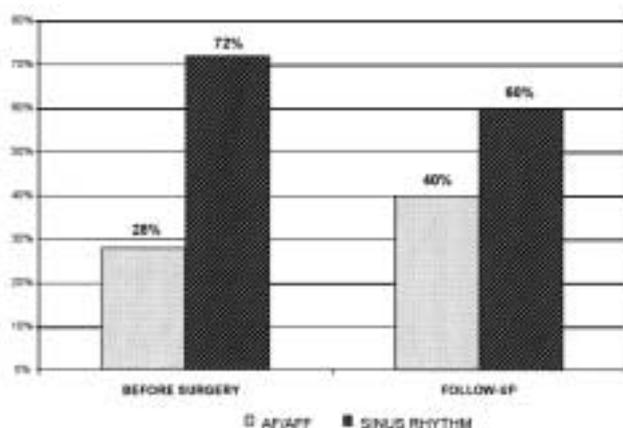


Figure 3. Incidence of atrial fibrillation and atrial flutter (AF/AFF) before surgery and at follow-up in 53 patients with atrial septal defect. *p* = NS (*p* value for incidence of AF/AFF before surgery and at follow-up).

brillation/flutter. Out of 39 patients who were preoperatively in sinus rhythm, 7 (17.9%) developed atrial fibrillation after surgery. In all patients who presented with a preoperative history of atrial fibrillation/flutter, arrhythmias persisted postoperatively.

All the patients with atrial arrhythmias were symptomatic and 12/21 patients (57.1%) were in Somerville class III-IV. On the other hand, the majority of the patients in sinus rhythm (28/32, 87.5%) were asymptomatic or only mildly symptomatic (Somerville class I-II).

The mean age at operation and at follow-up was similar in patients with or without tachyarrhythmias (58 ± 5 vs 55 ± 4 years and 67 ± 8 vs 63 ± 5 years, *p* = NS).

At multiple logistic regression analysis, the only risk factor for the occurrence of postoperative atrial fibrillation and flutter was the presence of atrial fibrillation or flutter before surgery, but the relevance of this datum as a risk factor was very low (relative risk 0.05, 95% confidence interval 0.009-0.266).

In 34 patients (64.2%) closure of the atrial septal defect was achieved by applying a patch (large atrial septal defect); at follow-up 17 (50%) experienced atrial

fibrillation or flutter. Out of 19 patients (35.8%) who were submitted to direct closure of the atrial septal defect, 4 (21%) developed atrial fibrillation or flutter during follow-up (*p* = NS).

Only 8 (38%) of the 21 patients with atrial arrhythmias were submitted to anticoagulant therapy (warfarin 7 patients, aspirin 1 patient).

Discussion

In children and young adults surgical closure of an atrial septal defect is widely accepted. In this age group the operative mortality is very low (< 1%) and, when surgery is performed before 25 years of age, the long-term survival has been shown to be comparable to that of a control age-matched population³.

Controversy exists as to whether an atrial septal defect should be closed in adult or elderly patients. As a matter of fact, patients with atrial septal defect have been reported to survive even to 80 years and above¹².

Furthermore, the operative mortality in this age group has been reported to be higher¹⁻³ and the long-term survival after surgery lower than in a control age-matched population particularly in patients operated on after 41 years of age³. Finally, the occurrence of atrial arrhythmias and of thromboembolic events is not reduced when closure of the defect is performed late in life^{3,4,7}.

Studies comparing medical treatment and surgery in adult patients with atrial septal defects have yielded controversial results.

Shah et al.⁴ and Favilli et al.⁵ found no difference in survival, symptoms, arrhythmias and embolic phenomena between two similar groups of adult patients treated either medically or surgically.

On the other hand, Kostantinides et al.⁷, in a group of 179 patients with an atrial septal defect diagnosed after 40 years of age, showed that surgical closure, as compared with medical therapy, increased the long-term survival and improved the clinical status; no positive ef-

fect of surgery on the occurrence of atrial arrhythmias or of thromboembolic events was demonstrated.

Horvath et al.⁹ and Gatzoulis et al.^{8,10} similarly showed that surgical closure of an atrial septal defect in adults can be performed with a very low mortality (1.2 and 0% respectively) and can result in hemodynamic and clinical improvement; moreover, in the study by Gatzoulis et al.⁸ 56% of the patients with preoperative atrial arrhythmias converted to sinus rhythm after surgery.

Our study was based on a population of patients who underwent surgical closure of a secundum atrial septal defect at 50 years of age or above. Similar to other reports^{6-8,10,13,14}, the majority of our patients were symptomatic. Eighty-five percent were in Somerville classes II-IV and only 15% were symptom-free. Previous reports, such as that by Shah et al.⁴, suggested that the occurrence of symptoms in adults with atrial septal defect could be substantially lower. In fact, these authors report that more than 70% of patients were symptom-free but the lower mean age in that study can well explain the difference.

All the patients survived surgery and only one died because of a thromboembolic complication 1 month postoperatively. Thus, in accordance with the most recent reports on surgery for atrial septal defect in adults⁷⁻¹⁰, the operative mortality was 0% and the in-hospital mortality was low (1.9%). The long-term survival was comparable to that reported by other authors^{3,7} in patients operated on after 40 years of age.

Similar to previous studies⁷⁻¹⁰, the clinical status of our patients has been significantly improved by surgery as the majority of them (69.8%) were symptom-free or only mildly symptomatic (Somerville class I-II) at a mean follow-up of 9 ± 6 years. Twenty-two patients (41.5%, $p = 0.03$) presented with a symptomatic improvement equivalent to one or two Somerville classes and only 1 patient, with preoperative Somerville class III symptoms, deteriorated after surgery.

The occurrence of atrial arrhythmias in patients with atrial septal defect is a matter of concern because atrial fibrillation or flutter may be an important cause of morbidity both before and after surgery. In the literature^{6,9}, the reported incidence of atrial fibrillation/flutter in adults with atrial septal defects varies widely. According to some reports⁶, more than half of the patients experience atrial arrhythmias.

Fourteen patients (28.3%) in our study group had atrial fibrillation/flutter preoperatively. Similar to many other reports^{3,7,9}, even in our experience surgical closure of the defect had no beneficial effect on atrial arrhythmias. As a matter of fact, 7 patients (17.9%) out of the 39 who were in sinus rhythm developed atrial fibrillation/flutter after surgery. Thus, in our study, the incidence of *de novo* postoperative atrial fibrillation is lower than that reported in previous studies such as that by Murphy et al.³. However, our follow-up is shorter and we cannot exclude that the incidence of atrial arrhythmias will increase with time. Furthermore, atrial arrhythmias persisted in all the patients who experienced them preop-

eratively so confirming the low rate of conversion to sinus rhythm that has been reported in previous studies^{9,15}.

A recent report by Gatzoulis et al.¹⁰ has shown that conversion to sinus rhythm is more likely in patients operated upon before 40 years of age while persistence or new onset of atrial arrhythmias after surgery is more frequent in patients operated upon after the age of 40.

In our study, the mean age at the time of surgery and at follow-up was not different in patients with or without atrial arrhythmias at the last follow-up but all our patients were older than 50 years at surgery so that we cannot exclude any possible beneficial effect of early surgery on the development of atrial fibrillation/flutter.

In patients with preoperative chronic atrial fibrillation, surgery for the arrhythmia, performed at the time of atrial septal defect closure (maze procedure), has been shown to be effective in restoring sinus rhythm even after 50 years of age^{16,17} so that it might have been a valid therapeutic option in our patients too.

Transcatheter closure of an atrial septal defect is a new technique and the initial results appear to be very encouraging¹⁸. No data are available about its effect on atrial arrhythmias but by avoiding the surgical scar on the right atrium it could possibly reduce the development of new atrial fibrillation or flutter in patients who are in sinus rhythm before closure of the atrial septal defect.

Even in our study, the occurrence of atrial arrhythmias had a great relevance not only for morbidity but also on mortality. The presence of atrial arrhythmias clearly affected the clinical status of our patients. In fact, the great majority of the patients in sinus rhythm (87.5%) were asymptomatic or mildly symptomatic while the majority of the patients with atrial arrhythmias (57.1%) presented with moderate or severe symptoms.

We looked for possible risk factors for the occurrence of atrial fibrillation and flutter during follow-up but none of the parameters we analyzed turned out to be clearly associated with the onset of postoperative arrhythmias. Postoperative atrial arrhythmias were more frequent among patients whose atrial septal defect was closed with a patch. However, we were not able to show any statistically significant difference between atrial septal defect closure using a patch or by direct suture. The higher incidence of postoperative arrhythmias after patch closure could merely reflect the presence of a larger defect with more pronounced dilation of the right atrium.

Two of 65 patients (3%) presented with a preoperative history of thromboembolic events. After surgery a thromboembolic complication occurred in 2 patients both of whom died (one of an intestinal infarction 30 days after surgery and one of stroke 5 years postoperatively). In both patients the atrial septal defect was repaired by direct suture.

All the patients who experienced thromboembolic events had atrial arrhythmias and were not taking warfarin. This raises the suggestion that the incidence of such complications could be lowered by a correct anticoag-

ulant therapy in the setting of atrial arrhythmias. As a matter of fact, the majority of thromboembolic complications reported in other studies occurred in patients with atrial arrhythmias who were not on warfarin^{7,10}.

Based on this experience, our current policy is to prescribe warfarin, both before and after surgery, to any patient with chronic atrial fibrillation. On the other hand, patients with recurrent paroxysmal atrial fibrillation or flutter are treated with anticoagulants only in the setting of known risk factors for stroke such as prior stroke or transient ischemic attacks, left atrial enlargement, hypertension, diabetes, age above 75 years or congestive heart failure¹⁹.

In conclusion, the present study shows that the majority of patients with an atrial septal defect who reach the age of 50 experience a significant clinical impairment with a very low probability of being symptom-free. Nowadays, surgical closure of the defect in this age group is feasible. Mortality is low and a substantial improvement in the patient's clinical status may ensue.

Atrial arrhythmias remain a critical problem and can predispose to thromboembolic events; their occurrence cannot be reduced by surgery when performed late in life but their impact on the long-term morbidity might be limited by adequate anticoagulant treatment.

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