Surgical Repair of Atrial Septal Defect in Patients over 60 Years of Age
Long-term Results

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SUMMARY In order to evaluate results of surgical repair of se-
cundum atrial septal defect (ASD) in patients 60 years of age or older, a review
was made of 16 patients who had undergone such operation between January 1964 and December 1974. Before opera-
tion eight patients were in functional classification III (New York Heart Association), seven were in class II, and one was in class I. Twelve patients had a left-to-right shunt greater than 3:1. Pulmonary
artery systolic pressure was greater than 40 mm Hg in 12 patients and
greater than 60 mm Hg in five. Four patients had documented
paradoxical emboli and were being treated with Coumadin. Before
operation all patients but one were receiving digoxin.

ATRIAL SEPTAL DEFECT (ASD) is the most common
form of congenital heart disease encountered in adults. Of
all congenital cardiac defects permitting survival beyond
middle age, ASDs are the most common.1 The peculiar
characteristic of ASD, setting it apart from other con-
genital heart defects, is the slow progress of the clinical
course, which does not usually lead to debilitating symptoms
until after the fourth or fifth decade.2, 4

The success of surgery in treatment of middle-aged
patients with ASD has been evaluated previously.2, 4, 6 Based
on the favorable experience thus far gained, the opinion
generally accepted is that surgical treatment is usually
beneficial and is the treatment of choice, particularly in un-
complicated cases.1, 2, 7, 8, 10 Reports concerning older
patients, however, are sparse and conclusions are contra-
dictory.2, 5, 11

General belief holds that elderly patients with ASD are
not suitable candidates for surgical treatment. It appears
appropriate then to report the detailed results of surgical cor-
rection of a number of these patients, aged 60 or over, who
underwent operation at our institution.

Materials and Methods

From January 1964 through December 1974, 138 patients
over the age of 45 years underwent surgical repair of a se-
cundum ASD at the Texas Heart Institute. Of the 138
patients, 26 were over the age of 60. Among the 26 patients,
ten had an associated lesion and all underwent concomitant
surgical correction (table 1). This study is confined to
the 16 patients 60 years or older (range 60 to
76, with an average age of 65) who underwent surgical cor-
rection of isolated secundum ASD.

Repair was accomplished by direct suture in two patients
and Dacron patch graft in 14. No deaths occurred during the
postoperative period. Postoperatively, ten patients were in class I,
five in class II, and one remained in class III. The hospital stay
ranged from eight to 20 days (average 11 days). Two patients
died one year and another (at the age of 77) five years after
surgery. The remaining 13 patients are alive and well three months
to 11 years after surgery.

We conclude that repair of secundum ASD in patients over
the age of 60 is safe, has low morbidity, and produces considerable
clinical improvement.

In these 16 patients, 13 women and three men, clinical
assessment (history, physical examination, chest roentgen-
ography and electrocardiography) was made and cardiac
catheterization was performed before surgery. Repair of the
defect in all patients was performed, under total cardiopul-
monary bypass, by direct suture in two patients (12.5%) and
Dacron patch graft in 14 patients (87.5%). Follow-up infor-
mation on the 16 patients was obtained from their frequent
visits to our institution, provided by written reply or
telephone interview with the patient, or in most instances,
from the referring physician.

Results

The clinical, hemodynamic and surgical results and
follow-up data of 16 patients over the age of 60 who un-
derwent surgical closure of secundum ASD are summarized
in table 2.

Clinical Features

Eight patients were in functional class III, seven in class
II, and one in class I. Four patients (25%) had paradoxical
emboli with documented cerebrovascular accidents. Nine
patients experienced palpitations. The chest roentgenogram
revealed cardiomegaly in all but one of the 16 patients.
Pulmonary vascular pressure was interpreted as normal in one and
increased in 15 (93.5%). The chest roentgenogram suggested
pulmonary hypertension (peripheral vascular "pruning") in
two patients. Results of electrocardiography demonstrated
normal sinus rhythm in eight patients (50%); atrial fibrilla-
tion and flutter or both in six (37.5%). Of the remaining two
patients, one had paroxysmal atrial tachycardia and the
other had a wandering pacemaker. Incomplete right bundle
branch block consistent with right ventricular hypertrophy
of the volume overload type was present in eight patients
(50%) and complete right bundle branch block in seven
(43%). Right axis deviation was observed in six patients
(37%). All patients but one were being treated with digoxin
in conjunction with other drugs preoperatively (table 2); four
patients were receiving Coumadin for documented paradoxical emboli.

**Hemodynamic Data**

Pulmonary artery peak systolic pressure was less than 30 mm Hg in three patients (19%), 30–39 mm Hg in one (6%), 40–49 mm Hg in six (37.5%), 50–59 mm Hg in one (6%) and greater than 60 mm Hg in five (31%). Pulmonary vascular resistance, however, was moderately elevated in only two (12.5%) patients.

The magnitude of the left-to-right shunt through the ASD, expressed as a ratio of the pulmonary-to-systemic flow, is presented in table 2. A pulmonary-to-systemic ratio greater than 3:1 was found in 12 patients (75%).

The surgical mortality for all patients from age 45 on who had surgical repair of ASD is shown in table 3. In patients over the age of 60 with uncomplicated ASD no death occurred during the postoperative period. Hospitalization ranged from eight to 20 days (average 11 days). Minor postoperative complications occurred in nine patients. One patient who was known to have chronic lung disease developed bronchospasm and remained in the hospital for 20 days with no sequelae (table 2, patient 1). The sick sinus syndrome developed in one patient, postpericardiotomy syndrome in one, congestive heart failure in two, and rhythm disturbances including atrial fibrillation and/or flutter in four patients.

Two patients (12.5%) died one year after operation—one from myocardial infarction and another suddenly from unknown cause. One patient died five years after surgery, at the age of 77, from a cerebrovascular accident. Follow-up data from postoperative periods ranging from three months to 11 years (average 4.3 years) revealed the remaining 13 patients to be alive and well.

A comparison of the preoperative status and late postoperative functional classifications of the patients is shown in figure 1. Preoperative paradoxical systemic embolization in the single patient initially in class I and the three in class II indicated that surgery should be considered (table 2). After operation, 40% no longer required digitalis, 10% had no arrhythmia complications and 17% had no need for diuretic therapy (table 2).

**Discussion**

Controversy concerning the medical versus surgical management of elderly patients with ASD has remained un-

<table>
<thead>
<tr>
<th>Concomitant Procedure</th>
<th>Number of Patients</th>
<th>Postop. Rhythm</th>
<th>Postop. Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitral valve replacement</td>
<td>3</td>
<td>AF</td>
<td>5 yrs*</td>
</tr>
<tr>
<td>Aortic valve replacement</td>
<td>2</td>
<td>AF</td>
<td>1 yr*</td>
</tr>
<tr>
<td>Coronary artery bypass</td>
<td>2</td>
<td>AF</td>
<td>2.4 yrs</td>
</tr>
<tr>
<td>Mitral annuloplasty</td>
<td>1</td>
<td>AF</td>
<td>11 yrs</td>
</tr>
<tr>
<td>Ventricular septal defect repaired</td>
<td>1</td>
<td>AF</td>
<td>4.5 yrs</td>
</tr>
<tr>
<td>Persistent left superior vena cava</td>
<td>1</td>
<td>AF</td>
<td>9.5 yrs</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td></td>
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</tbody>
</table>

**Table 1. Concomitant Surgical Procedure in 10 Patients who Had Surgical Correction of ASD**
resolved largely because of the scarcity of information regarding the natural history of the disease in such patients. Although patients with ASD over the age of 60 may remain free of symptoms, disabling cardiorespiratory complications occur in most older patients. In our study all patients had significant symptoms before operation, and 50% experienced severe complications (table 2).

The presence of pulmonary hypertension, large left-to-right shunt, congestive heart failure, or atrial fibrillation has been reported to preclude surgical intervention because of a high operative mortality and, hence, many older patients with ASD were not considered candidates for operation. Previous reports indicated that operative mortality averaged approximately 6%, in patients over 45 years of age. Our over-all hospital mortality was 4.3% (6/138) in patients 45 and older, 7.9% (3/38) in patients with repair of associated defects, and 3% (3/100) in patients with repair of an isolated atrial defect alone (table 3). The hospital mortality was 10% (1/10) in patients over 60 years of age who had an associated procedure. There was no hospital mortality among the 16 patients 60 and over who had repair of uncomplicated ASD (table 3). The presence of pulmonary hypertension in the absence of a marked increase of pulmonary vascular resistance, a large left-to-right shunt, congestive heart failure and/or atrial fibrillation did not affect the outcome in this series, and the results of surgical treatment were favorable regardless of age. Because direct suture repair is more likely to distort the atrial septum and foster arrhythmias and recurrence, it has been our preference to utilize a knitted Dacron patch closure to prevent such complications.

The majority of survivors in this study uniformly experienced significant improvement and at present report no functional disabilities. These findings are consistent with those of Daicoff, et al., but are in contrast to those of Wolf et al. Anticoagulant therapy was not used postoperatively and there has been no occurrence of systemic emboli in any of our patients, contrary to findings of another report.

Despite adequate medical treatment, most patients over the age of 60 with ASD have disabling and often progressive symptoms. The findings in our study indicate such patients have a large left-to-right shunt often accompanied by pulmonary hypertension. Paradoxical emboli occur more frequently than generally reported. In our experience surgical closure of ASD in patients above the age of 60 has proved to be successful and safe, with low morbidity even in patients with moderate pulmonary artery hypertension and moderately increased pulmonary vascular resistance, and large left-to-right shunt or congestive heart failure.

References

15. Reid JM, Stevenson JC: Cardiac arrhythmias following successful surgical closure of atrial septal defect. Br Heart J 29:742, 1967

Table 3. Hospital Mortality in Adults who Underwent Surgical Closure of Secundum ASD

<table>
<thead>
<tr>
<th>Age</th>
<th>Secundum ASD</th>
<th>No. pts</th>
<th>Hospital mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-59</td>
<td>With associated procedure</td>
<td>28</td>
<td>2 (7.0)</td>
</tr>
<tr>
<td>45-59</td>
<td>Without associated procedure</td>
<td>84</td>
<td>3 (3.5)</td>
</tr>
<tr>
<td>≥ 60</td>
<td>With associated procedure</td>
<td>10</td>
<td>1 (10.0)</td>
</tr>
<tr>
<td>≥ 60</td>
<td>Without associated procedure</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>138</td>
<td>6 (4.3)</td>
</tr>
</tbody>
</table>

FIGURE 1 Pre- and postoperative functional classifications (New York Heart Association) of 16 patients who underwent surgical closure of ASD.
Surgical repair of atrial septal defect in patients over 60 years of age. Long-term results.
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