Risk Factors and Operative Results of Patients Aged Less Than 66 Years Operated on for Asymptomatic Abdominal Aortic Aneurysm

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Objective: to report risk factors, early operative results and survival after repair of asymptomatic abdominal aortic aneurysm (AAA) in patients aged less than 66 years.

Design: a retrospective study based on a prospectively updated database in a University hospital.

Patients and Methods: between 1985 and 1999, 118 patients of less than 66 years were operated for AAA. Pre-operative risk factors, early complications, operative mortality (<30 days), and survival are compared with that of 333 older patients operated during the same period.

Results: risk factors were similar to older patients. Serious early (<30 days) complications were recorded in 20% of both groups. The operative mortality was 1.7% for the younger patients and 6% for the older (n.s.). The eight-year survival of the younger patients was 69%, which was significantly below that of a demographically matched population. The older patients had a significantly poorer eight-year survival of 47% (p<0.01), but their relative survival was significantly better (p<0.05).

Conclusions: younger patients with an AAA were not healthier than older patients. Complications were equally common among both groups. Although the operative mortality was lower, the long-term relative survival was poorer than that of the older patient. Present data do not support a more aggressive surgical attitude towards the younger patients with an asymptomatic abdominal aortic aneurysm, as compared to the older.

Key Words: AAA; Young patients; Morbidity; Mortality; Survival.

Introduction

The incidence of abdominal aortic aneurysms (AAA) increases with age. Most graded patients are in the seventh or eighth decade, with an average age close to 70 years. The risk factors, surgical complications, operative mortality, life expectancy of these patients have been well documented. In the present study a selected population of patients aged less than 66 years subjected to AAA repair were studied to determine if risk factors, operative results or long-term survival would support a more aggressive approach to younger AAA patients.

Patients and methods

Between 1985 and 1999, 118 patients (11 women) of less than 66 years were operated on for asymptomatic AAA. The mean age was 60.5 years (range 46–65 years). Open and stentgraft procedures (n=10) have been included. All operations were performed at the only vascular unit in the county, leaving an unselected series of young patients. The unit's total number of elective operations for abdominal aortic aneurysm during the study period was 451. A prospectively updated database run by the department and the patient records were the data sources. Follow-up included a clinical examination one month and one year after the operation followed by ultrasound scanning two and five years postoperatively.

Co-morbidity and early complications (<30 days) were prospectively registered. Operative mortality was defined as death within 30 days. The long-term survival was calculated with the product limit method and illustrated with Kaplan–Meier curves. Complete information regarding the time of death was obtained from the Norwegian Registrar’s Office of births and deaths. The expected survival of an age and sex matched population was calculated from death-rate tables of the nineties issued by the Norwegian Bureau of Statistics. The relative survival is defined as the ratio of the observed survival to that of a demographically matched population.
Abdominal Aortic Aneurysm Surgery of Young Patients

Table 1. Registered co-morbidity of the study population with comparison to the older patients.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Young (n=118)</th>
<th>Old (n=333)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>48 (41%)</td>
<td>130 (39%)</td>
</tr>
<tr>
<td>Cardiac disease</td>
<td>32 (27%)</td>
<td>123 (37%)</td>
</tr>
<tr>
<td>Pulmonary disease</td>
<td>17 (14%)</td>
<td>62 (19%)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>11 (9%)</td>
<td>26 (8%)</td>
</tr>
</tbody>
</table>

Table 2. Registered cardiac morbidity of the study population with comparison to the older patients.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Young (n=118)</th>
<th>Old (n=333)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous myocardial infarction</td>
<td>26 (22%)</td>
<td>87 (26%)</td>
</tr>
<tr>
<td>Angina pectoris</td>
<td>18 (15%)</td>
<td>77 (23%)</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>2 (2%)</td>
<td>27 (8%)</td>
</tr>
<tr>
<td>Heart failure</td>
<td>2 (2%)</td>
<td>10 (3%)</td>
</tr>
<tr>
<td>Previous CABG*</td>
<td>13 (11%)</td>
<td>33 (10%)</td>
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</table>

*CABG: coronary artery bypass grafting.

matched population. The standard mortality rate is likewise defined as the ratio of the observed mortality to the expected. Comparison of the observed and expected survival was done with the Mantel–Haenzel test. Different relative survival was compared with a proportional test based on a multiplicative model. Risk factors, early complications and survival data of this young population were compared to the older patients operated at our institution during the same time period, and to results presented in the literature.

Preoperatively recognised co-morbidity such as hypertension, cardiac disease, diabetes mellitus and pulmonary disease were studied for impact on survival. Patients on medical treatment for hypertension were registered as hypertensive. Aneurysms of 50 mm or less were characterised as small and the rest as large. This cut-off point was chosen to obtain a similar number of patients in each group. Based on this definition correlation between aneurysm size and survival was investigated. The Cox regression analysis was used to study statistically significant influence on survival of co-morbidity and aneurysm size. Categorical data were compared with Fisher’s exact test. The SPSS 9.0 for Windows was used for the statistical computations.

Discussion

The patients less than 66 years accounted for about one quarter of all the patients operated for asymptomatic AAA. Nearly half of these operations were performed for an AAA less than 5 cm in diameter. This treatment strategy was based on a hypothesis of a healthier population with lower operative risk and a longer life expectancy, as compared to the older patients. The results of the present study seem to contradict this hypothesis. Co-morbidity, both cardiac and non-cardiac, of this subgroup did not seem to differ from that of the older patients going through aortic aneurysm repair, or from what is reported in the literature.

The high rate of ischaemic heart disease is also in agreement with previous reports concerning all age groups with aortic aneurysm. In the present series both young and old patients experienced early complications in a fifth of cases, many of which were serious. The complication rate and the types of complications are similar to that reported in the literature.

Despite a low operative mortality the younger the patients demonstrated an 80% increase in mortality over that of a demographically matched population. This indicates a relative survival well below that of older patients operated for abdominal aortic aneurysm. As was the case for our older patients, several authors have reported a long-term survival close to that of the expected for patients subjected to elective aneurysm repair. Our results may indicate a more complex situation. Apparently, patients of 65 years or younger with aneurysm disease experience a poorer long-term relative survival than the older.

Results

Preoperative co-morbidity is presented in Tables 1 and 2. Coronary artery disease predominates in both age groups. Two of the 118 younger patients and 20 of the older patients died within 30 days, giving an operative mortality of 1.7% and 6%, respectively (not significant). Twenty-two serious early non-fatal complications were registered for the 118 young patients (Table 3). Surgical and medical complications distributed evenly between younger and older patients, though younger patients revealed a tendency for more medical complications ($p = 0.06$).

The mean follow-up was 72 months (range 0–185 months). The observed eight-year survival was 69%, compared with 83% for a demographically matched population (<0.01) (Fig. 1). The standard mortality rate of the study population was 1.82, indicating an 82% increase in mortality. The younger patients had an eight-year survival of 47%. This was significantly lower than for the younger ($p<0.01$) but not different from that of a matched population (Fig. 1). Consequently, the study population had a significantly poorer relative survival than the older patients ($p<0.05$) Comorbidity and AAA size did not affect survival.
Table 3. Early (<30 days) postoperative complications of the study population with comparison to the older patients. Medical complications include cardiac, neurological, renal and pulmonary complications.

<table>
<thead>
<tr>
<th>Complication</th>
<th>Young (n=118)</th>
<th>Old (n=333)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical complications</td>
<td>11 (9%)</td>
<td>45 (11%)</td>
<td>0.31</td>
</tr>
<tr>
<td>Graft occlusion</td>
<td>5 (4%)</td>
<td>14 (4%)</td>
<td></td>
</tr>
<tr>
<td>Distal embolism</td>
<td>1 (1%)</td>
<td>7 (2%)</td>
<td></td>
</tr>
<tr>
<td>Bleeding</td>
<td>2 (2%)</td>
<td>8 (2%)</td>
<td></td>
</tr>
<tr>
<td>Wound rupture</td>
<td>3 (3%)</td>
<td>16 (5%)</td>
<td></td>
</tr>
<tr>
<td>Medical complications</td>
<td>11 (9%)</td>
<td>14 (4%)</td>
<td>0.06</td>
</tr>
<tr>
<td>Perioperative mortality</td>
<td>2 (1.7%)</td>
<td>20 (6%)</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Fig. 1. Eight-year observed and expected survival of 118 patients aged 65 years or younger (upper curve) and of 333 older patients (lower curve) operated for abdominal aortic aneurysm. The number of patients at risk is stated above (younger) and below (older) the curves.

This is a pattern of long-term survival much similar to that of patients operated on for occlusive atherosclerotic disease. The favourable relative survival documented in many reports might then actually reflect dominance of old patient populations. The poorer long-term survival combined with a better relative survival of our older patients seem to substantiate this conception.

The Cox regression analysis could not document significant impact on survival of co-morbidity such as hypertension, cardiac disease, diabetes mellitus or pulmonary disease. This observation is surprising since these factors seem to impair survival in most series. The most obvious explanation of our results is the limited number of patients. However, our patients actually had developed an aneurysm, regardless of their co-morbidity status, and they might therefore be subjected to limited long-term survival due to their systemic atherosclerotic disease.

In conclusion, patients of 65 years or younger treated for asymptomatic abdominal aneurysm show a similar pattern of co-morbidity and postoperative complications as older patients. Although the operative mortality may be kept low the relative long-term survival of these patients seems to be poorer than that of the older. These observations would contradict a more aggressive attitude towards aneurysm surgery among these younger patients, as compared to the older.

References

15 Hertzer NR, Beven EG, Young JR et al. Coronary artery disease in peripheral vascular patients. A classification of 1000 coronary


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