The Spontaneous Course of Small Abdominal Aortic Aneurysms. Aneurysmal Growth Rates and Life Expectancy

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Summary. Since abdominal ultrasonography has become a routine diagnostic procedure, increasing numbers of small asymptomatic abdominal aortic aneurysms are detected incidentally. Of 128 patients (108 male, 20 female) with abdominal aortic aneurysms, 96 patients were observed clinically and by repeated ultrasound studies for an average of 3.47 years, adding up to a total observation period of 333 patient-years. Among these 96 patients, 72 had small aneurysms (averaged diameters less than 5 cm). Three of them were lost to follow up. None of the remaining 69 patients died from rupture, 20 died from other causes and 8 patients were successfully operated. Of the patients with a large aneurysm one was lost to follow up. Five patients of the remaining 23 died as a result of rupture, 7 were successfully operated. The average growth rate of small aneurysms was 0.18 cm/year, whereas the larger aneurysms showed a growth rate of 0.28 cm/year (diameter).

The survival rate of patients with small aneurysms was 94% after one year, 80% after 3 years, and 73% after 5 years, indicating that life expectancy is reduced in patients with an aneurysm of the abdominal aorta, but not because of complications of the aneurysm.

Key words: Sonography – Ruptured aneurysms – Abdominal aortic aneurysm

Patients and Methods

All 128 patients in whom an abdominal aortic aneurysm has been discovered during routine abdominal sonography were included in this study.

At entry the patients’ ages ranged from 39 to 90 years, the average age was 69.8 years. The men’s average age was 68.7 years, while the women had an average age of 75.5 years (Fig. 1). The average observation time was 3.47 years, adding up to a total observation period of 333 patient-years. 32 patients were seen only once; their data are included in the evaluation of risk factors and life expectancy but not used for the calculation of the growth rate. Preliminary results have been described before [31, 70].

An abdominal aneurysm is defined as a localized widening of the aorta in which the average diameter is more than 2.5 cm (Fig. 2) [40].

All aneurysms were fusiform and probably arteriosclerotic in origin. Seven patients with an ectasia of the whole abdominal aorta were not included.

To calculate the average growth rate of an abdominal aortic aneurysm the difference between the most recent and the earliest measurement of the diameter is divided by the number of years of observation.

Fig. 1. Distribution of age and sex in 128 patients with abdominal aortic aneurysms
Fig. 2. Measurement of the sagittal and transverse diameter of an aortic aneurysm. The average diameter (cm) is calculated according to the following formula: \( d = 0.5 \left( d_1 + d_2 \right) \)

Table 1. Risk factors of abdominal aortic aneurysms in 128 patients

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Number of patients (%)</th>
<th>Risk factor</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>66 (52%)</td>
<td>Hypertension</td>
<td>18 (14%)</td>
</tr>
<tr>
<td>Smoking</td>
<td>59 (46%)</td>
<td>Smoking</td>
<td>19 (15%)</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>30 (23%)</td>
<td>Hyperlipidemia</td>
<td>7 (5%)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>15 (11%)</td>
<td>Diabetes</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>None</td>
<td>18 (14%)</td>
<td>None</td>
<td>18 (14%)</td>
</tr>
</tbody>
</table>

Fig. 3. Growth rate (cm/year) of abdominal aortic aneurysms in 96 patients

The survival rate of the patients suffering from abdominal aortic aneurysms who were not treated surgically was determined using the life table analysis of Cutler and Ederer [43].

**Results**

Abdominal aortic aneurysms are five times more common in men than in women. 51% of the patients were older than 70 years and 12% were older than 80 years. At the time of writing, after an average of 3.47 years following diagnosis, 90 (70%) of the 128 patients are still alive; 33 (26%) patients died during the observation period.

16 (48%) died from myocardial infarction or cardiac failure secondary to cardiovascular disease and four from stroke. In five cases death was caused by malignancy and in three by pneumonia. Five patients died from aneurysmatic bleeding; their aneurysms were greater than 6.0 cm in averaged diameter (6.0 cm; 6.5 cm; 6.7 cm; 8.5 cm; 9.0 cm), and all patients were suffering from severe abdominal or back pain. The cause of death in five patients was unknown (4.5 cm; 4.7 cm; 4.8 cm; 5.0 cm; 6.35 cm). To our knowledge thus far none of the patients with an asymptomatic aneurysm smaller than 5.0 cm has died from a complication of the aneurysm.

Most patients presented with risk factors for coronary heart disease (Table 1). The strong association between cigarette smoking and aortic aneurysm has been documented in several epidemiologic studies [2, 30, 35]. Hypertension is common in patients with abdominal aortic aneurysms and it is possibly a pathogenetic factor. Moreover, hypertension may produce a predisposition to rupture, shorten survival after resection and contribute to the development of false aneurysms [53, 59]. Diabetes and hyperlipidemia seem to be of little importance in regard to aneurysm formation (Table 1).

Most of the small asymptomatic abdominal aortic aneurysms grow slowly. While 72 small aneurysms showed a mean growth rate of 0.18 cm/year, 24 aneurysms with a diameter of over 5 cm had a growth rate of 0.28 cm/year (Fig. 3). In a few cases, small aneurysms grew rapidly, 15 of