

# Early surgery or surveillance for small abdominal aortic aneurysms?

Lederle FA, Wilson SE, Johnson GR, Reinke DB, Littooy FN, Acher CW, et al. Immediate repair compared with surveillance of small abdominal aortic aneurysms. *N Engl J Med* 2002;346(19):1437-44.

**Background:** Ruptured abdominal aortic aneurysms are associated with a high death rate. Controversy exists regarding the best way to manage small, asymptomatic aneurysms, with some experts advocating immediate surgery and others calling for frequent ultrasonographic surveillance.

**Question:** Does immediate repair of small, asymptomatic abdominal aortic aneurysms improve survival compared with serial ultrasonographic surveillance?

**Design:** This randomized trial recruited people aged 50–79 years through referral and ultrasonographic screening programs. Subjects were asymptomatic, and aneurysms were 4.0–5.4 cm in diameter at baseline, as measured by CT scanning. Exclusion criteria included previous aortic surgery or juxtarenal aortic aneurysm, serum creatinine level above 221 µmol/L, high-risk conditions including advanced pulmonary, cardiac or liver disease, or expected survival of less than 5 years.

Subjects were assigned to either immediate repair or ultrasonographic surveillance. Open repair with synthetic graft interposition was done within 6 weeks after randomization. In the surveillance group subjects underwent ultrasonography every 6 months, with surgical repair if the aneurysm enlarged to more than 5.5 cm in diameter or had an expansion rate of 0.7 cm in 6 months or 1.0 cm in 1 year. The development of symptoms, which were not well defined in the protocol, also resulted in surgical repair in the surveillance group.

The primary outcome was death from any cause. The secondary outcome was death attributable to the aneurysm, including rupture or complications of sur-

gical repair. Intention-to-treat analysis was used with cumulative survival curves generated by the product-limit method.

**Results:** Of the more than 125 000 veterans who underwent screening ultrasonography and patients who were referred, 5038 people were considered for randomization. Of these, 76% either declined to participate or met one or more exclusion criteria. Most of the 1136 patients who underwent randomization were white men with a history of prior or current tobacco use. More than 50% had hypertension, and about 15% were taking a  $\beta$ -blocker. The mean diameter of the aneurysms at study entry was 4.7 cm (standard deviation 0.4 cm).

During the average follow-up of 4.9 years, 92.6% of the subjects underwent repair in the immediate repair group, with 72.1% of the procedures occurring within the first 6 weeks after randomization. In the surveillance group, 61.6% of the subjects underwent repair by the end of the study; 9% of the repairs occurred even though repair criteria had not been met. Four years after randomization 81% of the subjects in the surveillance group with aneurysms that had measured 5.0–5.4 cm in diameter at study entry had undergone repair, compared with only 27% whose aneurysms had measured 4.0–4.4 cm at entry. Aneurysms expanded 0.32 cm per year on average over a mean surveillance period of 3 years.

Data on repair status and mortality were complete. The primary outcome did not differ between the 2 groups. By the end of the study, 25.1% of the patients in the immediate repair group had died, compared with 21.5% of those in the surveillance group (relative risk 1.21 for repair v. surveillance; 95% confidence interval 0.95–1.54). No significant survival differences were found between the groups when the data were analyzed by prespecified subgroups such as aneurysm size and subject age, or when adjusted for baseline clinical characteristics. The 30-day mortality was 2%, with a reoperation

rate of 1.5%. Patients in the surveillance group did not have higher mortality or reoperation rates than those in the surveillance group, although they did have a higher rate of myocardial infarction (3.8% v. 1.0%;  $p = 0.004$ ).

**Commentary:** This study compared immediate repair versus ultrasonographic surveillance of abdominal aortic aneurysms in asymptomatic subjects with low perioperative risk status. Even with high-risk individuals excluded, and with a very low surgical mortality rate, this large study failed to find a significant difference in survival rates favouring immediate repair.

**Implications for practice:** This study, along with a companion article by a British group, supports the use of ultrasonographic surveillance of small abdominal aortic aneurysms.<sup>1</sup> Subjects were almost exclusively male, and results may not be applicable to women, in whom the natural history of this disease may differ.<sup>2</sup> Unless physicians ensure ultrasonographic follow-up every 6 months and refer patients for surgery when the aneurysm enlarges beyond 5.4 cm in diameter, or expands at a rate of more than 1.0 cm per year or 0.7 cm in 6 months, the results found in this study may not be reproducible in primary care practice.

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## References

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