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Editorial

Applying the gender lens to abdominal aortic aneurysm screening

Four randomized controlled trials (RCT),^{1–4} including 125,201 men, have shown that ultrasound screening to identify abdominal aortic aneurysms (AAA) >5 cm followed by surgery reduces cause-specific mortality among individuals older than 65 years. This benefit is not apparent among men older than 75 years,⁵ and there is some controversy regarding the benefit of screening for AAA among women. No specific recommendations are given in the ACA/AHA task force guidelines for screening of AAA in women.⁶ The United States Preventative Services Task Force (USPSTF) recommends one-time screening for AAAs in men 65 to 75 years of age who have ever smoked and recommends against routine screening in women,⁷ and the Screening Abdominal Aortic Aneurysms Very Efficiently (SAAAVE) Act⁸ supports only a screening program for AAA in male ever-smokers when they turn 65 years old.

Only one RCT,⁴ the Chichester trial, included women ($n = 9342$) aged 65–80 years old. In this trial, the prevalence of AAA >3 cm among women (1.3%) was substantially lower than in men (7.6%). The subgroup analysis addressing the effect of screening in women concluded that screening followed by surgery did not reduce mortality⁹: the relative risk (RR) of the screened versus not screened female population was 1.49 (95% CI 0.72–3.10), whereas it was 0.60 (95% CI 0.45–0.80) among men.⁵ However, the confidence interval for the RR in women is wide and therefore this finding cannot be definitive. In women, the incidence of ruptured AAA was similar in the control and screening groups, and in general the incidence of death from ruptured aneurysm increased with age, since more than 70% of ruptures occurred among women > 80 years. On the basis of the low prevalence of AAA in women and the unfavorable RR, screening of women may not be beneficial or cost effective.⁹

The evidence available from the Chichester trial regarding the effect of population screening in women should be considered with caution because of the possibility of confounding factors or biases. The gender analysis was a subgroup analysis and, as expected, the number of participating women was considerably lower

than men. In this study, only 3052 women attended screening which, given the low prevalence of AAA in this population, may leave a trial not powered enough to demonstrate the benefit of the intervention as evidenced by the wide confidence interval around the RR (amplification of systematic error). In addition, patients were excluded by the referring physician, before randomization, if it was thought that the patient was not a candidate for surgery (sampling bias). Since the risk factors associated with increased risk for surgery are the same as those associated with increased incidence of AAAs, it is possible that many women were excluded, giving a falsely lower incidence of AAAs (ascertainment bias).

Before making a final decision on the effectiveness of AAA screening in women, a number of features unique to women should be considered. The lower prevalence of AAA in women is most likely due to their lower burden of risk factors compared with men. The evidence supports that like in men, for women the probability of AAAs is increased among smokers (odds ratio (OR) 3.8), those aged >70 years (OR 1.8), family history (OR 2.6), and pre-existing cerebrovascular disease (OR 3.20).¹⁰ Since the ORs of these risk factors were derived from a multivariate logistic model, the presence of multiple risk factors in a woman likely confers a multiplicative risk of having an AAA. It is also reasonable to expect that, as women's lifestyle practices become more similar to men's (e.g. increased smoking), the incidence of AAA would be expected to increase. Like coronary heart disease, the increase in prevalence of AAA among women appears to occur approximately one decade after men. For example, in the Chichester trial, women were screened starting at age 65: the prevalence of AAA was 0 in the 65-year-old group, 1% for 66–70, 1.8% for 71–80, and unknown in women older than 80 years. Because of this 10-year delay in onset, and lower burden of AAAs likely due to the currently more favorable cardiovascular risk factor profile of women, the cost effectiveness of screening and repair of AAA to prevent death does not favor screening at present.

However, we must also consider the observation that although women have a lower incidence of AAA,

when they are found to have an AAA > 3 cm the risk of rupture is greater than that of men,^{11,12} and mortality associated with surgery for ruptured aortic aneurysms is higher compared with that in men.⁹ In a population-based study of patients with thoracic aortic aneurysms, the 5-year cumulative risk of rupture was 20% (95% CI 12–28) and was significantly higher in women than in men (30% [95% CI 19–47] vs 9% [95% CI 1–17]; $p < 0.01$; RR 6.8; 95% CI 2–20).¹² The United Kingdom Small Aneurysm Trial also found that female sex increased the risk of aneurysm rupture (hazard ratio 3.0 [95% CI 1.99–4.53]; $p < 0.001$).^{11,13} This higher risk of rupture in women may be because the prevalence of the disease was defined as an aorta with a diameter >3 cm, which is the usual threshold used for men, and it does not take into account the smaller size of a normal aorta in women. Thus, an aneurysm of 5 cm in a woman may have a higher rupture rate because it is equivalent to an aneurysm of 6 cm in a man.

Given the state of the evidence, a number of outstanding issues should be considered for the screening of AAA in women. First, the evidence does not support population-based screening over 65 years of age, due to the low incidence of AAA. However, it would be reasonable to recommend targeted screening of 'higher risk women', including those of an older age, who are current or had a long history of smoking, as well as those with co-existing vascular disease. In addition, accumulating data to assess whether sex-specific criteria to define AAA and the equivalent risk of rupture are also needed. While existing data amassed in large population-based studies or randomized trials may help us determine if this is a sensible approach, future studies of AAA diagnosis and screening among women are needed.

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