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Patients with Small Abdominal Aortic Aneurysm are at Significant Risk of Cardiovascular Events and this Risk is not Addressed Sufficiently

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WHAT THIS PAPER ADDS

Previous data suggest that patients with small AAA have a high risk of cardiovascular (CV) mortality and morbidity. The recent implementation of the NHS AAA screening programme (NAAASP) and similar programmes elsewhere has led to several individuals being diagnosed with small AAA, yet addressing their CV risk factors is still not formalised clinical practice within screening programmes. The precise contemporary CV risk profiles of these patients also remain unknown. The findings of the present study suggest that despite recent advances in CV prevention in high-risk populations, the management of patients with small AAA remains suboptimal. Better CV protection should be offered and monitored during surveillance.

Background: Patients with abdominal aortic aneurysm (AAA) are at significant risk of cardiovascular (CV) events. Recent implementation of AAA-screening means thousands of patients are now diagnosed with small-AAA; however, CV risk factors are not always addressed. This study aimed at assessing and quantifying the CV characteristics of patients with small AAA following the introduction of screening programmes.

Methods: CV profiles of 384 men with a small AAA (<55 mm diameter) were assessed through the United Kingdom Aneurysm Growth Study (UKAGS), a nationwide prospective cohort study of men with small AAA. A prospective local cohort of an additional 142 patients with small AAA with available blood pressure (BP) and lipid profiles was also included and followed-up for 1 year.

Results: In the UKAGS population, 54% were current and 30% ex-smokers; 58% were hypertensive and 54% hypercholesterolaemic. In the local group, 54% were current and 40% were ex-smokers, and 94% were hypertensive. Patients were not more likely to receive CV medication after entering AAA surveillance in either group. All local patients were clustered "high-risk" for future CV events based on the Framingham score (mean 21.8%, 95% CI 20.0–23.6), JBS-2 (16.3%, 14.7–17.9) and ASSIGN (25.2%, 22.7–27.7). No change was seen in systolic BP levels between baseline and 1 year (140.9 mmHg vs. 142.5 mmHg, $p=.435$). A rise was seen in cholesterol (4.0 mmol–4.2 mmol, $p<.0001$) values at 1 year.

Conclusions: This study suggests that patients with small AAA are at significant risk for developing CV events and this is not currently addressed, which is evident by the "high-risk" CV risk profiles of these patients despite being in AAA surveillance. Design and implementation of a CV risk reduction programme tailored for this population is necessary.

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INTRODUCTION

Ruptured abdominal aortic aneurysm (AAA) is an important cause of cardiovascular (CV) death in the Western world.[1] The long latent period between development of AAA and rupture offers an opportunity for screening which has been shown to reduce AAA-related mortality in men by detecting aneurysms prior to rupture and offering elective surgical repair to prevent rupture.[2] Screening reduces AAA-related mortality by 50% and has been shown to be cost-effective, even at low AAA prevalence rates.[2–4] Nationwide AAA screening programmes have subsequently been introduced

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across the UK, Sweden, in some regions of Denmark, and in the US Veterans' Association. However, screening for AAA has little impact on all-cause mortality.[1] Interestingly, CV events, and not AAA rupture, are by far the commonest cause of death in patients with small AAA (<55 mm in maximal diameter), regardless of whether they are offered an intervention to treat the aneurysm or not[5] — in the MASS screening trial 41% of deaths in the screening arm had a CV cause, of which only 2% were AAA related.[2] A recent meta-analysis using data from 10 old retrospective series of patients with a small AAA which had previously reported CV death rates, showed a 3% per year chance of CV mortality, as well as a high prevalence (41%) of ischaemic heart disease (IHD) in this population.[6] This risk of CV death is similar to patients that have already experienced a major cardiac event. The American Heart Association (AHA), European Society of Cardiology (ESC), and UK National Institute for Health and Care Excellence (NICE) all recommend aggressive CV risk factor modification for patients after a myocardial infarction (MI) or those with established peripheral arterial disease (PAD); however, current evidence and guidance for those with an AAA is lacking. No relevant guidance is currently available for these patients. In the UK, by 2014, a total of 235,409 men had already undergone screening. A total of 9031 patients with small AAA had been identified and were entered into surveillance.[4] Surveillance involves an assessment of aortic diameter at 6- or 12-monthly intervals but no specific interventions are currently in place to systematically address CV risks. These small AAAs will take years before they require surgical intervention, hence these men are likely to stay in surveillance (measurement of AAA size) for a long period of time.[7] Most screening units do not institute specific secondary preventative strategies at the moment. It is unknown if AAA surveillance programmes represent an opportunity to reduce CV morbidity and how this may be implemented, with ongoing international discussions regarding the necessity of such strategies.[8]

Following the above, the present study aimed at assessing the contemporary CV risk characteristics of patients with small AAA identified through screening in the UK (through the NHS AAA Screening Programme [NAAASP]) and ascertaining the proportion of patients receiving secondary preventative medication after they have been diagnosed with a small AAA. Data from a nationwide prospective study (United Kingdom Aneurysm Growth Study [UKAGS]), a local study whereby individuals are invited to enter the study dependent on the presence of a small AAA solely from the NAAASP screening, were used, and also a local prospectively assembled cohort of individuals with small AAA identified through screening for which precise blood pressure and lipid measurements were obtained over a period of 1 year, further to traditional CV risk factors, were assessed to quantify their CV risk using validated risk scores.

METHODS

All individuals who participated in a prospective nationwide cohort study of men (UKAGS) were included in the study (period ending July 2015). All of these patients had been identified as having a small AAA through a UK-based screening programme. Precise aortic diameter was obtained directly from NAAASP records (ultrasound-based screening) and participants were sent a bespoke questionnaire for completion, collecting demographics, data on smoking habit, past medical history, and drug history. Men with a newly detected AAA and those already under surveillance for an AAA were sent repeat questionnaires each year to coincide with their surveillance appointments. This follow-up was only completed for those with a detected small AAA, continuing only until the patient had reached the threshold for surgical intervention (55 mm), had died, or withdrew from the study. Given the lack of precise blood pressure measurements in the UKAGS population, hypertension was defined as receiving an antihypertensive agent at the point of inclusion in the study.

A second population of patients with a small AAA (local group) was identified prospectively from vascular outpatient departments in two tertiary referral centres in the West Midlands (UK). All patients had been referred to a vascular clinic (outpatients) following AAA detection through NAAASP (none were UKAGS participants). They were all asymptomatic and AAAs had been detected incidentally on cross-sectional abdominal imaging. Data collected included AAA size, medical history, smoking-habit, blood pressure (BP) levels, lipid profiles (total cholesterol, high and low density lipoproteins), and drug-history at baseline and 1 year. Patients were followed-up 1 year after their first appointment. Relevant ethical approvals for both populations had been granted and patients provided written informed consent for participation in the study.

In the local group, hypercholesterolaemia was defined as total cholesterol >5 mmol/L[9] and hypertension as patient taking antihypertensive medication or blood pressure ≥140/90 mmHg.[10] All CV events in the study were defined as per the American Heart Association (AHA).[11] In this group, BP was measured using an electronic automated oscillometric BP measuring device (eBPM) — the Omron (Omron, Milton Keynes, UK), which has previously been validated for use in clinical trials.[12] BP was recorded by a nurse independent to the study and documented in the patient's notes and entered on an electronic database. A total of three blood pressure measurements were obtained and the mean reading was recorded, as per previous evidence, suggesting that this is an accurate form of measuring BP in this setting.[12] Three sequential independent measurements were taken at all visits.

Using the UKAGS data to assess the pharmaceutical CV protection offered to those patients with an AAA detected compared with those without in the NAAASP AAA population, the proportions were compared of each group reporting use of antiplatelet agents, statins, beta-blockers, and anti-hypertensive agents, as well as other identifiable CV risk factors. The same aspects of CV risk in patients with a newly diagnosed AAA were also compared with those who had at least one surveillance appointment.

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