Screening for popliteal aneurysms should not be a routine part of a community-based aneurysm screening program

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Introduction: Several studies have found an increased incidence of peripheral aneurysms in patients with an abdominal aortic aneurysm (AAA). The aim of this study was to determine whether screening for popliteal aneurysms should be part of an AAA screening programme.
Setting: A community-based AAA screening programme
Methods: The diameters of the internal abdominal aorta and both popliteal arteries were assessed by B-Mode ultrasound in a subgroup of the screened population. An AAA was defined as an infrarenal aortic diameter >29 mm. A popliteal aneurysm was defined as a popliteal diameter >19 mm.
Results: Information was available for 283 subjects, 112 subjects with a small AAA, and 171 subjects with a normal aorta. No popliteal aneurysms were found in the subjects with a normal aorta. Three popliteal aneurysms were found in patients with a small AAA. Scanning both popliteal arteries took an experienced sonographer on average three times as long as scanning for an AAA (5 vs 15 minutes).
Conclusion: Popliteal artery aneurysms are seen in less than 3% of men with a small AAA and not at all in men with a normal aortic diameter. It is therefore not cost effective to include screening for popliteal aneurysms in population screening for AAA.
Keywords: popliteal aneurysm, screening program

Introduction

The presence of a popliteal aneurysm (PA) can have serious consequences: 50% of patients with PA become symptomatic, presenting with compression of adjacent structures, distal limb ischemia secondary to embolization or thrombosis, and rarely rupture. Twenty percent of patients with a symptomatic PA will undergo a distal amputation (Thompson et al 2001).

PA are known to be the second most common form of peripheral aneurysm after abdominal aortic aneurysms (AAA) (Guvendik et al 1980). The incidence has been found to be approximately 15 times less than that of AAA (Hirsch et al 1981). However their incidence varies widely in different studies. Lawrence et al (1995) found the incidence of popliteal and femoral aneurysms in a population of hospitalized patients to be 0.004%. A recent study from Michigan found that the incidence of PA in a population of patients referred to hospital for treatment of an AAA was 10% (Diwan et al 2000).

The exact pathogenesis of aneurysm formation is still unknown. Smoking, male gender, and family history are the most important risk factors. It is likely that aneurysm development occurs under the influence of environmental factors acting upon subjects

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predisposed to arterial dilatation. Using this epidemiological evidence, the case for nationwide AAA screening with ultrasound has repeatedly been promoted as cost effective and beneficial to patients and healthcare providers alike (Earnshaw et al 2004; Greenhalgh 2004; Fleming et al 2005).

The aim of this study was to examine the incidence of PA in a community-based population of males over the age of 50 years who had been put forward for AAA screening to assess the value of PA screening as part of an AAA screening programme.

Methods

The study was carried out in a community-based screening programme for AAA for men older than 50 in Huntingdon (UK). A PA was defined as a popliteal artery diameter exceeding 19 mm on screening. An AAA was defined as an infrarenal aortic diameter exceeding 29 mm. A random selection of subjects from the matching age bands from the screened population known to have a normal aorta was chosen to compare the prevalence of PA's in subject with a normal aorta with the prevalence of PA's in subjects with a small AAA. A normal aorta was defined as an aortic diameter less than 25 mm. Data about current smoking status, smoking history, family history of AAA, occupational history, previous medical history, and current medication were obtained through a self-administered questionnaire. All subjects had a brief standardized medical examination where measurements of height, weight, blood pressure, and ankle brachial pressure index (ABPI) were taken.

Infrarenal aortic and popliteal artery diameters were measured by ultrasound. The popliteal arteries were examined bilaterally in the prone position at the popliteal fossa. All measurements were performed by the same ultrasonographer.

Statistical analysis was performed using unconditional logistic regression methods with STATA 5.0 for Macintosh.

Results

Data from 286 men, 112 subjects with an AAA (aortic diameter > 29 mm), and 175 subjects with a normal aorta were available for analysis. The mean popliteal diameter was slightly larger at 8.7 mm in cases (range 6–28 mm) compared with 8.3 mm (range 6–12 mm) for controls. Differences in arterial diameter disappeared once adjusted for differences in body surface area (BSA) (Table 1). Three PAs were found in 112 cases (2.7%), aged 68, 76, and 78 years. The diameter of their AAA was 37 mm, 33 mm, and 36 mm respectively. No PAs were found in subjects with a normal aorta. Measuring the popliteal diameter of PA tripled the scanning time per subject from 5 to 15 minutes.

Discussion

We found that popliteal artery diameter was very similar in subjects with small AAA compared with subjects with a normal aortic diameter. The measurements of popliteal artery diameters from this study correspond well with other studies (Hollier et al 1983; Sandgren et al 1998). Two more recent studies in male screening populations for AAA also report a low incidence of PA, with Morris-Stiff et al (2005) finding no PA greater than 19 mm in a population of 449 subjects screened for AAA and Trickett et al (2002) finding 11 PA in a population of 1074 subjects, although they used a lower cut-off of a diameter greater or equal to 15 mm to define a PA. These published data support the findings in our study.

We suspect that the big difference in PA incidence in subjects with AAA found in this study and that carried

Table 1 Main characteristics for case and control populations

Variable	Control	Case	p value
Population number	112	175	-
Age range (years)	54–87	54–88	-
Mean aortic diameter	20(19.8–20.3)	34.4(33.4–35.3)	-
MPD	8.3(8.2–8.5)	8.7(8.4–9.0)	0.02
Number of PA in population	0	3	-
Height (cm)	172(170–174)	174(173–175)	0.14
BSA	1.91(1.88–1.95)	1.96(1.93–1.99)	0.05
MPD:BSA ratio	4.4 (4.3–4.4)	4.5(4.3–4.6)	0.28

Note: 95% confidence intervals are shown in brackets where appropriate. The MPD:BSA ratio was calculated to adjust for difference in body size between cases and controls.
Abbreviations: BSA, body surface area; MPD, mean popliteal diameter; PA, popliteal aneurysm.

out by Diwan et al (2000) relates to the stage in the disease process at which the screening was carried out. The mean aortic diameter for our subjects with an AAA was 34.5 mm and for Diwan et al (2000) it was 58 mm.

We found that screening for PA tripled scanning time per subject from 5 to 15 minutes. This is not a cost effective use of this resource.

Popliteal artery aneurysms are rare in men to be screened for AAA. They are seen in less than 3% of men with a small AAA and less than 1% of the total population screened for AAA.

PA screening should not be included in programmes set up for AAA screening. The incidence of PA is much higher in subjects referred to hospital as a result of their AAA, and it is at this point that examination for PA should be carried out (Diwan et al 2000).

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