Prevalence of abdominal aortic aneurysms in over 65-year-old men with inguinal hernias

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ABSTRACT

INTRODUCTION The aim of this study was to determine the prevalence of abdominal aortic aneurysms (AAAs) in over 65-year-old men who have inguinal hernias and discuss if pre-operative selective screening of this population is appropriate.

PATIENTS AND METHODS A prospective study on 70 consecutive male patients with an age range of 65–88 years (mean, 74 years) who were referred to a single vascular consultant's out-patient clinic with an inguinal hernia were screened for the presence of an AAA with an ultrasound scan before hernia repair over a period of 3 years.

RESULTS Two patients were found to have an AAA measuring 3.8 cm and 6.0 cm giving an AAA prevalence of 3% (exact 95% confidence interval = 0–10%).

CONCLUSIONS This study does not demonstrate an increased AAA prevalence in over 65-year-old male patients with inguinal hernias, scanned pre-operatively when compared to screening programmes. Selective screening of this cohort cannot be justified on this evidence.

KEYWORDS

Abdominal aortic aneurysm – Inguinal hernia

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Acute rupture of an abdominal aortic aneurysm (AAA) accounts for 2% of mortality in over 60-year-old men.¹ Emergency AAA repair at the time of rupture has a mortality of approximately 75% and elective AAA repair before rupture has a mortality of approximately 5%.² Screening programmes attempt to detect asymptomatic AAAs in order to repair them electively before rupture occurs.

Age and sex are the only AAA risk factors that are currently used to select a population to be invited for screening. It has been shown that a history of an inguinal hernia repair is a risk factor for AAA and that selectively screening over 65-year-old men with inguinal hernias pre-operatively may detect more AAAs than conventional screening programmes.³

This study aimed to confirm whether pre-operative screening of male patients over the age of 65 years, who have an inguinal hernia, detected a significantly increased prevalence of AAA compared with the results of screening programmes using only age and sex to select their populations.

Patients and Methods

This study was calculated to require $n = 70$ to be able to achieve a power of 86% if the expected prevalence = 12%

and the control prevalence = 3% ($\alpha = 0.05$, one-tailed, exact method).

Seventy consecutive male patients aged 65 years and older who were referred to the out-patient clinic of a single vascular surgeon with an inguinal hernia between June 2004 and March 2007 underwent ultrasound examination of the abdominal aorta in the supine position. The variety of ultrasound machines (one Siemens Sonoline Antares, two Hitachi EUB 8500 and two EUB 5500) and ultrasonographers was not limited for this study.

Results

The age range of the study population was 65–88 years (mean, 74 years; mode, 66 years; median, 73 years; 95% confidence interval [CI], 73–75). Ultrasound scan results were < 2.5 cm in any transverse section in 64 cases (91%), ectatic (2.5–3 cm in any transverse section) in 3 cases (4%), aneurysmal (≥ 3 cm in any transverse section or dilated $\geq 50\%$ than the proximal aorta) in two cases that measured 3.8 cm and 6.0 cm (3%) and occluded in one case (1.4%). This gives an AAA prevalence of 3% (normal 95% CI, –1 to 7%, exact 95% CI, 0–10%).

Hernia types were bilateral inguinal (6), right inguinal (40), left inguinal (22), and side not recorded (2). Three cases had a para-umbilical hernia in addition to a single inguinal hernia (all right-sided), one case had a para-umbilical hernia in addition to bilateral inguinal hernias. No patient had a previous ultrasound scan for AAA.

A chi-squared test comparing the prevalence of AAA found in this study with that found in the study by Pleumeekers *et al.*⁵ (4.98 1df; $P = 0.026$) signifies that the distributions are significantly different. Chi-squared tests comparing the prevalence of AAA found in this study and that found in four screening programmes^{20–25} that only used age and sex to identify their populations (1.57 1df; $P = 0.21$; 0.61 1df; $P = 0.43$; 2.27 1df; $P = 0.13$; and 1.71 1df; $P = 0.19$, respectively) signify that the distributions are insignificantly different.

Discussion

Planned UK AAA screening programmes have inclusion criteria that are based solely on the age and sex of the patient (over 65-year-old men).^{4,5} Other known risk factors of AAA are smoking,⁶ hypertension^{7,8} and peripheral vascular disease,⁹ but screening programmes do not plan to use these factors to select a population to be invited to screening.

Many research studies in the past have found that AAAs are a risk factor for hernias.^{10–17} If the reverse association were true (*i.e.* if hernias were a risk factor for AAAs), then the presence of a hernia could be used to select higher risk patients and, therefore, increase the effectiveness of a screening programme.

Pleumeekers *et al.*⁵ demonstrated that in a cohort of male patients aged over 55 years, with a history of inguinal hernia repair in the past, there was a significantly increased risk of AAA of 12.2% (95% CI, 7.0–17.4) compared to 3.7% (95% CI, 2.8–4.6) in those without a history of inguinal hernia repair. The incidence of AAA in UK screening programmes is reported to be between 4.1–7.7%.^{18–25} Pleumeekers *et al.*⁵ suggested that pre-operative screening of male patients > 55 years of age with inguinal hernias may be of value.

We examined a cohort of over 65-year-old male patients, who were referred with an inguinal hernia, with an ultrasound scan of the abdomen. The prevalence of AAA in our study population was 3% with a normal 95% CI of –1 to 7% and exact 95% CI of 0–10%. Statistical analysis reveals that our results are significantly different to those of Pleumeekers *et al.*,⁵ but not significantly different to those from screening programmes; it also reveals that this study has sufficient power to make a type 2 error unlikely.

This study has not shown that AAA is significantly more common in patients with an inguinal hernia than that reported in screening programmes which select patients

purely on the basis of being male and aged over 65 years.

This is clinically important, because it reduces uncertainty for clinicians and patients who have to decide whether or not to have an ultrasound scan of the abdominal aorta to exclude a AAA before repair of an inguinal hernia in male patients over the age of 65 years.

Our study is different to the study performed by Pleumeekers *et al.*⁵ because we did not exclude patients with inguinal hernias from the control group and we did not limit the variety of ultrasound machines and ultrasonographers used. Our definition of an aneurysm is ≥ 3 cm which is an accepted definition of an abdominal aortic aneurysm;^{20–21,24–25} applying the definition of an aneurysm used by Pleumeekers *et al.*⁵ of ≥ 3.5 cm would not change our results because the two aortas found to measure more than 3 cm were 3.8 cm and 6 cm and would be included in both definitions.

The study by Pleumeekers *et al.*⁵ may be questioned for allowing the study population to select themselves for the study, lack of blinding, different ultrasound equipment and ultrasonographer for the study and control groups, a significant difference in the AAA risk factor profile of the study and control groups (age, blood pressure and intermittent claudication) and the temporal difference between the inguinal hernia repair and performing the diagnostic test for a AAA. This may have led to selection, performance and observation bias and confounding.

Our study identified three ectatic aortas that can potentially enlarge.^{24–26} If all the ectatic aortas in our study became aneurysms then our results would not be significantly different to the results of Pleumeekers *et al.*⁵ (chi-squared test 1.29 1df; $P = 0.26$); however, this may take more than 10 years.²⁷ It may be hypothesised that inguinal hernias make the development of an AAA more likely in the future.

Conclusions

Selectively screening for AAA pre-operatively in over 65-year-old men with an inguinal hernia is of no greater value than screening over 65-year-old men regardless of the presence of an inguinal hernia.

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