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Abdominal aorta aneurysm screening program in Swietokrzyskie Voivodeship: early results

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Abstract

Introduction: *The prevalence of abdominal aorta aneurysms (AAA) is estimated to be between 1.3–12.5% in men and 5.2% in women, which poses a serious public health issue. Ruptured aorta aneurysm most often causes internal bleeding and ultimately leads to death. The cause of high mortality is the asymptomatic occurrence of AAA. Usually, the first symptom is its rupture*

The aim of our paper is to provide a relationship between the percentage of the population reporting to the vascular surgeon and the type of residence based on the analysis of data from screening studies carried out in one of the regions of Poland.

Material and methods: *Patients previously informed about the free diagnostics in the Provincial Hospital in Kielce were examined by qualified physicians with ESAOTE MyLab Seven ultrasound device. Prior to that, patients were asked to fill a questionnaire to acquire data about their risk factors, demography, and medical history.*

Results: *A total of 22 (7.3%) aneurysms were found in a group of 301 patients, of which 20 (6.6%) were found in men and 2 (0.66%) in women.*

Conclusions: *Screening tests are an effective method to significantly improve early detection of AAAs. However, it is necessary to provide easier access to health professionals qualified to perform ultrasound examinations. It is especially important for the population of men with a family history of AAA, because they are at a higher risk of developing this pathology. The incidence rate of AAA observed in our study is consistent with the data published in worldwide literature.*

Key words: abdominal aorta aneurysms, screening, prevalence

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Introduction

The prevalence of abdominal aorta aneurysms (AAA) is estimated to be between 1.3–12.5% in men and 5.2% in women, which poses a serious public health issue [1, 2]. The dilatation of the aorta meeting the AAA criteria is a localized, continuous increase in the diameter of the vessel by 50% relative to its normal diameter or by 3 cm and more [3]. Nearly 80% of patients with AAA rupture die before they get to the hospital, while in-hospital mortality rate in patients with established AAA diagnosis is about 50% [3, 4]. Among the risk factors for the development of AAA are age, gender, hypertension, positive family history and coronary artery disease [5]. Diabetes seems to have a protective effect on the formation of AAA [6, 7]. One of the causes of

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high mortality is the asymptomatic occurrence of AAA. Usually, its first symptom is a rupture. Mortality associated with planned open surgery of the aortic aneurysm ranges from 3% to 6%, and perioperative mortality in patients with AAA rupture is 60–80%. That is why in most cases the aortic aneurysm surgery is done by endovascular repair with a mortality rate of 1–2% [8]. Early diagnosis and implemented treatment can protect patients from life-threatening consequences [9]. The implementation of AAA screening led to a reduction in mortality in the population observed [10–12]. So far, there has been no quantitative data about the development of AAA among the inhabitants of rural and urban areas. It is now known that the mental state of patients who are aware of their life-threatening pathology can lead to emotional disturbances, deterioration of the quality of life and hinders social and professional activity [13]. The aim of our paper is to determine the relationship between the percentage of the population reporting to the vascular surgeon and their place of residence based on the analysis of data from screening studies carried out in one of the regions of Poland.

Material and methods

Patients previously informed about the free diagnostics in the Provincial Hospital in Kielce, were examined by qualified physicians with ESAOTE MyLab Seven ultrasound device. Prior to that, patients were asked to fill a questionnaire to acquire data about their risk factors, demography, and medical history (Fig. 1). The screening was held in rooms of the Department of Vascular Surgery. On arrival, the physician explained the procedures to the patient, checked their questionnaire, and answered queries. Signed informed consent was obtained.

Then, the patient had an ultrasound scan of the abdominal aorta. The maximum transverse diameter of the aorta in the transverse plane and the maximum anteroposterior diameter in the longitudinal plane were measured with calipers on the device and noted by a medical student in the appropriate text box in patients' screening program documentation. The largest diameter of these two readings was recorded as the maximum aortic diameter for each patient (Fig. 2). After that procedure, the scanned group was divided into two groups: those who had an abdominal aortic aneurysm, and those in whom no aneurysm was detected. The first group was given a referral to their family doctors, for follow up, at intervals related to the aortic size. All data had been transcribed to Excel file and then database operations have been performed. Statistics were calculated using Statistica 13 StatSoft Software.

Results

A total of 22 (7.3%) aneurysms were found in a group of 301 patients, of which 20 (6.6%) were found in men and 2 (0.66%) in women. Both women had no history of smoking, had a history of coronary artery disease, suffered from high blood pressure and hyperlipidemia, and were not diabetic. One of the patients had a positive family history of aneurysm. The diameters of the AAA's were 42.7 mm and 32 mm.

In the group of men, a correlation between coronary disease, smoking, hyperlipidemia, diabetes and the occurrence of AAAs was not significant. A correlation between familial occurrence of AAAs and the occurrence of AAAs in patients was observed, OR = 9.00 (95% CI 2.0507 to 39.4988), p = 0.0036. In this group, most AAA's (n = 14) were of a diameter range of 30–35 mm. Additionally, there was one of 46 mm, 53 mm, 41.9 mm and 44.6–50.3 (on 10 cm length). We found also dilatation in iliac arteries ranging 15.2–50 mm in a left common iliac artery (LCIA) and 16.9–32 mm in right common iliac artery (RCIA) (Tables 1–3, Fig. 3).

Discussion

Screening tests for abdominal aortic aneurysms are performed on patients fulfilling at least three of the following criteria: (1) age above 65 years, (2) male, (3) hypertension, (4) coronary artery disease, (5) hyperlipidemia, (6) smoking or (7) negative family history [14–16]. According to recent reports, the risk of developing AAA is higher in the first degree relatives of AAA patients, regardless of sex, in comparison to those without a family history of AAA [17]. This suggests that patients of both sexes above the age of 65 with a positive family history of AAA should be screened. In women within the risk group, there is a need for prophylactic screening, due to the higher risk of death following rupture of the aneurysm (88%, p = 0.001), despite a twice lower risk of AAA development (p = 0.009) compared with men [18]. Based on the results of our research, we are unable to present a correlation between the risk factors and the development of AAA in female patients we examined. It is probably the result of a smaller percentage of women taking part in the study compared with men and a low number of women with AAA in this group (n = 2; 0.66%). Research shows that the most important risk factors of developing AAA in women are: (1) coronary artery disease [19], (2) hypertension and (3) hyperlipidemia [20].

The early results of this study correspond with papers covering a similar problem. The percentages we observed in the Swietokrzyskie Voivodeship are in accordance with observations made during the study

Nationwide abdominal aortic aneurysm screening program 2018–2020

Please answer the following questions which help us identify risk factors

	Yes	No
Age greater than or equal to 65		
Coronary artery disease		
Smoking		
Hypertension*		

*If yes, is it treated?.....

Dyslipidaemia		
Sex	Women	Men

BMI: Weight: Height:
Cardiovascular diseases .....

Previous surgical treatment .....

Hernia .....

Chronicobstructivepulmonarydisease .....

Other significant diseases .....

Injuries .....

Family history of aneurysm* .....

*If yes — which artery .....

Figure 1. Questionnaire

performed in Grampian in 2012–2013 [21]. A comparison of the results shows a similar level of interest by the population. In large cities, it was 42.6%, in villages 38.9%, in small towns — 18.5% and in mid-sized towns — 4%. Such a distribution might indicate an insufficient level of accessibility to health care in smaller towns and villages.

Based on the above, we believe that the public in large cities is more aware of the risks of AAA and due to higher accessibility of hospitals and specialist care, the rate of detection is higher. According to Lesjak et al. [10], it is advisable to have mobile ultrasound device for AAA in areas with a population below 20,000 people, where accessibility of screening tests is limited [22, 23].

In a similar study, but based on a significantly bigger group, the results regarding the prevalence of AAA were similar to ours (7.2% of all screened patients) [24]. This stands in agreement with another study described by Palombo et al. [25]. It also referred to the problem of decreasing the mortality rate by a successful

Examination number .....

Full name .....

Sex .....

Patient ID .....

Date of birth/age .....

Address .....

Telephone number .....

Medical history:

Family history .....

Previous treatment .....

Risk factors: coronary artery disease, smoking, hypertension, hyperlipidemia, male*

*Mark appropriate

Clinical examination:

USG device used: .....

Description:

The study included the abdominal aorta, its division, and common iliac arteries

The aneurysmal dilatation of abdominal aorta and/or iliac arteries was **found/not found.***

*Mark appropriate

Max. diameter of the aorta		
Max. diameter of iliac arteries	R:	L:

Control ultrasound examination of the abdominal aorta and iliac arteries for 6 months is **indicated/ not indicated.***

*Mark appropriate

A referral to the hospital/information to the general practitioner was **issued/not issued.***

*Mark appropriate

Comments: .....

Figure 2. Screening record

Table 1. Risk factors and diameter of abdominal aorta dilatation in population of women in the study

No	Risk factors	Aneurysm diameter
1	Coronary artery disease, hypertension, hyperlipidemia	42.7 mm
2	Coronary artery disease, hypertension, hyperlipidemia, family history of aneurysms	32 mm

Table 2. Presence of risk factors in the study population

	Women	Men
BMI > 30	46	62
Smoking	18	21
Hyperlipidemia	127	143
Coronary artery disease	91	83
High BP	119	152
Family history of aneurysms	20	8
Diabetes	29	40

Table 3. Distribution of patients according to their place of residence

Population (in thousands)	Place of residence	Number of patients
< 5	Village	65
5–20	Small towns	33
20–100	Mid-sized towns	12
> 100	Large cities	191
Total		301

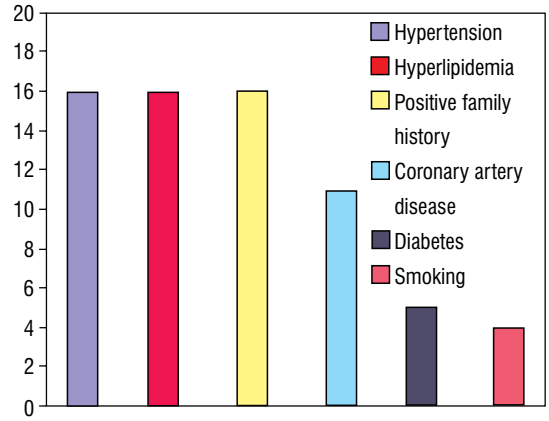

Figure 3. Risk factors of abdominal aneurysms in population of men diagnosed with AAA

screening program, which will be discussed in our next paper with the follow-up.

The presence of AAA is usually symptom-free. The Polish Cardiac Society states that on rare occasions the symptoms might be abdominal or back pains. USG tests decrease the mortality rate in men in the long run [26] by 34% (RR, 0.66; 95% CI, 0.47–0.93; NNS, 311). This shows the effectiveness of screening examination for AAA using of USG devices. It is important to state that the larger size of the aneurysm and the possible later detection results in increased vascular complications and a more difficult repair of the aneurysm [27]. In older patients (> 80 years), the EVAR procedure survival rate is 2.53-fold lower ([HR] = 2.53; 95 [CI], 1.73–3.70; $p < 0.001$) [28]. Additionally, patients above the age of 70 are at higher risk of post-operational complications than those below 70 years of age (10.7% vs. 7.0%, $p = 0.007$) [29].

Conclusion

During the pilot screening program, we confirmed the correlation between the family history of abdominal aorta aneurysm and a higher risk of its development. The incidence rate of AAAfound in our study is consistent with the data available in worldwide literature. Our paper focused on early, sociological data, and we concluded that people from large cities are more likely to attend screening than those from rural areas. We hope that due to the regionalization of screening for AAA in cities and rural areas, the accessibility to tests done by experienced physicians will improve.

It is especially important, as early detection of AAA leads to a decreased risk of mortality and its treatment can lead to a higher quality of life. Therefore early detection of AAA is crucial for the patients.

More data and the follow-up will be published after the pilot study ends.

Conflict of interest

None.

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