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Incidence of Finding Abdominal Aortic Aneurysms in Abdominal Computed Tomography Scans: A Single Tertiary Center Experience

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Abstract

Objective: The aim is to look for the incidence of the incidental Abdominal Aortic Aneurysm (AAA) on routine abdominal Computed Tomography (CT scans) based on a single tertiary center at the Kingdom of Saudi Arabia (KSA).

Methods: A retrospective study in which a review of all abdominal CT scans performed in one institution from 2011 to 2016 was conducted. Our target population was males aged between 65-75 years old. The CT scans were reviewed by investigators trained in reviewing and measuring the aortic diameter. The maximal anterior-posterior diameter of the infra-renal abdominal aorta was measured on transverse cuts. The aortic diameter was recorded and the measurements were taken by two investigators independently for each CT scan. Any discrepancy of more than 15% was then reviewed by the primary investigator.

Results: The total number of reviewed CT scans was 2032. The mean age was 70 ± 3 years, and the mean aortic size was 1.9 ± 0.3 cm. Only 6 cases (0.3%) found to have AAA (sizes ≥ 3 cm), with a mean age of 72 ± 3 years. There was a statically significant difference in age between those who had AAA and those who did not have AAA (72 ± 3 *vs*. 70 ± 3 years, with a P value of 0.0433).

Conclusion: Our data suggests that the incidence of incidental AAA is low. A national pilot screening program in the non- hospital population would provide more robust evidence on the incidence of AAA in the KSA.

Keywords: Abdominal aortic aneurysm; Incidence; KSA

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Introduction

Abdominal Aortic Aneurysm (AAA) is a localized abnormal dilatation of the aorta greater than 3 cm [1]. It is uncommon in persons younger than 50 years; moreover, abdominal aortic aneurysms are found in 4% to 8% of older men, and 0.5% to 1.5% of older women [1-5]. Age, smoking, sex, and family history are the most significant AAA risk factors [2]. Most are asymptomatic, and detection by physical examination of the patient is usually possible only if the aneurysm is large which carried a high risk of rupture. Often rupture may occur without warning, and is associated with mortality between 65% and 85% [6,7]. Over one-half of all deaths attributed to a ruptured AAA take place before the patient reaches hospital [8,9]. In comparison, mortality in elective AAA repair ranges between 1% to 5% depending of the type of intervention, experience, and risk factors [10,11].

National and opportunistic AAA screening programs exist in many developed countries [12]. Ultrasonography has a high sensitivity and specificity (95% and nearly 100%, respectively) for detecting AAA when performed by a person experienced in the use of ultrasonography [13]. Additionally, there are no significant harms associated with abdominal ultrasonography [13]. Due to the limited data available examining AAA in the middle-east, in this study we aimed to look for the incidence of the incidental abdominal aortic aneurysm (AAA) on the routine abdominal Computed Tomography (CT scans) based on a single tertiary center at the Kingdom of Saudi Arabia (KSA).

Methods

A retrospective study in which a review of all abdominal Computed Tomography (CT) scans performed (both contrast and non-contrast studies) at King Faisal Specialties Hospital and Research Center (KFSH&RC), Riyadh, Saudi Arabia, between January 1, 2011 and December 31, 2016 was conducted. We included all male patients with age range between 65 and 75 years. We excluded female patients, patients older than 75 years old or younger than 65 years old, patients who underwent CT scan to diagnose, plan management or follow up an aortic aneurysm, patient with non-retrievable CT scans, and patients with CT scans in which the infra-renal aorta to the iliac bifurcation not fully visualized.

After obtaining the approval from the research advisory council (#2171135) we created a list of the abdominal CT scans done in our institution during the requested period for men using the radiology PACS system. The data was collected using a data sheet containing the unique patient identifier, demographic data, indication for imaging and size of the abdominal aorta. The included CT scans were reviewed by investigators trained in reviewing and measuring the size of the aorta. The maximal anterior-posterior diameter of the infra-renal abdominal aorta was measured on transverse cuts. The aortic diameter was recorded and the measurements were taken by two investigators independently for each CT scan. Any discrepancy of more than 15% was then reviewed by the primary investigator.

Results

Based on the age, gender and date criteria, we included 3500 scans. Out of these, 1468 (41.9%) were excluded. Among them 649 (18.5%) were excluded because of known or suspected aortic aneurysm. Another 819 (23.4%) were excluded due to incomplete visualization of the infra-renal aorta or inability to retrieve the scan. Thus, a total of 2032 scans were eligible for complete review.

The mean age of the patients was 70 ± 3 years and the mean aortic size was 1.9 ± 0.3 cm. The majorities, 2026 (99.7%) patients found to have an aortic size of < 3 cm, with a mean age of 70 ± 3 years. Only 6 cases (0.3%) found to have an aortic size of ≥ 3 cm, with a mean age of 72 ± 3 years. We compare the age between the two groups and we found that patient with AAA were older 70 *vs.* 72 ± 3 years, and that was statistically significant (P 0.0433), which may indicate that the age may consider a risk factor for AAA. We could not conduct a risk factor analysis for the AAA since this was a retrospective study in which we collected a retrospective data using the radiology PACS system which did not include all the risk factor data.

Discussion

Thompson et al. conducted the largest randomized, controlled, population-based to provide data on AAA screening included approximately 70,000 men between 65 and 74 years of age for 10 years [14]. Participants were randomized to an offer of ultrasonography or to a control group. The study demonstrated a reduction in AAA-related mortality improved from 42% to 48% at four-year and 10-year follow-up respectively [14]. In addition, the Multicenter Aneurysm Screening Study (MASS) indicate, the main benefit of screening is decreased AAA-related mortality [15]. Persons with the greatest potential benefit from screening have the major risk factors of male sex, increased age, and history of smoking. Approximately 238 men older than 65 years need to be screened to prevent one AAA-related death [16,17].

Knowing that the KSA is ranked seventh in the world for the rate of diabetes with a prevalence of 34.1% and 27.6% in males and females respectively based on the World Health Organization (WHO) has report [18], and tobacco consumption rates in KSA have risen from 21.9% of males and 0.6% of females to 37% of males and 6% of females from 1996 through 2012 [19,20]; data suggests that AAA incidence is likely to rise. However, in the KSA, there is limited data on AAA prevalence in the region. To our knowledge, there is only one study published investigating the topic of AAA screening. In their study, the investigators screened 392 participants between 60 and 80 years old [21].

This small cohort revealed an overall AAA prevalence of 1.8%, but as high as 7% in those with peripheral vascular disease [21]. This data was seen as highly supportive of an AAA screening program particularly in high risk groups. However, there is no published data about the risk factors, screening or the result of AAA management, since then. Moreover, there is currently no policy for AAA screening.

In our study, the incidence of incidental AAA in our study was only 0.3%. There are a number of possible contributing factors to the low incidence. The study was conducted in a tertiary hospital receiving referrals from other hospitals, mostly cancer patients after staging. This suggests that patients imaged would have been diagnosed and managed at the referring hospital. The number of excluded scans with a known diagnosis of AAA was 649 (18.5%) of the total cohort which tends to support this theory, but it also includes patients being managed for AAA in our hospital. There are a number of limitations to our study that may bias these results, like population biases, and retrospective data. Thus, a prospective pilot screening program in the non- hospital population would provide more robust evidence on the need for a national AAA screening program. Such a program would better estimate the prevalence of AAA in the KSA and its associated risk factors.

Conclusion

Our data suggests that the incidence of incidental AAA is low based on one territory center experience. However, a national pilot screening program in the non-hospital population would provide more robust evidence on the incidence of AAA in the KSA.

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