Editorial Article

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Screening of abdominal aortic aneurysm

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Abdominal aortic aneurysm (AAA) is a pathological condition characterized by an abnormal, localized dilatation of the abdominal aorta, at least 50% greater in diameter than normal An abdominal aorta of a 3.0 cm diameter is considered an aneurysmal aorta [1]. AAA is almost exclusively a disease of the elderly, and is more frequent in males than in females [2-12]. Due to the risk of rupturing, AAA is a life threathening event and one of the most serious emergencies in vascular surgery. Mortality rate associated with ruptured AAAs remains very high taking into account both perioperative deaths and those occurring before treatment. By contrast, elective treatment of AAAs ensures very good results, emphasizing the importance of early diagnosis and treatment to avoid rupture.

AAA can be diagnosed by ultrasound investigation [13-15]. This simple, noninvasive, and accurate screening method is highly reliable and reproducible. Ultrasound screening can be a vital tool in the early identification of AAAs, as in most cases it is a silently evolving, asymptomatic condition. Many AAAs are recognized only at the time of rupture, indeed. A decrease in AAA ruptures of nearly 50% and AAA-related mortality of 21-68% has been reported where ultrasound screening is used [2-5,10,16-30]. It has been estimated that this reduction could reach 63-68% after 5 years' screening and 73% after 10 years [3,18,25,31]. In the perspective of early diagnosis of AAA, screening in the population was initiated and ultrasound examination was extensively employed as a first level investigation.

Screening programme for AAAs, named S.A.GE 2006 (Screening Abdominal aortic aneurysm GEnoa), has been carried out in a metropolitan area of Genoa (Italy) for subjects aged 65 years or more to evaluate the prevalence of this disease and risk factors between March 2007 and September 2009 [32]. Screening was carried out in the outpatient clinic of the Vascular and Endovascular Surgery Unit at the San Martino University Hospital in Genoa (Italy) using ultrasound apparatus. The mean age of subjects included in the study was 74.8±5.8 years (range 65-92 years). Of the 8,234 screened subjects, 512 (6.2%) had evidence of an AAA (with or without involvement of the common iliac artery) according to the definition by Johnston et al [1]. Among these subjects, 469 (out of 4,327, 10.8%) were males and 43 (out of 3,907, 1.1%) females, difference statistically significant (P=0.0045). None of the patients with an AAA were aware of their condition, and all of them were asymptomatic. With regards to risk factors, family predisposition to cardiovascular disease was significantly higher in subjects with AAA compared to the ones without AAA. Based on the policy of the Vascular and Endovascular Surgery Unit, elective aneurysm repair was indicated in 29 subjects with an AAA of ≥5.0 cm diameter (27 males and 2 females), and 25 underwent repair. Open surgery was performed on 19 subjects and endovascular repair on 6 subjects. In all cases, outcomes associated with interventions were successful. There were no postoperative deaths or major complications (such as heart disease, respiratory insufficiency, renal failure or failure of endograft).

An important difference between males and females (10.8% vs. 1.1%) was observed according to previous reports [9,10,12]. Several risk factors for the development of AAAs have been identified. These include smoking, history of myocardial infarction or peripheral arterial disease [5,8,17,24]. Family predisposition to cardiovascular disease only resulted significant risk factors associated with AAA. Many studies about the same issue were carried out previously and in the following years this epidemiological research. A North American study in 2000 showed the risk factor for AAA: age, smoking, family history of AAA, and atherosclerotic diseases remained the principal positive associations with AAA, and female sex, diabetes, and black race remained the principal negative associations [8]. In 2001 a British study by Scott et al [3]. showed that screening once for AAA at age 65 can identify the majority of AAA that are of clinical significance and can identify a large population at low risk from rupture who do not require surveillance. This policy has been effective when combined with selective treatment in reducing the risk of rupture for ten years in those who attend the screening programme. Subsequently, in 2002 Scott et al [10].

evaluated usefulness of screening in female genre showing that

the prevalence of AAA was six times lower in women (1.3 per cent) than in men (7.6 per cent). Over 5- and 10-year follow-up intervals, the incidence of rupture was the same in the screened and control groups of women. In conclusion, screening women for AAA is neither clinically indicated nor economically viable. In an English population-based programme in 2002 65 aneurysm-related deaths (absolute risk 0.19%) were observed in the invited group, and 113 (0.33%) in the control group (risk reduction 42%), with a 53% reduction in those who attended screening [4]. 30-day mortality was 6% after elective surgery for an aneurysm, and 37% after emergency surgery. Vardulaki and Coworkers in 2002 demonstrated the benefits of full participation in a screening programme that could provide a larger and sustained mortality reduction (21%) [5]. Another English study (by Darwood et al., 2012) concluded that screening reduced the number of ruptured AAAs in a British county (Gloucestershire) during the 20 years of the program [33]. There has been a significant reduction of men with an abnormal aorta, as the mean aortic diameter of the 65-year-old male has reduced over 20 years. A Danish research showed that over ten years screening reduced mortality from AAA by 73%, and the frequency of emergency operations by 68% [31]. A Swedish report in 2014 highlighted that AAA screening in a contemporary setting was safe at 5 years, with a single AAA rupture observed among non-attenders [34]. Men with a screening detected AAA had a high repair rate and high non-AAA related mortality. AAA-formation was common among men with sub-aneurysmal dilatation, indicating a possible need for surveillance of this group. An interesting and recent research by Ali et al. in 2018 has emphasized that population-based one-time screening for AAA with ultrasound in asymptomatic men aged 65 years and older remains beneficial during the longer term after screening has ceased, with significant reductions in AAA mortality and AAA rupture rate, and hence avoids unnecessary AAA-related deaths [35].

The sensitivity analyses also showed that the benefits of AAA screening were more pronounced in men at a mean age of <70 years with a relatively lower prevalence of AAA than in men at a mean age of >70 years with a relatively higher prevalence of AAA. Future research should explore the long-term benefits of a targeted AAA screening approach based on risk factors such as age, sex, smoking status, family history, aortic diameter, and baseline risk of rupture. Based on the results of several studies, the screening have led to some observations. Willingness to participate in screening is satisfactory thanks to a strong collaboration of the general practitioners in the chosen area for screening and involvement of the mass media. Epidemiological studies can have a strong impact, especially those concerning the ones involving a large sample population, and can also raise public awareness about AAA.

References

1. Johnston, K. W., Rutherford, R. B., Tilson, M. D., Shah, D. M., Hollier, L., & Stanley, J. C. (1991). Suggested standards for reporting on arterial aneurysms. Journal of vascular surgery, 13(3), 452-458.
2. Bickerstaff, L. K., Hollier, L. H., Van Peenen, H. J., Melton III, L. J., Pairolero, P. C., & Cherry, K. J. (1984). Abdominal aortic aneurysms: the changing natural history. Journal of vascular surgery, 1(1), 6-12.
3. Scott, R. A. P., Vardulaki, K. A., Walker, N. M., Day, N. E., Duffy, S. W., & Ashton, H. A. (2001). The long-term benefits of a single scan for abdominal aortic aneurysm (AAA) at age 65. European Journal of Vascular and Endovascular Surgery, 21(6), 535-540.
4. Ashton, H. A., Buxton, M. J., Day, N. E., Kim, L. G., Marteau, T. M., Scott, R. A., ... & Walker, N. M. (2002). Multicentre Aneurysm Screening Study Group The Multicentre Aneurysm Screening Study (MASS) into the effect of abdominal aortic aneurysm screening on mortality in men: a randomised controlled trial. Lancet, 360(9345), 1531-1539.
5. Vardulaki, K. A., Walker, N. M., Couto, E., Day, N. E., Thompson, S. G., Ashton, H. A., & Scott, R. A. P. (2002). Late results concerning feasibility and compliance from a randomized trial of ultrasonographic screening for abdominal aortic aneurysm. Journal of British Surgery, 89(7), 861-864.
6. MELTON III, L. J., Bickerstaff, L. K., Hollier, L. H., PEENEN, H. J. V., Lie, J. T., Pairolero, P. C., ... & O'fallon, W. M. (1984). Changing incidence of abdominal aortic aneurysms: a population-based study. American journal of epidemiology, 120(3), 379-386.
7. Lindholt, J. S., Henneberg, E. W., Fasting, H., & Juul, S. (1996). Hospital based screening of 65–73 year old men for abdominal aortic aneurysms in the county of Viborg, Denmark. Journal of medical screening, 3(1), 43-46.
8. Lederle, F. A., Johnson, G. R., Wilson, S. E., Chute, E. P., Hye, R. J., Makaroun, M. S., ... & Makhoul, R. G. (2000). The aneurysm detection and management study screening program: validation cohort and final results. Archives of internal medicine, 160(10), 1425-1430.
9. Lederle, F. A., Johnson, G. R., & Wilson, S. E. (2001). Abdominal aortic aneurysm in women. Journal of vascular surgery, 34(1), 122-126.
10. Scott, R., Bridgewater, S. G., & Ashton, H. A. (2002). Randomized clinical trial of screening for abdominal aortic aneurysm in women.
11. Ogata, T., Arrington, S., Davis, P. M., Sam, A. D., Hollier, L. H., Tromp, G., & Kuivaniemi, H. (2006). Community-based, nonprofit organization-sponsored ultrasonography screening program for abdominal aortic aneurysms is effective at identifying occult aneurysms. Annals of vascular surgery, 20(3), 312-316.
12. DeRubertis, B. G., Trocciola, S. M., Ryer, E. J., Pieracci, F. M., McKinsey, J. F., Faries, P. L., & Kent, K. C. (2007). Abdominal aortic aneurysm in women: prevalence, risk factors, and implications for screening. Journal of vascular surgery, 46(4), 630-635.
13. Lederle, F. A., Walker, J. M., & Reinke, D. B. (1988). Selective screening for abdominal aortic aneurysms with physical examination and ultrasound. Archives of internal medicine, 148(8), 1753-1756.
14. Wilmink, A. B. M., Forshaw, M., Quick, C. R. G., Hubbard, C. S., & Day, N. E. (2002). Accuracy of serial screening for abdominal aortic aneurysms by ultrasound. Journal of medical screening, 9(3), 125-127.
15. Participants, T. U. S. A. T. (1998). Mortality results for randomised controlled trial of early elective surgery or ultrasonographic surveillance for small abdominal aortic aneurysms. The Lancet, 352(9141), 1649-1655.

16. Scott, R. A. P., Wilson, N. M., Ashton, H. A., & Kay, D. N. (1995). Influence of screening on the incidence of ruptured abdominal aortic aneurysm: 5-year results of a randomized controlled study. Journal of British Surgery, 82(8), 1066-1070.
17. Lederle, F. A. (1997). Aneurysm Detection and Management (ADAM) Veterans Affairs Cooperative Study Group. Prevalence and associations of abdominal aortic aneurysm detected through screening. Ann Intern Med, 126, 441-449.
18. Wilmink, T. B., Quick, C. R., Hubbard, C. S., & Day, N. E. (1999). The influence of screening on the incidence of ruptured abdominal aortic aneurysms. Journal of Vascular Surgery, 30(2), 203-208.
19. Kniemeyer, H. W., Kessler, T., Reber, P. U., Ris, H. B., Hakki, H., & Widmer, M. K. (2000). Treatment of ruptured abdominal aortic aneurysm, a permanent challenge or a waste of resources? Prediction of outcome using a multi-organ-dysfunction score. European Journal of Vascular and Endovascular Surgery, 19(2), 190-196.
20. Lindholt, J. S., Vammen, S., Fasting, H., & Henneberg, E. W. (2000). Psychological consequences of screening for abdominal aortic aneurysm and conservative treatment of small abdominal aortic aneurysms. European Journal of Vascular and Endovascular Surgery, 20(1), 79-83.
21. Irvine, C. D., Shaw, E., Poskitt, K. R., Whyman, M. R., Earnshaw, J. J., & Heather, B. P. (2000). A comparison of the mortality rate after elective repair of aortic aneurysms detected either by screening or incidentally. European Journal of Vascular and Endovascular Surgery, 20(4), 374-378.
22. Heather, B. P., Poskitt, K. R., Earnshaw, J. J., Whyman, M., & Shaw, E. (2000). Population screening reduces mortality rate from aortic aneurysm in men. British Journal of Surgery, 87(6), 750-753.
23. Lawrence-Brown, M. M., Norman, P. E., Jamrozik, K., Semmens, J. B., Donnelly, N. J., Spencer, C., & Tuohy, R. (2001). Initial results of ultrasound screening for aneurysm of the abdominal aorta in Western Australia: relevance for endoluminal treatment of aneurysm disease. Cardiovascular Surgery, 9(3), 234-240.
24. Singh, K., Bønaa, K. H., Jacobsen, B. K., Bjørk, L., & Solberg, S. (2001). Prevalence of and risk factors for abdominal aortic aneurysms in a population-based study: The Tromsø Study. American journal of epidemiology, 154(3), 236-244.
25. Lee, T. Y., Korn, P., Heller, J. A., Kilaru, S., Beavers, F. P., Bush, H. L., & Kent, K. C. (2002). The cost-effectiveness of a "quick-screen" program for abdominal aortic aneurysms. Surgery, 132(2), 399-407.
26. Lindholt, J. S., Juul, S., Fasting, H., & Henneberg, E. W. (2002). Hospital costs and benefits of screening for abdominal aortic aneurysms. Results from a randomised population screening trial. European journal of vascular and endovascular surgery, 23(1), 55-60.
27. Earnshaw, J. J., Shaw, E., Whyman, M. R., Poskitt, K. R., & Heather, B. P. (2004). Screening for abdominal aortic aneurysms in men. Bmj, 328(7448), 1122-1124.
28. Lindholt, J. S., Juul, S., Fasting, H., & Henneberg, E. W. (2005). Screening for abdominal aortic aneurysms: single centre randomised controlled trial. Bmj, 330(7494), 750.
29. Ashton, H. A., Gao, L., Kim, L. G., Druce, P. S., Thompson, S. G., & Scott, R. A. P. (2007). Fifteen-year follow-up of a randomized clinical trial of ultrasonographic screening for abdominal aortic aneurysms. Journal of British Surgery, 94(6), 696-701.
30. Lindholt, J. S., Juul, S., Fasting, H., & Henneberg, E. W. (2006). Cost-effectiveness Analysis of Screening for Abdominal Aortic Aneurysms Based on Five Year Results from a Randomised Hospital Based Mass Screening Trial□. European journal of vascular and endovascular surgery, 32(1), 9-15.
31. Lindholt, J. S., Juul, S., Fasting, H., & Henneberg, E. W. (2006). Preliminary ten year results from a randomised single centre mass screening trial for abdominal aortic aneurysm. European journal of vascular and endovascular surgery, 32(6), 608-614.
32. Palombo, D., Lucertini, G., Pane, B., Mazzei, R., Spinella, G., & Brasesco, P. C. (2010). District-based abdominal aortic aneurysm screening in population aged 65 years and older. The Journal of cardiovascular surgery, 51(6), 777-782.
33. Darwood, R., Earnshaw, J. J., Turton, G., Shaw, E., Whyman, M., Poskitt, K., ... & Heather, B. (2012). Twenty-year review of abdominal aortic aneurysm screening in men in the county of Gloucestershire, United Kingdom. Journal of vascular surgery, 56(1), 8-13.
34. Svensjö, S., Björck, M., & Wanhainen, A. (2014). Editor's choice: five-year outcomes in men screened for abdominal aortic aneurysm at 65 years of age: a population-based cohort study. European Journal of Vascular and Endovascular Surgery, 47(1), 37-44.
35. Ali, M. U., Fitzpatrick-Lewis, D., Kenny, M., Miller, J., Raina, P., & Sherifali, D. (2018). A systematic review of short-term vs long-term effectiveness of one-time abdominal aortic aneurysm screening in men with ultrasound. Journal of vascular surgery, 68(2), 612-623.