



Prevention/detection/management of abdominal aortic aneurysm

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Abstract: Risk factors for abdominal aortic aneurysm (AAA) are age, cigarette smoking, dyslipidemia, increased blood pressure, male sex, and family history. An AAA is diagnosed if the aortic anteroposterior diameter is 3 cm or larger. Men aged 60 years and older who are siblings or offspring of patients with an AAA should undergo physical examination and ultrasound screening for detection of an AAA (class I indication). Men who are 65 to 75 years of age who have ever smoked should undergo a physical examination and a 1-time ultrasound screening for detection of an AAA (class IIa indication). Guidelines recommend that patients with an AAA should undergo intensive risk factor modification. In patients that have evidence of back, abdominal, or groin pain in the presence of a pulsatile abdominal mass, the aorta needs to be evaluated immediately, preferably with computed tomographic scanning. In patients with abdominal and/or back pain, a pulsatile abdominal mass, and hypotension, immediate surgical evaluation is indicated (class I indication). In patients with symptomatic AAAs, repair is indicated regardless of AAA diameter (class I indication). Guidelines recommend that patients with infrarenal or juxtarenal AAAs measuring 5.5 cm or larger in diameter should undergo endovascular or open repair to eliminate the risk of rupture (class I indication). Patients with infrarenal or juxtarenal AAAs measuring 4.0 to 5.4 cm in diameter should be monitored by ultrasound or computed tomographic scans every 6 to 12 months to detect expansion (class I indication).

Keywords: Abdominal aortic aneurysm (AAA); peripheral artery disease; endovascular repair; open repair

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Risk factors for abdominal aortic aneurysm (AAA) are age, cigarette smoking, dyslipidemia, increased blood pressure, male sex, and family history (1-4). Of 96 AAA patients aged 77 years, 80% were men (2). Of these patients, 32% were smokers, 89% were hypertensive, 81% had hypercholesterolemia, and 25% were diabetics (2). During 24-year follow-up of 15,792 persons, the lifetime risk for developing AAA in persons from an index age of 45 years through 85 years of age was 5.6% (8.2% in men) (4). Current smokers had a 10.5% risk of developing an AAA. Smokers who quit smoking between visit 1 [1987-1989] and visit 4 [1996-1998] had a 29% lower risk of AAA (4). Modifiable risk factors for development of an AAA such as cessation of smoking and treatment of hypertension and hypercholesterolemia should be performed to prevent development of an AAA.

Screening for AAA

An AAA is diagnosed if the aortic anteroposterior diameter is 3 cm or larger (5). Guidelines recommend a physical examination and ultrasound screen for AAA in men aged ≥ 60 years who are siblings or offspring of patients with an AAA and in men aged 65 to 75 years who have ever smoked (1). Other guidelines recommend an ultrasound screen for AAA in men aged 65 to 75 years who have ever smoked and a selective ultrasound screen for AAA in men aged 65 to 75 years who have never smoked (6). Current evidence is inadequate to know whether women aged 65 to 75 years who have ever smoked should have an AAA screen (6). A routine screen for AAA in women who have never smoked should not be performed (6). The Swedish Nationwide Abdominal Aortic Aneurysm Screening

Program found that AAA was present in 1.5% of men aged 65 years (7). After 4.5 years, 29% of patients with an AAA found by screening were operated on. The number needed to screen and the number needed to operate on to prevent 1 premature death was 667 and 1.5, respectively (7). Patients with an AAA detected are usually asymptomatic.

Coexistent atherosclerotic vascular disease

In a study of 96 AAA patients 74% had ischemic heart disease, 18% had prior ischemic stroke, 20% had carotid disease, and 39% had lower extremity peripheral arterial disease (2). In 110 men with AAA, 71% had ischemic heart disease, 46% had peripheral artery disease of the lower extremities, and 27% had cerebrovascular arterial disease (8). Women with an AAA have a worse prognosis than men with a PAD (9).

Management of AAA

Guidelines recommend intensive risk factor modification in AAA patients (1). Hypertension should be treated with a blood pressure goal of <140/90 mmHg (10). AAA patients should be treated with either atorvastatin 40 to 80 mg daily or rosuvastatin 20 to 40 mg daily (11). Patients with an AAA or family history of AAA should stop smoking with the aid of behavior modification, nicotine replacement, or bupropion therapy (1).

Angiotensin-converting enzyme inhibitors have been reported to reduce the risk of ruptured AAA (12). At 45-month follow-up of 130 AAA patients, use of statins reduced mortality (13). This study also showed that the AAA size did not change in statin-treated patients but increased from 4.5 to 5.3 cm at 24-month follow-up in persons without statin treatment (13).

Use of statins also reduced perioperative and 2-year mortality in patients who had surgical repair of their AAA (14,15). In a study of 577 patients who had noncardiac vascular surgery perioperative mortality or 2-year mortality occurred in 11% of the statin-treated group versus 27% of the non-statin-treated group (15). Treatment with statins also caused at 4.7-year follow-up a lower all-cause mortality (60%) and cardiovascular mortality (70%) after AAA surgery in 570 AAA patients (16).

A computed tomographic scan for detection of an AAA should be performed immediately in persons with back, abdominal, or groin pain in the presence of a pulsatile abdominal mass. Sullivan *et al.* reported mortality rates of

35% for ruptured AAAs, 26% for symptomatic AAAs, and 5% for asymptomatic AAAs undergoing AAA repair (17). At 90-day follow-up of 96 high-risk AAA patients treated with an endovascular stent-graft prosthesis, 100% were alive (18).

Guidelines recommend repair of infrarenal or juxtarenal AAAs measuring ≥ 5.5 cm in diameter to reduce the risk of rupture (1). Infrarenal or juxtarenal AAAs measuring 4.0 to 5.4 cm in diameter should have an ultrasound or computed tomographic scan every 6 to 12 months to see if expansion has occurred (1). AAA repair can be considered for infrarenal or juxtarenal AAAs measuring 5.0 to 5.4 cm in diameter (1). Repair is probably indicated in suprarenal or type IV thoracoabdominal AAAs measuring larger than 5.5 to 6.0 cm (1). AAAs less than 4.0 cm in diameter should have an ultrasound for AAA every 2 to 3 years (1). Intervention should not be performed in asymptomatic infrarenal or juxtarenal AAAs measuring <5.0 cm in diameter in men or <4.5 cm in diameter in women (1).

Surgical evaluation should be performed immediately in patients with abdominal and/or back pain, a pulsatile abdominal mass, and hypotension (1). Patients with symptomatic AAAs should have repair of their AAA regardless of the size of their AAA (1).

Beta blockers should be administered to patients with ischemic heart disease undergoing surgical repair of their AAA (1). Beta blockers may be also considered for treatment in AAA patients to reduce the rate of aneurysm expansion (1).

Open or endovascular repair of infrarenal AAAs and/or common iliac aneurysms is indicated in patients who are good surgical candidates (1). Patients who underwent endovascular repair of infrarenal aortic and/or iliac aneurysms should be monitored with long-term surveillance imaging for an endoleak, to detect shrinkage or stability of the excluded aneurysm sac, and to determine need for further intervention (1). Open AAA repair is reasonable in patients who are good surgical candidates who cannot comply with long-term surveillance (1).

Repairing an AAA smaller than 5.5 cm has not been found to improve survival (19). Numerous randomized clinical trials have demonstrated that mortality and morbidity immediately after AAA repair are lower with AAA endovascular repair, but long-term mortality and morbidity are not sustained with endovascular repair (20-22). A propensity-score matched analysis study in the Medicare population included 39,966 persons having open AAA repair and 39,966 patients undergoing AAA endovascular repair (23). Both groups had a mean age of 76 years, and 22% were women. Mortality immediately after repair was

less with endovascular repair (1.6%) than with open repair (5.2%). Late survival was similar in both groups after 3 years. Through 8 years of follow-up, aneurysm rupture was more common with endovascular repair (5.4%) than with open repair (1.4%). Through 8 years, Interventions related to management of the AAA or its complications were higher with endovascular repair, whereas interventions for complications related to laparotomy were higher with open repair (23).

Need of future study

Future research should investigate the potential benefit of screening for an AAA in high-risk women and men. Not every person with an AAA is anatomically suitable for endovascular repair. Patients with severe comorbidities may benefit more from endovascular repair. Future research should investigate which subgroups of patients should have AAA endovascular repair versus AAA open repair.

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Footnote

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Ethical statement: The author is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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