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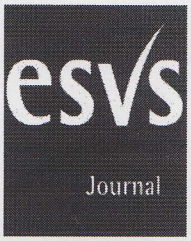

Management of Abdominal Aortic Aneurysms Clinical Practice Guidelines of the European Society for Vascular Surgery

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Introduction

Purpose of these guidelines

The European Society for Vascular Surgery (ESVS) appointed the AAA Guidelines Committee to write the current clinical practice guidelines document for surgeons and physicians who are involved in the care of patients with abdominal aortic aneurysms (AAAs). Guideline development was recommended in 1990 by the Institute of Medicine to improve decision making for specific patients' circumstances and to decrease the variability in appropriate and inappropriate

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health care between providers.[1,2] Appropriate decision-making is critical to achieving excellent outcomes.

Abdominal aortic aneurysm disease is complex and has significant clinical practice variability, although a valid evidence base is available to guide recommendations. The significant increase in the quantity of scientific literature concerning abdominal aortic aneurysmal disease published in recent years along with the number of technical and medical advances enables guideline recommendations with more certainty and supporting evidence than before. Potential increases in health care costs and risks due to industry and public-driven use of novel treatment options make the current guidelines increasingly important.[3–6]

Many clinical situations of patients with AAAs have not been the subject of randomised clinical trials. Patient care, however, needs to be delivered and decisions have to be made in these situations. Therefore, this document also provides guidance for decisions when extensive level I evidence is not available and recommendations are determined on the basis of the currently available best evidence for these situations. By providing information about the relevance and validity of the quality of evidence, the reader will be able to locate the most important and evidence-based information relevant to the individual patient.[7] To optimise the implementation of the current document, the length of the guidelines has been kept as short as possible to enable prompt access to the guideline information. This clinical guidelines document is supposed to be a guide, not a document of rules, and allows flexibility for specific patients' circumstances.

This is the resulting clinical practice guidelines document and provides recommendations for clinical care of patients with abdominal aortic aneurysms including pre-operative, perioperative and post-operative care.

Methods

Patients with AAAs are defined as male or female patients with asymptomatic, symptomatic or ruptured AAA with fusiform dilatation. This document does not cover patients with a saccular, infected or mycotic AAA or pseudoaneurysmal aortic dilatation. The AAA Guidelines Committee met in September 2009 for the first time to discuss the purpose and methods. The AAA Guidelines Committee has been constituted with incorporation of members from different European countries, from academic and private hospitals, vascular and endovascular specialists and patients to maximise the support for the final guidelines document. Since Europe encompasses a variety of health care systems and political economies, health policy makers were not included.[8]

The AAA Guidelines Committee performed a systematic literature search in MEDLINE, EMBASE and COCHRANE Library databases for each of the different topics that are discussed in this guidelines document. The Guidelines Committee used a grading schema based on levels of evidence and grades of recommendation according to the levels of evidence from the Oxford Centre For Evidence-Based Medicine.[9]

The level of evidence classification provides information about the study characteristics supporting the recommendation and expert consensus, according to the categories shown in Table 1.

The recommendation grade indicates the strength of a recommendation. Definitions of the grades of recommendation are shown in Table 2.

The AAA Guidelines Committee aimed to report as much as possible the calculated estimates of effects with their 95% confidence intervals. Every part of the guidelines document has been prepared by at least two members of the Committee and has been reviewed by the entire Committee. The initial guidelines document has been subsequently reviewed by the AAA Guidelines Review Committee. After incorporation of all comments and recommendations, the guidelines have been provided to the members of the ESVS. The final document has been approved by the ESVS.

Chapter 1 – Epidemiology

Definition of abdominal aortic aneurysms

Abdominal aortic aneurysm (AAA), which comes from the Ancient Greek word ἀνεύρυσμα, means a dilatation or widening of the abdominal aorta. The most accepted definition of an AAA is based on the diameter of the abdominal aorta: an abdominal aortic diameter of 3.0 cm or more, which usually is more than 2 standard deviations above the mean diameter for both men and women, and is considered to be aneurysmal.[10–12] Other researchers have suggested defining abdominal aortic aneurysm as the maximum infra-renal aortic diameter being at least 1.5 times larger than the expected normal infra-renal aortic diameter to compensate for individual variation in the diameter of the adjacent aorta.[13–15]

AAA can be defined as an abdominal aortic diameter of 3.0 cm or more in either anterior-posterior or transverse planes. Level 2c, Grade B.

Epidemiology

Prevalence and risk factors

Population screening studies offer the best evidence regarding the prevalence of AAA. Several of these have been conducted as randomised trials to assess the benefits of screening (MASS, Western Australia, Viborg and Chichester, the latter being the only one to include women).[16–19] Other evidence comes from the Rotterdam, Tromsø and other large epidemiological screening studies.[20,21] Prevalence rates vary according to age, gender and geographical location (Table 3). Level 1a.

In keeping with ethnic and environmental risk factors, a screening study of US veterans (between 50 and 79 years old, $n = 73{,}451$) showed the highest prevalence of AAA $\geq$3.0 cm was 5.9% and was found in white male smokers between 50 and 79 years.[22] All the aneurysm population screening data (Table 3) are now dated and there is little contemporary information for 21st century prevalence, although there are some indications, at least in the USA, that the admission rate for aneurysm repair is declining.[23]

Important risk factors for AAA are advanced age, male gender and smoking.[20–31] A positive family history for AAA especially in male first-degree relatives, is also associated

insufficiency, while no evidence is supporting their preferential use in patients with normal renal function. A meta-analysis of prospective comparison trials found a nearly twofold higher incidence of CIN with high osmolar contrast media, but it has to be underlined that these studies did not routinely include prophylactic volume expansion or other pharmacologic prophylaxis.[302]

In the meta-analysis of Kelly *et al.* published in 2008,[303] fenoldopam, as ascorbic acid, prostaglandin I, dopamine, and theofilline, did not show any beneficial effect on the incidence of CIN. N-acetyl-cysteine reduced acute nephropathy with a relative risk of 0.66 (95% CI = 0.44–0.88), while furosemide increased it with a relative risk of 3.27 (95%CI, 1.48 to 7.26).

Direct intra-arterial fenoldopam infusion with specifically designed delivery systems may have the advantage of providing a higher local effective dose with potentially greater renal effects, while limiting systemic adverse effects due to renal first-pass elimination. These effects have been found to be beneficial in a prospective registry (Be-RITe!), where a reduction of 71% on the expected CIN in high risk patients was observed.[304]

Use of non-ionic, low- or iso-osmolar contrast media are to be preferred in patients with pre-existing renal insufficiency. Level 1b, Recommendation B.

Pre- and post-operative NAC administration for 3 days may be protective for those patients at high risk of developing CIN. Level 1b, Recommendation C.

Morphological criteria

The increased use of EVAR has been affected by limitations of the related technology, although the percentage of AAA deemed suitable for EVAR has been growing over the past decade, due to improvements in graft design. However, long-term durability is still being questioned especially in case of adverse anatomy, rendering the pre-operative anatomical evaluation crucial for late success of EVAR. According to the instructions for use of the commercially available standard endografts, main anatomical characteristics and indications may vary according to graft model; minimal requirements are listed in Table 8.

Table 8 Minimal requirements for standard commercially available endografts.

Proximal aortic neck
Neck diameter >17 mm, < 32 mm
Angle between the suprarenal aorta and the juxtarenal aorta <60°
Angle between the juxtarenal aorta and the long axis of the aneurysm sac <60°–90°
Neck length >10 mm;
Neck thrombus covering <50% of the proximal neck circumference
Neck dilated <3 mm within 10 mm of the most caudal renal artery
Focal neck enlargement <3 mm within 15 mm from the most caudal renal artery
Neck calcification <50% of the proximal neck circumference
Aortic bifurcation
Aortic bifurcation diameter >20 mm in case of a bifurcated graft
Iliac artery
Iliac luminal diameter > 7 mm
Angle between the long axis of the aneurysm and the iliac axis <60°
Iliac calcification: non extensively circumferential
Iliac neck diameter <22 mm
Iliac neck length >15 mm

Graft model choice

Appropriately sized aortic endograft should be selected on the basis of patient anatomy: according to the instruction for use of abdominal endografts, generally the device should be oversized 15–20% with respect to the aortic neck diameter to guarantee optimal seal. Level 2a, Recommendation A.

Several devices are available today to treat abdominal aneurysm, differing with respect to design, modularity, metallic composition and structure of the stent, thickness, porosity, methods of attaching the fabric to the stent and the presence or absence of an active method of fixing the device to the aortic wall. The overall performance among the current generations of aortic devices is quite similar and data appear to confirm low complication rate. An ideal stent graft incorporating all the advantages and no drawbacks is unreliable. Randomised trials comparing different devices would be challenging given the different anatomical requirements specific for each device.

Non-randomised comparisons of the results of different grafts have been published. At the Cleveland Clinic the authors reviewed different devices specific outcomes from their 6-year single series including 703 EVAR finding no differences in risk for aneurysm-related death, conversion, secondary intervention, migration, freedom from rupture, and Type I or III endoleaks.[305]

The European Registry Eurostar compared the outcomes of relatively new stent grafts (AneuRx, Excluder, Talent and Zenith) versus the earlier EVT/Ancure, Stentor (MinTec, La Ciotat, France) and Vanguard in 6787 patients. All new devices carried a lower risk of migration, kinking, occlusion and secondary intervention, conversion.[306]

A direct comparison between bifurcated versus aorto-uni-iliac (AUI) stent grafts may be very unreliable because it is recognised that AUI can be used to treat a large proportion of aneurysms, and are often used in older, unfit patients with larger aneurysms or in symptomatic or rupture settings. The RETA Registry reported alarmist unfavourable outcomes for the early outcomes in 263 AUI versus 733 bifurcated/tubular endografts implanted in UK centres. All in-hospital complications, reinterventions, conversions, and technical failure were significantly more frequent in the AUI group.[307]

A more recent attempt to compare results among different EVAR devices in patients enrolled in 2 randomised controlled trials on EVAR has been recently published. Two bifurcated devices, Talent and Zenith, implanted within the EVAR 1 and 2 trials were compared. Authors failed to find any convincing device-specific differences between AAA related outcomes.[308]