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Original research

Outcome of elective treatment of abdominal aortic aneurysm in elderly patients

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HIGHLIGHTS

- Optimal management of an AAA in the elderly is not straightforward.
- Patient selection could be the key to improve results of aneurysm treatment.
- The desire of the elderly patient remains the guiding principle in AAA treatment.

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ABSTRACT

Introduction: Optimal management of an abdominal aortic aneurysm (AAA) in the elderly is not straightforward. We evaluated treatment results of elderly patients with asymptomatic abdominal aortic aneurysm that met the treatment criteria in our clinic.
Methods: Hospital charts between January 2005–December 2012 were reviewed of all patients 70 years and older diagnosed with AAA with a diameter that met the treatment criteria. Patients were stratified by age (group I: 70–79 years, group II: 80 years or older) and treatment. Outcome was measured in terms of survival and complications.
Results: In total 283 patients (240 (85%) men, median age 77.4 years) were included, 211 (75%) in group I and 72 (25%) in group II. There was an overall significantly higher mortality rate in the octogenarians ($p < 0.01$). This difference was not seen in the groups treated conservatively and with OPEN repair. However, in the EVAR group there was a significantly higher mortality rate in octogenarians ($p < 0.01$).
Conclusion: Long-term outcome after EVAR procedures results in higher mortality rates for the population older than 80 years as compared to the group aged 70–79 years.

1. Introduction

Abdominal aortic aneurysm (AAA) is a common vascular disease and can lead to serious life-threatening complications if left untreated in patients with a diameter over 55 mm. AAA is diagnosed in 5–10 % of men aged 65 years or older [1]. Approximately 75% of AAAs are asymptomatic and are found coincidentally during physical examination or by ultrasonography or CT scanning [2].

Optimal management of an AAA is not straightforward. Treatment of AAA should be based on patient's comorbidity and aorta morphology. An important issue in decision-making is the size-related risk of aneurysm rupture in relation to the mortality risk of a surgical intervention [2].

Open abdominal repair (OPEN) was for many years the gold standard for treatment of AAA [3]. However, endovascular aortic repair (EVAR) is a safe and effective alternative treatment option, which made it possible to treat a larger proportion of the population suffering from AAA [4]. The EVAR-1 trial revealed similar overall mortality rates in patients after undergoing EVAR and/or OPEN repair of an AAA. However, the long-term complications and reinterventions after EVAR were more common among older patients [5]. In case of significant comorbidity can be chosen for a conservative treatment. Given the increased risk of rupture this should be done in good consultation with the patient.

Despite the Society of Vascular Surgery/North American Chapter of the International Society for Cardiovascular surgery (SVS/ISCVS)

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[6] – and the European Society for Vascular Surgery (**ESVS**) [7] reporting standards, treatment of AAA should be based on the individual patient. Especially in elderly patients with considerable comorbidity it remains difficult and challenging to choose the best option of treatment. For this reason we evaluated treatment results of elderly patients with abdominal aortic aneurysm that met the treatment criteria in our clinic. The aim of this study was to determine the optimal treatment of asymptomatic AAA in elderly patients.

2. Patients and methods

2.1. Patients' characteristics

A retrospective observational clinical review was conducted from data of 283 consecutive AAA patients treated between January 2005 and December 2012 at the vascular surgery department of the Amphia Hospital. Patients were stratified by age: patients between 70- and 79 years (group I) and patients 80 years or older (group II). Data of the patient characteristics are listed in Table 1. The study conforms the STROBE guidelines [8].

2.2. Risk factors and comorbidity

Risk factors and comorbidity were registered prospectively of all patients during their visit to the outpatient clinic. The risk factor and comorbidity management, according to the Trans-Atlantic Inter-Society Consensus Document on Management of Peripheral Arterial Disease (TASC) [9] and the American Heart Association/American College of Cardiology (AHA/ACC) [10] were either conducted by a vascular specialist or cardiologist preoperatively in the outpatient clinic or during admission before operation. The American Society of Anesthesiologists (ASA) classification [11] of patients was determined according to their general preoperative condition prospectively. Data of the risk factors and comorbidity are listed in Table 1.

Table 1
Patient and AAA-characteristics of all patients aged 70 years or older treated for AAA during the study period.

Characteristics	Group I ($n=211$)	Group II ($n=72$)	*P*-value[a]
Gender			0.46
Male	177 (84)	63 (88)	
Female	34 (16)	9 (12)	
Age (years, mean ± SD)	75.3 ± 3.0	83.5 ± 2.7	
Risk factors			
Smoking	71 (34)	5 (7)	<0.01
Diabetes	27 (13)	7 (10)	0.49
Hypertension	94 (45)	22 (31)	<0.05
COPD	40 (19)	21 (29)	0.30
Heart failure	84 (40)	42 (58)	<0.01
Medications			
Statins	143 (68)	41 (57)	0.10
Acetylsalicylic acid	154 (73)	49 (68)	0.42
Acenocoumarol	23 (11)	10 (14)	0.50
ASA-classification			0.26
Classification 2	80 (38)	19 (26)	
Classification 3	122 (58)	49 (68)	
Classification 4	9 (4)	4 (6)	
Diameter AAA			
Aneurysm (mean; min; max) mm	620; 110	64; 50; 95	0.16

Data are presented as n and (%), unless otherwise specified.
AAA = Abdominal aorta aneurysm; *ASA* = American Society of Anesthesiologists; *Group I* = patients between 70 and 79 years; *Group II* = patients 80 years or older.
[a] Calculated by Chi-square test.

2.3. AAA characteristics

Indications for aneurysm repair were an aneurysm diameter ≥5.0 (female) or ≥5.5 (male) or growth of the aneurysm >0.5 cm within 6 months. Exclusion criteria comprised patients who needed branched or fenestrated stent grafts, patients with juxtarenal, - suprarenal, - or thoraco - abdominal aneurysms or patients presenting with a symptomatic- or ruptured AAA. The surveillance (with a Siemens Definition CT-scan) protocol was CTA at 1- and 12 months after EVAR, and if no complications were detected, a CT (without contrast) in association with plain abdominal X-ray annually thereafter. Data of the AAA characteristics are listed in Table 1.

2.4. Treatment

Fig. 1 is a flow chart of the different treatment options and their general criteria. In this study patients with symptomatic and ruptured AAA were excluded.

Conservative. Conservative management was started in patients where the operation risk was estimated greater than the mortality risk due to rupture of the aneurysm. This group contains mostly patients with advanced age, poor general health and an aneurysm that was not suitable for endovascular treatment.

OPEN. For all OPEN procedures the Dacron aorta graft was used.

EVAR. Three different stent graft systems were used for endovascular treatment of the AAA during the study period: Cook® Zenith Flex® AAA Endovascular Graft [12], Gore® Excluder® AAA Endoprosthesis [13] and the Medtronic® Endurant® AAA Stent Graft System [14].

The EVAR – and OPEN procedure were performed according to standard vascular – and endovascular techniques. All EVAR – and OPEN procedures were performed by a vascular surgeon. The requirements for these standard available stent grafts were driven by the Society of Vascular Surgery/North American Chapter of the International Society for Cardiovascular surgery (SVS/ISCVS) [6] – and the European Society for Vascular Surgery (**ESVS**) [7] reporting standards. Data of the EVAR procedures are listed in Table 2.

2.5. Complications

In the Netherlands, the Association of Surgeons of the Netherlands (ASN) has agreed on one common definition of complications [15–17]. The definition of a complication is: "an unintended and unwanted event or state occurring during or following medical care, that is so harmful to a patient's health that (adjustment of) treatment is required or that permanent damage results. The complication may be noted during hospitalization, until 30 days after discharge or transfer to another department.

The definition of endoleaks, the decision to intervene and the type of reintervention, endovascular (stent graft, percutaneous embolization) – or surgical reintervention (ligation), were driven by the SVS/ISCVS – and ESVS reporting standards [6,7]. Endoleak type 1 was defined as a graft that does not seal completely at the extremities, endoleak type 2 as backfilling of the aneurysm from other small vessels in the aneurysm wall. Data of the endoleaks are listed in Table 2.

2.6. Registration and statistical analysis

SPSS 20.0 for Mac (SPSS Inc., Chicago, IL, USA) was used for the statistical analysis. Frequencies and descriptive statistics were used for reporting the baseline characteristics of the patient group. The chi-square test was used to determine statistical significance. Survival interval rates were calculated with Kaplan Meijer curves and