Eur J Vasc Endovasc Surg (2016) 51, 802—809

Arbitrary Palliation of Ruptured Abdominal Aortic Aneurysms in the Elderly is no Longer Warranted

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WHAT THIS PAPER ADDS

The study analyzed current outcomes after the treatment of elderly people with ruptured abdominal aortic aneurysms (rAAAs) and stands against the arbitrary and extensive turndown of these patients after the introduction of endovascular aortic repair. There are few data supporting the "no treatment option" policy for rAAA, but the common and often indiscriminate high rejection rates in elderly patients are worrying. At the authors' institution a very restricted or no turndown strategy was applied for rAAA in both older and younger people. Despite the aggressive treatment for many elderly patients, repair allowed for a mean of 40 additional months of survival after aneurysm rupture.

Objective/Background: A consistent number of elderly patients with ruptured abdominal aortic aneurysms (rAAAs) are deemed unfit for repair and excluded from any treatment. The objective of this study was to examine the impact on survival of endovascular repair and open surgery with restricted turndown in acute AAA repair.

Methods: A prospective database for patients treated for rAAA was established. None of the patients admitted alive with rAAA were denied treatment. Multivariate regression models, the predictive risk assessment Glasgow Aneurysm Score (GAS), and subgroup analyses in older patients were applied to identify indicators of excessive 30 day mortality risk that could affect the decision for turndown.

Results: From 2006 to 2015, 113 consecutive patients (93 males; mean age 77.2 years) with rAAAs were treated (69 open surgery; 44 EVAR). Overall peri-operative (30 day) mortality was 38.9% (44/113): 40.6% (28/69), and 36.4% (16/44) after open surgery and EVAR, respectively ($p = .70$). Multivariate logistic regression identified old age as an indicator of increased peri-operative mortality (odd ratio [OR] 1.2, 95% confidence interval [CI] 1.1—1.3; $p = .001$), as well as free aneurysm rupture (OR 5.0, 95% CI 1.3—19.9; $p = .02$). GAS was higher in patients who died (97.75 vs. 86.62), but the score failed to identify increased peri-operative mortality risk in adjusted analyses (OR 1.0; $p = .06$). Almost two thirds of the patients ($n = 71$) were older than 75 at the time of aneurysm rupture (48.6% octogenarians) and EVAR was more commonly applied than open surgery (86.4% vs. 47.8%; $p < .0001$). Peri-operative mortality in $>$ 75 year old patients was 46.5% compared with 26.2% in younger patients ($p = .05$), with rates increased after open surgery (54.5% vs. 27.8%, $p = .03$) but not after EVAR (39.5% vs. 16.7%; $p = .39$). According to Kaplan—Meier estimates, mean survival was 39.7 $\pm$ 4.8 months. Patients older than 75 years of age survived for a mean of 23.0 $\pm$ 4.47 months after rupture.

Conclusion: In this study aggressive treatment with a very restricted or no turndown strategy for any rAAA, also applied to older patients, allowed for an additional mean 40 months of survival after aneurysm rupture. In the contemporary endovascular era the decision to deny repair arbitrarily to older patients with rAAAs must be revisited.

Article history: Received 21 September 2015, Accepted 6 February 2016, Available online 4 April 2016

Keywords: Elderly, EVAR, Old patients, Palliative treatment, Refusal, Ruptured aortic aneurysms, Turndown

INTRODUCTION

Endovascular aortic repair (EVAR) has been increasingly applied as a less invasive approach for treatment of ruptured abdominal aortic aneurysms (rAAAs) in elderly populations. Nevertheless, the results of gain in survival benefit from EVAR are unclear and a number of elderly frail patients with rAAA continue to be deemed unfit for any repair and excluded from any treatment. The modern era of increased

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http://dx.doi.org/10.1016/j.ejvs.2016.02.007

health transparency, requiring increased public reporting of surgical outcomes, has further predisposed toward the decision to deny repair of rAAA in many older patients because of fears about increased procedural risks.[1] Therefore, despite the availability of minimally invasive approaches, the turndown rates for rAAA seem not to have declined over time and are consistently influenced by age and sex, with the highest rates in the oldest female patients: only 29% of older patients are offered repair in some settings.[2] Currently, there is large variability in the "no-option" definition for rAAA repair by countries and centers, and the turndown rate for emergency surgery for rAAAs in older patients does not rely on solid, uniform, standardized criteria.[3–5]

The objective of this study was to examine the impact on survival of EVAR and open surgery with restricted treatment denial in acute AAA repair.

METHODS

A dedicated prospective database of emergency AAA repairs was established in 2006 at the Unit of Vascular Surgery, Hospital S. Maria Misericordia, Perugia, Italy. Collected data included pre-operative baseline, modality, and physiology of rAAA presentation; morphology; imaging; type of repair; intra-operative details; peri-operative complications; and clinical and morphology data after treatment. All repairs were performed using approved devices and techniques.

The study was performed in accordance with the institutional ethics committee rules and using formally approved devices and techniques; additional individual consent was waived. Between 2006 and May 2015, 791 consecutive patients with AAAs underwent open repair and 1,147 endovascular repair for infrarenal AAAs. In total, 113 required emergency treatment for aneurysm rupture at the time of presentation and this was the population of interest in the present study, and represented all patients admitted with a rAAA; there were no patients with do not resuscitate (DNR) orders and none of the patients was denied treatment according to the local policy of offering treatment for rAAA to any patient who arrives alive and is not DNR. No other criteria (e.g., mental illness, dementia, old age, comorbidities) were applied to declining the repair.

AAA rupture was confirmed and defined according to computed tomography angiography (CTA) scan performed in the emergency room (ER). Symptomatic non-ruptured AAAs were not included, even when treated as emergencies. Juxtarenal and type IV thoraco-abdominal aortic aneurysms were also excluded.

AAA rupture based on imaging findings was rated as free intraperitoneal rupture (free rupture), definite evidence of leak but hematoma contained around the aorta (contained rupture), or intraluminal blood dissecting and lying within the aortic wall (dissecting rupture with or without intramural hematoma).[6]

Patient selection for EVAR or open surgery was made in the ER at the discretion of the specialized operating team, which is available 24 hours a day, 7 days a week. Open surgical repair was accomplished by a midline intraperitoneal or left extraperitoneal abdominal approach.

All EVARs were performed by surgical exposure of the common femoral or distal external iliac arteries, under local or general anesthesia. There were no total percutaneous endovascular procedures in any of the patients.

EVAR stent grafts were chosen on the basis of device availability and aorto-iliac morphology. All EVARs were performed using approved and commercially available stent grafts: Excluder (W. L. Gore and Associates, Flagstaff, AZ, USA); Endurant (Medtronic, Santa Rosa, CA, USA); Zenith (Cook, Bloomington, IN, USA).

Post-operatively abdominal pressure was measured in the presence of symptoms indicating new organ dysfunction. Abdominal compartment syndrome (ACS) was considered with an intra-abdominal pressure of at least 20 mmHg with new organ dysfunction (bowel, respiratory, or renal) and treated by decompression laparotomy.

In the EVAR group, CTA was performed before discharge to assess complete exclusion of the aneurysm sac and absence of leak from the ruptured aneurysm. For all patients, post-operative follow up included clinical examination, telephone interview, and duplex ultrasound imaging, at 1, 6, and 12 months, and yearly thereafter. CTA was repeated at 12 months and yearly thereafter after EVAR and selectively after open repair. For missing information, mortality data were further supported by checking regional charts reporting on all-cause deaths in the local population.

The primary outcome measures were peri-operative mortality, defined as death during the index hospitalization or within 30 days of the procedure, and mortality up to 90 days after rupture.[7,8] Long-term survival included all deaths during the entire follow up period.

Statistical analysis

Summary statistics are presented as frequencies, percentages, means $\pm$ SD, or median, as appropriate. Categorical variables are presented as frequencies and percentages. Data were compared using the chi-square test or Fisher's exact test, and *t* test or variance, when appropriate. Odds ratios (OR) or hazard ratios (HR), when appropriate, for time—event reporting, and corresponding 95% confidence intervals (CIs) were used to report data. Continuous variables with an approximately normal distribution were investigated using the Student's t-test; variance test was alternatively applied when needed.

To identify potential indicators of higher peri-operative mortality risk that could influence the decision of denying repair in rAAA the following analyses were applied.

Multivariate logistic regression models. Independent associations with peri-operative mortality were identified using multivariate logistic regression models, including age, sex, hemodynamics and physiology at the time of presentation, Glasgow Aneurysm Score (GAS) score, and cardiovascular morbidity as covariates. The covariate selection process was based on models that included potential