Advances in Abdominal Aortic Aneurysm Care - Towards personalized, centralized and endovascular care

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Chapter 7

Fate of patients unwilling or unsuitable to undergo surgical intervention for a ruptured abdominal aortic aneurysm

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Submitted as short report
Abstract

Background
The primary objective was to assess duration of in-hospital survival in 40 patients with a ruptured abdominal aortic aneurysm who did not undergo surgical intervention.

Report
One hour after registration at the emergency room, 95% (95% confidence interval (CI) 88 to 100%) of patients were still alive. After two hours, 80% (95% CI 67 to 92%) of patients were still alive. The median survival was 13 hours (inter-quartile range 2-45 hours).

Conclusion
In patients with an RAAA without surgical intervention, the median duration of survival is 13 hours and the majority of patients survive the first hours after arrival at the emergency room.
Duration of survival after nonoperative therapy for RAAAs

Introduction

Rupture of an abdominal aortic aneurysm (RAAA) without surgical intervention almost invariably results in death. Although the outcome is virtually certain, little is known about the duration of survival. Walker et al. (1983) reported a median survival of 8 hours after confirmation of diagnosis. Lloyd et al. (2004) reported that 12% of patients died within 2 hours and median survival was over 10 hours. These findings have important implications for the discussion about the use of a computed tomographic angiography (CTA) to assess suitability for endovascular aneurysm repair, and about patient referral from regional hospitals to specialized tertiary hospitals.

The objective of this study was to assess the duration of survival in patients with an RAAA who did not undergo surgical intervention.

Report

We conducted a retrospective cohort study in patients with an RAAA, confirmed by CTA or autopsy, who did not undergo surgical intervention. Patients were identified from a prospectively assembled cohort of 539 consecutive RAAA patients between 2004 and 2011 in the Amsterdam ambulance region, The Netherlands. Sixty-six patients did not undergo intervention. To facilitate comparison with the group of surgically treated patients, seventeen patients were excluded because of pre-hospital cardiopulmonary resuscitation (CPR). Another nine patients were excluded because demographics or time of registration at the emergency room (ER) were unknown, leaving forty RAAA patients to be included in the analysis. The reasons to refrain from intervention were decision by patient or patient’s family (n = 15), cardiac arrest or shock (n = 7), unknown (n = 7), severe comorbidity (n = 6), age (n = 3) or aortic anatomical considerations (n = 2). Patients were allocated to two subgroups based on the reasons to refrain from intervention; subgroup 1 included patients not treated due to patient decision, comorbidity, age or aortic anatomical considerations (n = 26), and subgroup 2 included patients not treated due to shock (n = 7). Baseline characteristics are shown in Table 1. The primary endpoint was the duration of survival in hours after registration at the ER. If the primary endpoint was not retrieved from the record, the patients were censored at the last known time of survival. One hour after registration at the emergency room,
95% (95% confidence interval (CI) 88 to 100%) of patients were still alive (Figure 1). After two hours, 80% (95% CI 67 to 92%) of patients were still alive. Median survival was 13 hours (inter-quartile range 2-45 hours). In subgroup 1 survival after two hours was 96% (95% CI 89 to 100%) and in subgroup 2 29% (95% CI 0 to 62%).

**Table 1.** Baseline characteristics of patients with an RAAA in the Amsterdam ambulance region undergoing surgical intervention versus patients not undergoing surgical intervention. RAAA = ruptured abdominal aortic aneurysm, SBP = systolic blood pressure, ER = emergency room

<table>
<thead>
<tr>
<th></th>
<th>No surgical intervention</th>
<th>Surgical intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td>86 (78-89)</td>
<td>76 (69-80)</td>
</tr>
<tr>
<td><strong>Male : Female</strong></td>
<td>72% : 28% (29 : 11)</td>
<td>81% : 19% (378 : 89)</td>
</tr>
<tr>
<td><strong>Cardiac co-morbidity</strong></td>
<td>51% (20/39)</td>
<td>43% (200/467)</td>
</tr>
<tr>
<td><strong>Cerebrovascular co-morbidity</strong></td>
<td>13% (5/39)</td>
<td>15% (72/467)</td>
</tr>
<tr>
<td><strong>Cardiopulmonary resuscitation</strong></td>
<td>15% (6/40)</td>
<td>12% (54/467)</td>
</tr>
<tr>
<td><strong>Lowest in-hospital SBP (mmHg)</strong></td>
<td>110 (85-126)</td>
<td>106 (80-133)</td>
</tr>
<tr>
<td><strong>Hemoglobin at ER (mmol/L)</strong></td>
<td>7 (5.9-7.7)</td>
<td>7 (5.9-8.0)</td>
</tr>
<tr>
<td><strong>Serum creatinine at ER (µmol/L)</strong></td>
<td>130 (90-190)</td>
<td>108 (87-134)</td>
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</table>

Continuous data are presented as median (inter-quartile range) and categorical data as percentage (number).

**Figure 1.** Survival analysis of 40 patients with an RAAA not undergoing surgical intervention and without pre-hospital cardiopulmonary resuscitation. RAAA = ruptured abdominal aortic aneurysm, ER = emergency room
Discussion

The extrapolation of our outcomes to patients who are prepared for surgical intervention is hampered by several potential biases. It is to be expected that patients who did not undergo intervention are less hemodynamically stable, and these patients are represented mostly in subgroup 2. Table 1 shows surrogate markers of hemodynamic stability of patients in the Amsterdam ambulance region undergoing versus not undergoing surgical intervention. These markers indicate that the hemodynamic status of patients included in this study was comparable with the hemodynamic status in those who did receive surgical intervention. This applies mostly to patients in subgroup 1. Another potential bias was the inclusion of patients after CTA. We may have missed hemodynamically unstable patients who were diagnosed using duplex ultrasound and did not have an autopsy. However, a CTA was done in 83% (324/392) of patients in the region. Critics could argue that patients may have been alive after one or two hours but in a much worse condition than upon admission. Finally, the rejection rate in the region was only 12% (66/533) limiting the number of patients in this study.

Our results confirm the outcomes of the study by Lloyd et al. that the majority of patients with an RAAA are relatively stable. A recent study from England and the United States reported lower death rates in tertiary hospitals. If the death rate at a specialized tertiary hospital is lower than at a regional referring hospital, an increase in transfer time could be deemed acceptable. Analysis of survival in the Amsterdam ambulance region showed that despite delaying intervention, patient referral was not associated with impaired survival.

The results of this study should be interpreted within the context of these considerations. Although time is limited, the majority of patients arriving at hospital without prior CPR were still alive after one and two hours (95% and 80%, respectively). Survival was even longer (96% after two hours) in the subgroup most comparable to patients who do receive surgical intervention. Therefore, the present study is another indication that a reasonable increase of transfer time in order to reach a specialized hospital is justified.
Reference List


