

Inpatient Mortality Following Repair of Abdominal Aortic Aneurysm in a Tertiary Hospital in Tehran

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This study was conducted to monitor the rate of inpatient mortality and its associated factors following open reconstruction of abdominal aortic aneurysm (AAA) in a tertiary hospital in Tehran, Iran. This retrospective study was a chart review of 112 patients undergoing open infrarenal abdominal aortic aneurysm surgery in one of the main tertiary hospitals in Tehran, Iran. Baseline data (demographic data, risk factors) and outcome data (any cause mortality) were available in 106 cases, which included into this study. The inpatient mortality was very high (23.5%). Regression analysis revealed that in-patient mortality was higher in those with age over 70 years (OR= 3.028, 95% CI= 1.099-8.337) and those who developed temporary worsening of the renal function (OR= 3.141, 95% CI= 1.071-9.21). High inpatient mortality rate of the AAA reconstruction in this study is alarming. The decrease in the renal function in the wake of infra-renal aortic surgery and also high age seem to be main risk factors of the increased inpatient mortality.

Keywords: Aortic surgery, mortality, renal dysfunction

An abdominal aortic aneurysm (AAA) is a dilated and weakened segment of the abdominal aorta that occurs as a consequence of aortic medial degeneration. Its risk factors include high age, male gender, cigarette smoking, hypertension and raised cholesterol levels (1-3). Patients with AAA are at risk of vascular rupture, a catastrophic clinical emergency (2, 4). Nowadays, repair of AAA is an increasingly common surgical

procedure.

Monitoring of inpatient mortality after AAA repair is used for making comparisons between different health care settings, from different hospitals (5, 6) and countries. Such comparisons are believed to provide essential evidences for public health practitioners, policy makers and clinicians about whether outcomes are acceptable in their served population or not (7).

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Materials & methods

This is a secondary analysis of a retrospective chart review of all 112 consecutive patients who underwent reconstruction of AAA requiring infra-renal clamping–declamping between January 2004 and January 2007 at a tertiary care hospital in Tehran, Iran. The exclusion criteria were impairment in other organs such as kidney or heart at baseline. The Study was approval by the local ethics committee of Shaheed Beheshti University of Medical Sciences. Nephrologic side effects of this patient population were reported previously (8).

Procedure

AAA repair was done via thoraco-laparotomy or mid-line laparotomy. The aortic clamp was placed below the renal arteries, using a “clamp-and-sew” technique without protection of the kidneys apart from flushing the renal arteries with heparin. Possible intra-operative confounders for the renal outcome were noted: the duration of surgery,

clamping time, peri-operative blood loss, episodes of hypotension (defined as a systolic blood pressure of < 70 mm Hg lasting > 5 minutes), transfusion requirements and body temperature.

Baseline data

Data on demographic variables (i.e. gender and age), and risk factors (i.e. hypertension, ischemic heart disease, diabetes mellitus and smoking) (9), the elective versus ruptured AAA surgery and also the surgical technique and temporary decline in GFR (greater than 10% on the first 2 days and then returning to baseline value (10)) were registered.

Main Outcome

The main outcome (in-patient mortality) was any death occurring during the post-operative in-hospital stay. Causes of death were not included in this study on account of the fact that they had not been clearly recorded in the hospital database and autopsy had not been carried out.

Statistical Analyzes

Table 1. The association between inpatient mortality and baseline data

Demographic data		Inpatient Death		
		n	%	Sig
Age	> 70	15	36.6	0.012
	Up to 69	10	15.4	
Sex	Male	22	23.4	0.574
	Female	3	25.0	
Risk factors				
Ischemic Heart disease	No	17	21.5	0.353
	Yes	6	31.6	
Smoker	No	4	13.8	0.143
	Yes	19	27.5	
HTN	No	20	23.3	0.894
	Yes	3	25.0	
Leakage of Aneurism	Not present	16	18.2	0.004
	Present	9	50.0	
Diagnosis of AS	Not present	18	25.7	0.471
	Present	7	19.4	
Type of operation	Aortobiiliac	16	20.0	0.097
	Aortoiliofemoral	5	55.6	
	Aortobifemoral	2	16.7	
	Tubular	2	50.0	

All the computations were performed using SPSS software, version 13 (SPSS Inc., Chicago, IL) running under Windows 2000 Professional (Microsoft Corp., Redmond, WA). The chi-square or Fisher exact test was employed for the categorical variables, when appropriate. Logistic regression analyses were performed to investigate the independent value of the variables for in-patient mortality. The data were presented as Odds Ratios (ORs) with 95% confidence intervals (CIs). *P* less than 0.05 considered significant.

Results

Our sample population included 94 (88.7%) men. The patients' age range was 38-87 years, with a mean (SD) of 63.5 ± 11.6 years. The subjects were followed during their hospital stay for 7 ± 6 days (median= 5; inter-quartile range 4-9 days), with a range of 1-51 days.

A very high rate of inpatient mortality was seen (23.5%). Univariate analysis showed that mortality was higher in patients with age higher than 70 (36.6 vs. 15.4%, *P*= 0.012), aorta leakage before surgery (50.0% vs. 18.2%, *P*= 0.004), and those who developed temporary worsening of the renal but also renal function (44.0% vs 17.3%, *P*= 0.006) (Table 1).

The regression analysis showed that temporary renal dysfunction and the age over 70 years were independently associated with higher inpatient mortality (Table 2).

Discussion

In the present study, the inpatient mortality rate was very high and alarming. In fact almost one of four procedures ends with inpatient death. This rate was affected by age higher than 70 years and temporary worsening of renal function after surgery.

The overall 23.6% mortality in this study is alarming and is higher in comparison to most of previous reports from other countries (11-16). This may be due to the fact that most previous studies have included only elective surgery, while we included also ruptured aneurysms, which is known to be associated with a higher mortality, up to 75% (17-27). In our study, this was confirmed in univariate analysis when mortality was doubled when ruptured aneurysm was the diagnosis, which is an emergency surgery indication.

In contrast with other cardiovascular diseases where rates of deaths have fallen (28), the mortality rate for AAA has risen over recent decades. The high inpatient mortality has been attributed to high rate of post-surgery complications (2). The mortality highly depends to the experience of surgeon and quality of health care services, and decreasing mortality rate can be achieved not only through an increase in experience of the surgeons, the improvement in quality of operative and postoperative care (29).

Beside the link between high age and poor outcome which is in line with previous reports (30-34), patients with a temporary worsening of renal function were more likely to have poor in-patient outcome. This finding from the study was reported elsewhere (8). Similar results have been reported from other studies. One study reported that the greatest mortality rate within 30 days was seen in

Table 2. Predictors of inpatient mortality following aortic reconstruction

	Sig.	OR	95% CI for OR	
			Lower	Upper
Temporary worsening of renal function	0.037	3.141	1.071	9.214
Age higher than 70 year	0.032	3.028	1.099	8.337

patients with an increased serum creatinine. In that study, renal function changes within 3 days after surgery were a strong predictor of peri-operative mortality (35). In another retrospective cohort of patients who underwent elective open AAA surgery in a single center, negative impact of temporary worsening of the renal function on long-term mortality has been reported (10).

It should be noticed that most previous studies have published 30 days outcome, here we reported inpatient outcome, which happened in a mean 7 days stay at hospital. Although the mortality rate is not much high after discharge with stable condition, but the 30 days mortality might be higher than the inpatient mortality. Unfortunately, similar to our previous report (8), we had not access to the data of survival after discharge to compute 30 days outcome. Other limitations of the present study with its relatively small number of patients are not only the retrospective design but also not entering time of death to the analysis. The lack of availability of causes of death was another limitation of the study. Another limitation was not considering long-term mortality.

In conclusion, in a tertiary hospital in Iran, inpatient mortality following reconstructive surgery of AAA is very high. Age over 70 and temporary worsening of the renal function and are the associated factors of the poor inpatient outcome.

Conflict of interests

The authors declared no conflict of interests.

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